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THE UNIVERSITY OF ALBERTA

A COMPARISON OF GROUP AND DYADIC INTERACTION AS MEASURED

BY THE FLANDERS' INTERACTION ANALYSIS CATEGORIES

by

EDGAR MACDONALD $\copyright$

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

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The undersigned certify that they have read, and recommend
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ABSTRACT

The major purpose of this investigation was to explore the need
for considering dyadic interaction, between teachers and pupils, in
studies using the Flanders' Interaction Analysis Categories (FIAC).
Specific objectives were: (i) to determine the proportion of group and
dyadic interaction between teachers and pupils in grade IV mathematics,
(ii) to determine the variability of dyadic interaction within grade IV
mathematics classes, and (iii) to compare correlations between selected
FIAC variables and pupils' scores on achievement and attitude measures,
when group data and individual data are used.

The sample used in the study included 177 students and their
teachers in 7 different classrooms.

Twenty hours of verbal interaction data were gathered, with the
FIAC, over a several month period, by 3 trained observers. At the
conclusion of the observational period students were administered
achievement and attitude measures.

Analysis of the data indicated that a large proportion of
teacher-pupil interaction occurred on a dyadic or one-to-one basis.
Also considerable intraclass variation was found in the amount and
quality of verbal interaction that each student experienced with his
teacher.

The results of the correlational study showed that correlations
calculated from group scores varied significantly from those calculated
from individual scores. These findings held true for both relation-
ships between the FIAC variables and achievement, and between the FIAC

variables and attitude towards school. Also correlations based on individual data varied considerably from class-to-class.

It was concluded that in interactional studies, dyadic interaction between teacher and pupils should be examined.

ACKNOWLEDGMENTS

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CHAPTER I

INTRODUCTION

Background to the Study

Educational research journals and texts are replete with studies

in which correlates of teacher competence or effectiveness have been

sought. Much of this traditional research has been generated by

practical interests in finding better methods for selecting potentially

'good' teachers, and in improving the training and assessment of

students and practioners (Morrison and McIntyre, 1969).

In the early investigations on effectiveness, researchers

attempted to isolate and identify personal characteristics of teachers

which were related to effectiveness criteria such as principal's

ratings, pupil achievement, etc. To date, the results of this line of

research have been disappointing. Getzels and Jackson (1963) in their

extensive review of such studies concluded that:

> Despite the critical importance of the problem and a
> half-century of prodigious research effort, very little
> is known for certain about the nature and measurement
> of teacher personality, or about the relation between
> teacher personality and teacher effectiveness. The
> regrettable fact is that many of the studies so far
> have not produced significant results. Many others
> have produced only pedestrian findings. For example,
> it is said after the usual inventory tabulation, that
> good teachers are friendly, cheerful, sympathetic, and
> morally virtuous rather than cruel, depressed, unsym-
> pathetic, and morally depraved. But when this has been
> said, not very much that is especially useful has been
> revealed. For what conceivable human interaction is
> not the better if people involved are friendly, cheerful,
> sympathetic and virtuous rather than the opposite (p.574)?

Unfortunately many of the early investigations in attempting to relate personal characteristics of teachers to pupil outcomes had largely ignored the behavioral events of the classroom. The pressing need to investigate process variables was expressed by Biddle (1964):

> The bulk of studies on teacher effectiveness to date
> have produced negligible results. Further, until a
> great deal more is known about classroom interaction
> the bulk of educational theories must be judged 'untested'
> (p.3).

Withall and Lewis (1963) stated similar views regarding the lack of classroom observation:

> Researchers have looked for consistent relationships
> between what was put in the 'black box', the conditions
> of learning, and what came out of the 'black box',
> the outcomes of learning without looking into the
> classroom itself (p.604).

Observation systems devised for collecting behavioral data in the classroom have focused on student behavior, teacher behavior and teacher-student interaction. Simon and Boyer (1968) in their anthology of prominent observational systems, have classified them as either 'affective' or 'cognitive' depending upon whether they measure events in the affective or cognitive domain. Simon and Boyer note that these classifications are superficial, since most behavioral events in the classroom have both affective and cognitive components.

Although considerable research has been completed with the prominent systems, few have been used in prediction studies relating classroom behavior and interaction to pupil outcomes (Rosenshine, 1971). One of the main research thrusts in the affective area has centred on the examination of the relationship between teacher-class verbal interaction as measured by the Flanders Interaction Analysis Categories

and pupil achievement, and/or pupil attitudes towards school (Flanders, 1970).

In studies done with the Flanders system, the research design involved gathering interactional data on classrooms, grouping the data together, and then correlating selected interactional variables with mean scores of the students on achievement and attitude measures. The experimental unit in these studies was the class and not the individual student. Comparison of classes were made with little attention paid to variation within classes. Good and Brophy (1970) have argued for consideration of intraclass variation by examining interactions between teachers and individual students. They expressed their concern as follows:

> Observational systems which analyse the data from a 'class perspective' rest upon two tacit assumptions which appear to be invalid or at least questionable in some contexts. The first and basic, assumption is that those interaction variables included in the system are most appropriately conceptualized as interactions between the teacher and the class as a group rather than as dyadic interactions between the teacher and individual students. The second assumption is that the teacher behaviors are fairly consistent across the students in the classroom, so that the class mean on a particular variable is generally representative of how the teacher interacts with each of the pupils (p.131).

Both of the assumptions, described by Good and Brophy as being of questionable validity have been accepted in research done with the Flanders system. Most of the basic ten categories measure dyadic interactions between the teacher and individual students rather than teacher-class interactions. Briefly the basic ten categories include:

1. teacher accepts students' feelings

2. teacher praises or encourages students

3. teacher accepts or uses ideas of students

4. teacher asks questions

5. teacher lectures or gives information

6. teacher gives directions

7. teacher criticizes students or justifies authority

8. student talk-response

9. student talk-interaction

10. silence or confusion

It appears that categories 1, 2, 3, 4, 7, 8, and 9 primarily measure dyadic interactions. Categories 5 and 6 may also measure dyadic interactions, although generally it would be expected that they would measure teacher-to-group verbalizations.

Considerable research evidence (Anderson, 1949; DeGroat and Thompson, 1949; Hoehn, 1954; Davis and Dollard. 1963; Lippit et al., 1939; Jackson and Lahaderne, 1967) has been gathered regarding the variability of teacher-pupil contacts within the classroom. The results of these investigations indicated that there exists in most classrooms a great deal of variance in the quality of interaction between teachers and individual pupils. It follows that group data may be very misleading.

So far, no studies have been reported in which the Flanders system was used to gather interaction data on a teacher-to-individual pupil basis. These data could be very helpful in clarifying the relationship between classroom interaction variables and pupil outcomes. Hopefully, the present study will be useful in appraising the necessity for gathering such data.

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Statement of the Problem

The main objectives of this study are:

(1) to determine the variability among students within a class on the nine basic categories of the Flanders Interaction Analysis Categories (FIAC).

(1b) to determine the variability of more general indices of verbal interaction such as Teacher Response Ratios.

(2) to determine the proportion of classroom verbal interaction, as measured by the FIAC, that takes place between the teacher and (a) individual students; and (b) the class as a unit.

(3) to compare the variability of verbal interaction, as measured by the FIAC, within classes to the variability between classes.

(4) to compare and contrast correlations between selected FIAC variables and student achievement in mathematics and student attitude towards school when: (a) the class is used as the unit of measurement, and (b) the individual pupil is used as the unit of measurement.

Definition of Terms

A number of terms which have specific definitions relative to this study are noted in this section.

(1) Classroom Observational Systems. Simon and Boyer (1968) defined these systems as 'shorthand methods' for collecting observable, objective data about the way people talk and act in the classroom.

(2) Cognitive Interaction Analysis Systems. This term refers to systems of observation which deal with the thinking process.

These systems consist of categories in which are coded different

kinds of teacher information, teacher questions or pupil responses.

(Simon and Boyer, 1968).

(4) Interaction. This word is defined by Chaplin (1968) as a social

relationship between people of such a nature that individuals

mutually influence each other.

(5) Dyadic Interaction. This term is used to describe acts of

communication between two people. In this study, it refers to

interactions between a teacher and one pupil.

(6) Group Interaction is defined in this study as verbal interactions

between the teacher and the class as a unit.

(7) Direct Pattern of Teacher Influence. This pattern of influence

was defined by Flanders (1967) as verbal statements of teachers

that restrict freedom of action of the student, by focusing

attention on a problem, interjecting teacher authority, or both.

(8) Indirect Pattern of Teacher Influence. This pattern is defined

as verbal statements of the teacher that expand a student's

freedom of action by encouraging his verbal participation and

initiative (Flanders, 1967).

(9) Positive Reinforcer. Any stimulus which increases the probability

of occurrence of the response which it follows (Keller, 1969).

(10) Negative Reinforcer. Any stimulus which decreases the probability

of occurrence of the response which it follows (Keller, 1969).

(11) Observational Learning. Learning of new behavior by observing the

performance of others.

CHAPTER II

REVIEW OF RELATED LITERATURE

Overview of the Chapter

The first three sections of this chapter are designed to give detailed information on the background and development of the Flanders Interaction Analysis Categories system and its use as a research tool in studies of teacher effectiveness.

In the first section considerable attention is paid to the studies of Anderson et al.; Lippitt et al.; and Withall. This is necessary because they provide many of the concepts used in the construction of the Flanders system and hence are an integral part of its validity and reliability.

In the second section some of the basic findings which Flanders adopted from earlier studies are outlined. Also, Flanders' additional tenets regarding classroom interaction are described and his category system is explained.

In the third section, teacher effectiveness studies, in which the Flanders system was used, are reported. The major emphasis in this section is placed on the seven projects carried out by Flanders and his colleagues. The main purpose of most of these studies was to examine the relationship between different teaching patterns, as measured by the Flanders categories, and pupil outcome measures.

In section four, research and related literature on dyadic interaction are reviewed. Inequalities in teacher-pupil interchanges

are examined in terms of frequency of interaction, nature of interaction, and related pupil characteristics including sex, ability, etc. The relevance of this review to the present study is noted.

In the final section a model of classroom interaction is presented. Hough's reinforcement theory of classroom behavior is discussed and extended to incorporate principles derived from observational or vicarious learning. This model is accepted, by the writer, as being a parsimonious and useful framework from which to view the classroom behavior of teachers and pupils and its effect upon pupil growth.

Background to the Flanders Interaction Analysis Categories

The key studies upon which the Flanders system was developed have all stressed the leadership role of the teacher in the classroom. In all cases teacher behavior has been defined in a polarized fashion as either dominative or integrative (Anderson, et al., 1945, 1946, 1959); authoritarian or democratic (Lewin, Lippitt and White, 1939, 1940); teacher-centred or student-centred (Withall, 1949); and direct or indirect (Flanders, 1967). Although the various authors define their terms slightly differently the same basic dimension of teacher behavior is indicated.

All of these early works have stressed the social-emotional aspects of classroom interactions and have become known as studies on classroom climate. In an early study, Withall (1949) defined the social-emotional climate of the classroom as follows:

> Climate is considered in this study to represent the
> emotional tone which is a concomitant of interpersonal
> interaction. It is a general emotional factor which
> appears to be present in interactions occurring between

individuals in face-to-face groups. It seems to have some
relationship to the degree of acceptance expressed by
members of a group regarding each other's needs or goals.
Operationally defined it is considered to influence
(1) the inner private world of each individual (2) the
esprit de corps of a group (3) the sense of meaningfulness
of group and individual goals and activities (4) the
objectivity with which a problem is attacked, and (5) the
kind and extent of interpersonal interaction in a group
(pp.348-349).

Most of these definitive studies on classroom climate were

generated by interests in the interaction process in the school setting.

This review of studies pertinent to the development of the Flanders

system is by no means exhaustive and represents only the most relevant

as viewed by the writer.

Anderson Studies

Most of the studies on classroom climate evolved from the work

of Anderson and his colleagues on dominative-integrative social behavior

(Anderson, 1937a, 1937b, 1939; Anderson et al., 1945, 1946).

Anderson (1937a) suggested that due to individual differences,

interaction between people many times results in conflict. He indicated

that there are three possible ways to respond to these differences --

domination through the use of force, threats, fears or shame; compromise,

which affords no resolution of the conflict; and integration, in which

case a common purpose is discovered. Anderson stated that domination

evokes either resistance or submission from the respondent.

Anderson maintained that compromise is also a poor solution since

it is just an unsuccessful form of domination. Although both parties

involved in the conflict 'call a truce' and accept what edge they have

gained, the tension is still present. Anderson viewed integration as

the only healthy response to individual differences. Anderson believed that an integrative response results from a person's willingness to give up old values, goals, and purposes for new values, goals, and purposes that are in the process of becoming (Anderson, 1937a). Anderson indicates that through an integrative response the individual grows emotionally and creatively, and is more able to respect individuals who differ from himself.

In his earliest investigations, Anderson (1939) examined the dominative and integrative contacts among nursery school children. Anderson concluded from these early probes that dominative contacts usually elicit resistance whereas integrative contacts elicit cooperation.

The main purpose of subsequent research was to develop objective instruments for collecting data on teachers' dominative and integrative behavior and to relate these to pupil behavior. For this purpose, Anderson and Brewer (Anderson et al., 1946) developed 26 categories for measuring teacher behavior, and 29 categories for measuring student behavior. Using this category system, Anderson and his colleagues examined teacher-pupil interaction in kindergarten and elementary school.

One study done with grade two teachers is noteworthy in that the findings indicated that the direction of classroom influence was from the teacher to the students. In a study undertaken in 1939 it was found that two, out of a sample of four teachers, varied greatly in their classroom behavior as did their students. One teacher was consistently dominative in her classroom behavior while the other was consistently integrative. The question to be answered was: Is the teacher's

behavior responsible for the pupils' behavior or vice versa? In answer
this question, Anderson and his colleagues investigated the behavior of
the two teachers and their classes the following year. The results of
the behavioral analysis indicated that the teachers' behavior the second
year was similar to their behavior the previous year. However, the
behavior of the students with their new teachers had changed signifi-
cantly. Although the sample was very small, Anderson et al. concluded
that the teacher was primarily responsible for events in the classroom.

Flanders (1967) summarized the important findings of the Anderson
studies as follows:

> First the dominative and integrative contacts of the
> teachers set a pattern of behavior that spreads throughout
> the classroom; the behavior of the teacher, more than that
> of any other individual, sets the climate of the class.
> The rule is that when either type of contact predominates,
> domination incites further domination, and integration
> stimulates further integration. It is the teacher's
> tendency that spreads among pupils even when the teacher
> is no longer in the room. Furthermore, the pattern a
> teacher develops in one year is likely to persist in his
> classroom the following year with completely different
> pupils. Second, when a teacher's integrative contacts
> increase, pupils show an increase in spontaneity and
> initiative, voluntary social contributions, and acts of
> problem solving. Third, when a teacher's dominative
> contacts increase, the pupils are more easily distracted
> from school work, and show greater compliance to, as well
> as rejection of, teacher domination (p.105).

Another outcome, relevant to the present study, was the finding
that teacher-pupil contacts were quite variable within given classrooms.
In a study of teacher-pupil contacts in three kindergarten classes,
Anderson (1949) reported that some children averaged as many as 55
teacher-contacts per hour while others had none. On the basis of these
data Anderson concluded that kindergarten children live in very differ-
ent school environments.

At about the same time as the Anderson studies, a parallel line
of research on 'autocratic' and 'democratic' leadership styles was
undertaken (Lewin and Lippitt, 1938; Lippitt et al., 1939; Lippitt,
1940; Lippitt and White, 1943).

In a series of research projects, the effects of autocratic
democratic and laissez-faire leadership on the behavior of ten year old
boys was examined. In each case the boys were enrolled in small groups
ostensibly for the purpose of learning crafts such as the construction
of model airplanes. In these experimentally controlled studies, exten-
sive records were kept. These included stenographic records of group
conversation and data on group structure and social interactions. Also
data external to the experimental setting were gathered in the form of
projective tests and questionnaires regarding the group members, etc.

In order to compare the effects of different leadership styles
each leader roleplayed a style according to prescribed behavioral
criteria. Authoritarian leaders determined the policy of the group;
the techniques and activity steps; and the work companions of each
member.

In democratically run groups, members with the guidance of the
leader collectively decided on activities and each member was free to
choose his working partners. The laissez-faire group was left entirely
on its own with little participation from the leader. Each leader
played different roles to rule out the possibility of personality
effects.

The results of these studies generally substantiated the findings
reported by Anderson et al. The major conclusions were summarized by
Lewin et al. (1945) as follows:

1. that verbal conversation categories differentiated better between
    leadership styles than social behavior categories.

2. that different leadership styles promote different social and
    individual behaviors.

3. that members in the democratically led group showed more spontaneity,
    were more work-minded, had more frustration tolerance, were friend-
    lier and more cooperative towards other members, and took more
    initiative in the work of the group.

4. that autocratic leadership produced aggressive responses in the
    group members. In some cases the aggression was overt during the
    presence of the leader but in the majority it was expressed during
    the absence of the leader or transition to a freer atmosphere. In
    the presence of the leader the group members were submissive and
    apathetic.

    Following the lead of Anderson, Lewin, Lippitt et al., Withall
(1949) attempted to clarify the concept of classroom climate, and to
develop a simple and reliable instrument for measuring it. The structure
of the resulting instrument, which he called the 'climate index', was
founded upon three basic assumptions:

    1. that the social-emotional climate is a group phenomena.
    2. that the teacher's behavior is the most important
        factor in creating climate in the classroom, and
    3. that the teacher's verbal behavior is a representative
        sample of her total behavior (p.14).

    In developing the Climate Index, Withall analyzed teachers'
verbal behavior from sound recordings of regular junior high classes.
The final instrument consisted of seven categories for measuring teacher
talk on a continuum from 'learner-centredness' to 'teacher-centredness'.
The seven categories were:

1. Learner-supportive statements that have the intent of reassuring or commending the pupil.

2. Acceptant and clarifying statements having an intent to convey to the pupil the feeling that he was understood and help him elucidate his ideas and feelings.

3. Problem-structuring statements or questions which proffer information or raise questions about the problem in an objective manner with intent to facilitate learner's problem-solving.

4. Neutral statements which comprise polite formalities, administrative comments, verbatim repetition of something that has already been said. No intent inferable.

5. Directive or hortative statements with intent to have pupil follow a recommended course of action.

6. Reproving or deprecating remarks intended to deter pupil from continued indulgence in present 'unacceptable' behavior.

7. Teacher self-supporting remarks intended to sustain or justify the teacher's position or course of action (Withall, 1949; p.349).

The first three categories were classified as learner-centred and the latter three as teacher-centred. The ratio of categories 1, 2, and 3 to the total was defined as the 'Climate Index'. According to Withall, this ratio indicates to what degree a teacher uses learner-centred patterns in her classroom behavior.

Withall indicated that the 'Climate Index' was a valid, reliable instrument for gathering observational data on classroom climate. Since the validity, reliability, and objectivity of the Flanders system depended to a large extent on Withall's Climate Index, the procedures

used by Withall will be described. Withall (1949, p.53) outlined four

different procedures involved in his validation study:

1. The teacher behavior categories developed by Anderson et al. were

used, as a criterion measure, on the same data as the Climate Index.

2. Pupils' recorded perceptions and feelings of the classroom were

compared to the results from the Climate Index.

3. Results on the Climate Index were compared to ratings made by

independent judges in terms of a Teacher-Characteristic Rating Scale.

4. Comparisons of the data were made from three frames of reference --

a categorizer using objective criteria; judges' ratings of the teacher's

verbal behavior in a live situation; and pupils registering their

negative or positive feelings.

In order to determine reliability, Withall first of all deter-

mined the size of sample necessary before redundancy factors entered.

Successive blocks of teacher-statements were added until it was found

that 200 statements would comprise an adequate sample.

A Chi-square test was used to check the hypothesis that no

significant differences occurred from day to day in teachers' verbal

behavior. This test was applied to eight selected tapescripts of three

teachers. Two of the teachers showed no significant differences over

eight episodes. Withall found that the results of the third teacher

resulted from one atypical tapescript. When this episode was removed,

no significant differences were found over the remaining seven.

Objectivity was ascertained by comparing the proportion of

agreements between four trained judges and Withall on three transcripts,

containing a total of 184 teacher statements. The percent of agreement

ranged from 56 to 75 with a mean of 65. Tetrachoric correlations were also computed to determine the degree of association between the five judges, including Withall. On the basis of 3 transcripts Withall reported correlations of .84, .76, and .93.

Although the system was developed on the basis of sound recordings, Mitzel and Rabinowitz (1953) demonstrated that it could be reliably used for 'live' observation in the classroom.

Taken together the work of Anderson et al., Lippitt et al., and Withall greatly influenced Flanders' thinking on classroom interaction. Although the findings from these preliminary studies are tentative due to the small samples used, they strongly indicate that classroom climate is closely related to students' behavior and that it can be measured by valid, reliable and objective instruments. Other researchers, who influenced Flanders to a lesser degree (Bales, 1950; Perkins, 1951; and Cogan, 1956) have not been included in this review.

The Flanders Interaction Analysis Categories

As indicated in the previous section, Flanders in developing his model of teacher influence drew heavily on the exploratory work of Anderson; Lippitt and White; and Withall. The findings of these studies influenced Flanders to accept the following basic assumptions regarding classroom interaction:

1. That teachers are primarily responsible for the type of climate or atmosphere in the classroom.

2. That classroom climate is basically a group phenomenon.

3. That a teacher's verbal behavior is an adequate sample of her total behavior.

4.   That indirect (integrative; democratic; learner-centred) teacher behavior is conducive to pupil independence and growth.

Flanders (1970) on the basis of his own research elaborated further on the relationship between different teaching patterns and the clarity and desirability of learning goals as perceived by the student. Goals are clear for a student when he can perceive the end product of a learning activity and has a general idea about the steps to take towards its completion.   Teaching patterns may range from predominantly direct teacher initiative coupled with student response to a more indirect style characterized by pupil initiative followed by teacher response. Flanders (1970) stated the following hypotheses concerning the relationship between teaching patterns or styles and the perception students have of the clarity and desirability of learning goals:

1.   Indirect influence increases independence when goals are unclear, by reducing the real or imagined restraints of the teacher's control.

2.   Direct influence increases dependence, when goals are unclear, by maintaining or increasing the restraints of the teacher's control.

3.   When the initial positive valence of a goal is clarified with indirect influence, the effect of subsequent direct or indirect influence on the existing independence is insignificant.

4.   When the initial positive valence of a goal is clarified with direct influence, subsequent direct influence maintains or increases existing dependence, and subsequent indirect influence decreases existing dependence only slightly, if at all.

5.   A shift from negative to positive goal valence is most likely to occur in response to indirect influence by the teacher.

The original Flanders observational instrument was developed at the University of Minnesota between 1955 and 1960.   After three revisions

it consists of seven categories for coding the verbal behavior of
teachers, two for coding the verbal behavior of students, and one cate-
gory for coding silence or confusion. As indicated by the inclusive
nature of the system, all behavior occurring in a classroom can be
coded in one or other of the categories. The basic ten categories are:

Teacher-Talk Response	1.	**Accepts feeling.** Accepts and clarifies an attitude or the feeling tone of a pupil in a nonthreatening manner. Feelings may be positive or negative. Predicting and recalling feelings are included.
	2.	**Praises or encourages.** Praises or encourages pupil action or behavior. Jokes that release the tension but not at the expense of another individual; nodding head or saying 'Um hm?' or 'go on' are included.
	3.	**Accepts or uses ideas of 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.
Teacher-Talk Neutral	4.	**Asks questions.** Asking a question about content or procedure, based on teacher ideas, with the intent that a pupil will answer.
Teacher-Talk Initiation	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.
	6.	**Giving directions.** Directions, commands, or orders to which a pupil is expected to comply.
	7.	**Criticizing or justifying authority.** Statements intended to change pupil behavior from nonacceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing; extreme self-reference.
Pupil-Talk Response	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.
Pupil-Talk Initiation	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.
	10.	**Silence or confusion.** Pauses, short periods of silence and periods of confusion in which communication cannot be understood by the observer (Flanders, 1970; p.34).

Flanders (1970), as well as several other researchers including Amidon and Hunter, 1967; Hough, 1967; and Honingman, 1968; have subscripted or slightly modified the categories of the original system in order to evoke finer discrimination of observed behavior. However, the basic structure of the instrument has remained intact and the same 'ground rules' are used for coding behavior. In most of the research studies reported the basic 10 categories were used to code interaction data.

The Flanders technique requires a single observer to code classroom verbal behavior at the end of three second intervals. The observer writes down the number of the category which best describes the verbal behavior which has taken place, while observing the next three second interval. The category numbers are written in sequence thus giving a picture of the total pattern of interaction during the observation period.

When the data are tabulated, they may be entered in a 10 by 10 matrix. The matrix formed by coding in sequence greatly increases the amount of interaction data available to the user. The frequencies in the 100 cells indicate the pattern of interaction. For example, by referring to the matrix, one can tell whether or not pupil responses are more often praised or criticized by the teacher. Also from the matrix it can be determined what teaching format was used by the teacher.

Flanders (1970), suggested that the main feature of his system lies in the analysis of 'initiation' and 'response' which is characteristic of teacher-pupil interaction. Flanders (1970), defined these two terms as follows:

To initiate, in this context, means to make the first move, to lead, to begin, to introduce an idea or concept for the first time, to express one's own will. To respond means to take action after an initiation, to counter, to amplify or react to ideas which have already been expressed, to conform or even to comply to the will expressed by others (p.35).

It should be noted that previous to Flanders' (1970) publication, he referred to the concepts of 'direct' and 'indirect' in regards to teacher influence. Categories 1, 2, 3, and 4 were considered to measure a teacher's indirect influence and categories 5, 6, and 7 to measure direct influence. In his 1970 text, however, he suggested that it was more parsimonious to use the concepts 'initiation' and 'response' in regards to both teacher and pupil talk.

In the Flanders system categories 1, 2, and 3 represent teacher response while categories 5, 6, and 7 measure teacher initiation. Student response and initiation is measured by categories 8, and 9 respectively.

Flanders (1970), also has combined various categories to provide more general indices of initiation and response. Several of these have been expressed as ratios or percentages. One of the most commonly used measures of indirectness is the Indirect-Direct ratio (I/D) obtained by dividing the sum of categories 1, 2, 3, and 4 by the sum of categories 5, 6, and 7. A similar ratio (i/d) calculated by dividing the sum of categories 1, 2, and 3 by the sum of categories 6, and 7, indicates the emphasis given by the teacher to motivation and control. Flanders (1970) suggests that these ratios should only be used when applied to matrices with over 1,000 tallies.

The Teachers Response Ratio (T.R.R.) is another index of the teacher's tendency to react to the ideas and feelings of the students.

It is obtained by dividing the sum of categories 1, 2, and 3 by the sum

of categories 1, 2, 3, 6, and 7. A similar ratio for students, the

Pupil Initiation Ratio (P.I.R.) is calculated by dividing the frequency

of category 9 by the sum of categories 8 and 9. It indicates the

proportion of pupil statements which are judged to be acts of initiation.

Several of these ratios have been used, as independent variables, in

studies relating pupil achievement and attitude, to teacher-pupil inter-

action.

Relationship of Interaction Variables to Pupil Achievement and Attitude

Towards School

Flanders (1970), reported the results of seven projects in which

he and his colleagues studied the relationship between classroom inter-

action variables and pupil achievement and attitude toward school. The

samples for these projects which ranged over the years 1955 to 1967,

were drawn from grades 2, 4, 6, 7, and 8. The procedure followed for

projects 1 to 6 was quite similar. Samples of classes were randomly

chosen from school populations and administered an attitude test

(Flanders, 1965). For projects 1, 2, 3, and 4 classes which fell at

extremes of the distribution of attitude scores were chosen for observa-

tion. Projects 5 and 6 also included classes from the middle distribu-

tion. Classes for project 7 were picked solely on a random basis. In

all projects, except 1 and 2, assessment of achievement was made before

and after the observations.

The results of the first two projects involving grades 2 and 7

indicated that students in classes of indirect teachers as measured

by the I/D ratio scored higher on tests of motivation and independence
than students in classes of the more direct teachers. They also liked
their teachers more, were less anxious and more acceptant of the teacher's
method of granting rewards and punishments (Flanders, 1965). In these
studies achievement was not measured.

In projects 3 and 4, Flanders investigated the relationship of
interaction variables to pupil achievement and attitude in grade 8
mathematics, and grade 7 English-Social. Flanders (1965) reported
significantly higher pupil achievement and positive pupil attitudes in
classes in which indirect patterns of teacher behavior were used.
Flanders also found that teachers using direct patterns of teacher
influence varied their classroom approach very little in comparison to
teachers using indirect patterns. These 'flexible' teachers were most
indirect during the initial stages of learning episodes and gradually
changed to more direct patterns when learning goals became clearer for
the students.

Flanders also cited some evidence to support his hypothesis that
indirect teacher influence increases learning when a student's percep-
tion of the learning goal is ambiguous and direct influence increases
learning when the learning goal is clear.

Projects 5, 6, and 7, which were carried out in grades 6, 4, and
2 respectively, were reported together by Flanders in 1969. Grades 2
and 4 were observed during the regular class activities. In grade 4,
a specially constructed two week social studies unit was used as the
basis of observation. In grades 2 and 6 general achievement tests were
given, whereas in grade 4 a special test was devised to measure achieve-
ment in the social studies unit.

In analyzing the data from these three projects, Flanders found
a significant positive relationship between indirect teaching patterns,
as measured by the ratio i/i+d (indirect statements divided by the total
of indirect and direct statements), and achievement and attitude towards
school for grades 4 and 6. He also found that a variable he called
'flexibility' (computed by subtracting the lowest indirect/direct ratio
from the highest during different teaching episodes) was strongly
associated with attitude measures in grades 2 and 6, and with achievement
in grade 4. At all three grade levels, Flanders found no data to
substantiate earlier findings regarding relationships between indirect
teaching patterns and goal clarity.

In order to tease out relevant interaction variables, Flanders
(1970) factor analyzed 27 variables selected from the matrices of the
seven projects. Eight variables were selected from the FIAC to represent
the four strongest factors resulting from the analysis. Also added to
these 8 variables were Praise (category 2) and Flexibility (the differ-
ence between the highest and lowest i/d ratios for each teacher). These
10 variables were then used to predict average scores on pupil attitude
measures and achievement through the technique of stepwise, multiple
regression analysis.

From the analysis of the data collected in the seven projects,
Flanders (1970) concluded that patterns of indirectness as measured by
the Teacher Response Ratio, Sustained Acceptance (frequency of the 3-3
cell) and the sum of categories 1, 2, 3, and 4 were quite highly
correlated with class achievement and attitude.

Across the various grade levels, the simple correlations ranged
from .05 to .48 between indirectness and achievement and from .13 to .67

between indirectness and class attitude. None of the correlations with achievement were significant, while 7 were significant with attitude.

An interaction variable called Flexibility (high i/d - low i/d) also correlated relatively highly with class achievement and attitude. The range for achievement was .07 to .46, and for attitude .08 to .43. Only two of these correlations were significant.

Consequently, three variables measuring direct interaction patterns were found to correlate negatively with class achievement and attitude. These three variables (restrictiveness, restrictive feedback and negative authority) correlated with achievement over a range of -0.15 to -0.62 and with attitude over a range of -0.09 to -0.66.

Corrected multiple correlations between the pool of 10 selected interaction variables and class achievement ranged from .26 to .64 with a median of .55. The corrected multiple correlations between the predictor variables and attitude ranged from .00 to .94 with a median of .64. The number of classes observed in these projects ranged from 9 to 30 with a median of 16.

Other related field studies, in which positive relationships were found between indirectness and class achievement and/or class attitude, have been reported by Furst (1967), LaShier (1965), Pankratz (1967), Powell (1968), and Snider (reported in Flanders and Simon, 1969). A brief account of these studies has been presented in Table 1 (after Flanders, 1970, p.410).

A study by Soar (1968) is noteworthy in that he found a curvilinear relationship between indirectness and scores on reading and vocabulary tests. Soar found that growth for reading reached an optimum

TABLE 1

Summary of Research Studies Relating Verbal Interaction Variables

Derived From the Flanders Interaction Analysis Categories and

Student Achievement, and Attitude Towards School

Date Published	Researcher	Grade Level	Criterion Variables and Conditions
1965	LaShier	8	Student teachers observed who taught the same unit in biology. Indirect teaching gave higher adjusted achievement, $p = .001$.
1966	Snider	High School	Adjusted achievement in high school physics: no significant differences. Significant positive correlation between indirectness and positive pupil attitude.
1966	Soar	3, 4, 5, 6	Many different variables: some results consistent and others inconsistent with indirect and superior pupil growth; relationship shown to be curvilinear.
1967	Furst	High School	Reanalyzed Bellack's data, indirect showed higher achievement in economics, 4 day unit.
1967	Pankratz	High School	Teachers who were rated "more effective" by composite score on three criteria were significantly more indirect.
1967	Powell	1, 2, 3, 4	Pupils exposed to indirect teachers for 3 years in grades 1, 2, and 3 scored significantly higher in arithmetic, but not reading. Fourth grade design contaminated and no significant differences.

at a level of indirectness and criticism that was lower than that for
vocabulary. He explained these results in terms of the level of think-
ing required for each of the learning activities. Soar concluded that
growth on learning tasks which involved less abstract thinking would
reach an optimum at lower levels of teacher indirectness and criticism.
No optimum was found for growth in creativity. Soar assumed that the
optimum amount of indirectness needed to facilitate growth in creativity
was beyond the range of values present in his sample.

Several investigations have been reported in which experimental
designs were used. Schantz (reported in Flanders and Simon, 1969)
investigated the effect of direct and indirect teacher behavior on
classes of high and low ability students in grade 4. A teacher was
taught to roleplay either pattern of behavior when teaching three
lessons in science. The results indicated that high ability students
learned significantly more with indirect patterns of interaction. The
difference for low ability students was not significant.

Amidon and Flanders (1961) compared four treatments by combining
direct and indirect patterns of teaching with clear and ambiguous goal
orientations. Significantly higher achievement (geometry) was reported
for all students taught by the indirect method. Nonsignificant results
were found for differences in goal orientation. It was also found that
students who scored high on measures of 'dependent proneness' were more
sensitive to teaching patterns and achieved significantly more under
indirect teaching.

Filson (1957) compared the effect of direct and indirect patterns
of teaching on student dependence, when the task required of the student

was ambiguous. Filson found that the number of dependent responses made by students was significantly higher in the direct treatment.

A clear statement regarding the relationship between interaction variables and pupil attitudes and achievement is difficult to make, due to the inconsistent nature of the studies reported. Units of study varied greatly from one investigation to another. In some cases specific two-week units were developed specially for observational purposes, while in others observations were made on regular curriculum programs. Also, there was a wide variety of grade levels and course areas investigated. The same research designs and statistical analyses were not used in all studies. Most studies can be classified as field studies although a few were conducted as experiments. Some researchers used analysis of variance techniques to analyze their data, while others used correlational procedures. In some investigations the basic 10 category system was used. In other studies a subscripted system was used including up to 22 categories. Also measures of student outcome, particularly achievement, varied greatly from study to study.

These limiting factors no doubt can be ascribed to early investigations in any area of research. Despite the many differences among studies there seems to be considerable evidence that indirect teaching patterns are positively associated with pupil achievement and attitude towards school. However, as noted by Soar (1968) these relationships, particularly between teacher indirectness and pupil achievement may be curvilinear in nature. Nuthall (1970) considers such relationships to be logically expected. He states that:

> It is probably naive to expect increases in student freedom
> and teacher pleasantness to be directly and continuously
> related to gains in pupil intellectual growth (p.23).

More data are needed on classroom interaction before specific statements can be made regarding the desirability of indirect teaching styles in various grade levels, subject areas, ability groupings, etc. Also, information is needed on the effects of different teaching patterns on individual students.

Research on Dyadic Interaction In The Classroom

Although dyadic interactions in classrooms have not been widely researched, the findings which are available decisively point to significant variations within classrooms. Teachers treat individual students differently both in terms of the frequency of interaction and the quality or kind of interaction.

Little information has been reported in the literature regarding the percentage of 'teacher-class' and 'teacher-pupil' interaction in the classroom. In one study by French and Galloway (1966) 23 hours of observational data were gathered in junior high classrooms. They reported that roughly 30 to 50 per cent of the 'communication events' which took place were between the teacher and individual students. Anderson (1949) in his studies on kindergarten children found that the teacher made roughly 3 times as many contacts with individual children than with children in groups.

Anderson (1949) in his early study also found that both dominative and integrative contacts were unevenly spread over the classes by kindergarten teachers. He found that in seven classes, individual contacts ranged from 4.1 to 39.3 per hour with the median child receiving 13.2.

DeGroat and Thompson (1949) in a study of grade 6 classrooms examined the distribution of teacher approval and disapproval. Based on students' perceptions of their teacher's behavior, it was concluded that in a class of 30-35, 4 to 5 students received 35 to 70 per cent of the teacher's approval while another 4 to 5 received 25 to 40 per cent of her disapproval. Although the data are limited by the assumption that children accurately perceive their teacher's behavior, they do indicate that inequalities do exist.

Jackson and Lahaderne (1967), in an investigation of interaction in grade 6 classes, found that teachers set in motion about 80 individual interchanges per hour. They also reported great differences in the number of contacts experienced by individual students. Some students had as few as one per hour while others had as many as one every 5 to 10 minutes. In summing up these findings, the researchers stated that:

> For at least a few students, individual contact with the
> teacher is as rare as if they were seated in a class of
> a hundred or more pupils, even though there are actually
> only 30 or so classmates present. For others, the
> teacher's presence is the same as it might be if there
> were but a handful of classmates in the room (p.210).

Student related variables were found to account for some of the inequalities in interaction between teachers and individual pupils. Davis and Dollard (reported in Charters, 1963) reported a relationship between social class and teacher approval. They maintain that most teachers being of middle class values reward students who have the same values by virtue of their inclusion in the middle class strata. They indicate that on the whole 'middle class' children reap the rewarding behavior of the teacher while their 'lower class' counterparts suffer most of the punishments.

Hoehn (1954) also studied social status differentiation in the classroom behavior of third grade teachers. He examined middle class teachers' contacts with middle and lower class children, using a modification of the Anderson-Brewer instrument for measuring dominative and integrative teaching behaviors. He found that when social classes were compared the middle class children received proportionally more of the integrative contacts and the lower class children proportionally more of the dominative contacts. However, Hoehn also reported that low achievers received more dominative and less integrative contacts than higher achievers. The findings, therefore, may be related to achievement, social status and/or both.

Willis (1969) compared the behavioral interaction of teachers with students whom they designated as the least efficient, and most efficient learners in the classroom. In this study, 5 teachers rated 8 children on a continuous scale from most to least efficient. The lowest and highest ranked student was chosen from each class for close observation. Although the sample was very small, Willis concluded that teachers ignored the behavior of the 'least efficient' children significantly more frequently than the 'most efficient' children, and provided significantly more verbal consequences for the behavior of those labelled 'most efficient'.

Good (1970), also maintained that teacher expectancies resulted in inequalities in interaction. He suggested that teachers have 'stacked the deck' against low achievers by affording them less opportunity to respond in the classroom. Good cited three reasons why teachers do not permit low achievers as many chances to respond as high achievers.

He argues that teachers who want to motivate their class as a whole do not call on students who consistently give erroneous answers. Teachers may also ignore slower students in the hope that they will feel less anxious and prone to criticism from fellow students. Thirdly, teachers seeking reinforcing feedback on their teaching ability do not call on slower pupils.

In order to substantiate his hypotheses regarding teacher expectancies, Good conducted a study in 4, grade 1 classrooms. He found that opportunities to respond varied from class to class but were greater for higher achievers.

Some evidence has also been gathered on the relationship between sex of student and teacher-pupil interaction. Lippitt et al. (1964) observed that teachers in grades 2 and 5 initiated interchanges with boys more often than girls. Meyer and Thompson (1956) in an earlier study had found similar results. In their investigation they observed female teachers and their students in 6, grade 3 classes. They found that boys not only had more contacts with female teachers but that they received more teacher disapproval than girls. The researchers concluded that since boys are more aggressive than girls, teachers felt the need to 'socialize' them through dominative, aggressive behavior.

Jackson and Lahaderne (1967) in their study found marked sex differences in every class but not always the same difference across all four classes. They did report, however, that boys had more interchanges with teachers on matters pertaining to classroom rules, permissable behavior, keeping order, and punishment.

Although relatively few researchers have examined inequalities in classroom interaction, the findings to date indicate that students

experience quite different classroom settings.

If such findings are valid, researchers attempting to identify productive teaching patterns must be sensitive to individual events in the classroom, as well as to group events. As indicated by the few studies reviewed, Withall's (1949) labelling of classroom climate as solely a group phenomenon may be misleading. Although the importance of group factors cannot be denied, it appears from this review that individual factors play an important role in classroom interaction.

These studies suggest that the most appropriate emphasis in interactional studies may be individual pupils rather than the class unit. Jackson and Lahaderne (1967) question this traditional way of looking at the classroom as a unit. In summarizing their 1967 study they stated:

> This observation calls into question the conventional view
> of looking upon each classroom as a unit whose partici-
> pants have shared a common educational experience. In a
> sense, each classroom contains as many environments as
> it does pairs of eyes through which to view them (p.211).

A Learning Approach to Classroom Interaction

Although the Flanders system was generated from a 'field-theory' background, it can be clearly analyzed and described using behavior-oriented learning models. One such model which appeals to the writer for its theoretical soundness and utility was proposed by Hough (reported in Amidon and Hough, 1967). His theoretical formulations are of particular relevance to the present study since they are directly applicable to classroom interaction as measured by the Flanders system.

Hough analyzed classroom interaction using concepts derived from reinforcement theory. He assumes that teacher behavior influences

pupils in two ways. Firstly, teacher behavior can act as stimuli which elicit responses from students or secondly, they can follow student responses serving either as reinforcing or aversive stimuli. The basic premise is that if behavior emitted in the presence of a stimulus or elicited by a stimulus is contiguously reinforced it will, on presentation of a similar stimulus, be emitted or elicited with greater probability than if it had not been reinforced. Conversely, the probability of the behavior being elicited or emitted would decrease if it were followed by aversive or punishing stimuli.

Hough (1967) clarified the role of reinforcement in six additional statements:

1. A reinforcing stimulus has been by definition a reinforcer if it increases the probability that the response for which it is intended as a reinforcer will be made in the future, or if it increases the rate of the response.

2. Stimuli are the cause of behavior in at least two senses of the word. In one sense they elicit behavior; in a second sense they become the occasion for a behavior to be emitted.

3. The reinforcement must be associated with the behavior for which it is intended as a reinforcer, if the full effect of the reinforcement is to be achieved in regard to that behavior.

4. In order for a reinforcement to be associated with a particular behavior, it should follow that behavior in close temporal contiguity.

5. Repetition of behavior without reinforcement is largely an inefficient and ineffective way to learn.

6. For a stimulus to elicit a previously reinforced behavior, the

stimulus must be perceived by the behaver as being highly analogous to the stimulus which last elicited that behavior or the stimulus with which that behavior was originally paired (p.377-378).

Hough views indirect teacher behaviors such as praise, and acceptance or clarification of student ideas as stimuli which act as reinforcers for different types of student behaviors. Direct teacher behaviors such as lecturing, giving information, giving direction, and criticizing are proposed, by Hough, to have variable effects. For example, corrective feedback usually has a reinforcing effect upon student behavior, especially if the student is given a chance to reexamine his response. Conversely, criticism and rejection of a student's responses have aversive effects and elicit respondent behaviors, such as withdrawal, which interfere with learning. Hough indicates that the most widely used direct behavior, teacher lecture or directions, cuts off students' reinforcement since they are not responding overtly.

Hough suggests that the effect of aversive or reinforcing stimuli depends upon the nature of the student as well as the nature of the stimuli. For example, some students may find praise (category 2) quite reinforcing while others may be affected more by the acceptance of their ideas (category 3).

Although Hough doesn't directly refer to the extinction of student behavior through the withholding of reinforcing stimuli, it can be easily introduced into his analysis. According to conditioning principles, students' behavior such as initiation of ideas, questions, etc. (category 9) will decrease in probability of occurrence if they are not followed by reinforcing consequences.

Based on this reinforcement model, Hough outlined the following

hypotheses regarding productive classroom behavior:

1. Teachers should maximize the use of indirect influence during the

initial stages of instruction on a new topic. Much instructional time

should be used in drawing out student understanding of the content to

be taught, reinforcing correct elicited responses with praise and reward,

correcting misconceptions with corrective feedback and helping students

to develop a structure of understanding by encouraging elicited respon-

ses and questions and clarifying such responses.

2. Direct influence in the form of teacher-initiated information

should be used in the initial stages of instruction of a new unit,

primarily to help build a structure of understanding that will lead to

student self-reinforcement. As the unit of instruction proceeds,

increased use of teacher lecture seems appropriate.

3. Especially during the initial stages of instruction with a new unit,

but also at other appropriate times, teachers should consciously

predict and be sensitive to student anxiety created by the new or

difficult aspects of the unit of study, and should reflect and clarify

such feelings when they are sensed. In so doing, the teacher 'bleeds

off' anxiety that interferes with learning.

4. During the course of the unit, criticism, sarcasm, and justification

of authority should be avoided, since such behavior represents aversive

stimulation and, as such, could interfere with verbal learning.

5. During the course of the unit, the teacher should maintain an

optimum amount of overt student behavior by asking questions, encour-

aging students, accepting student responses, and responding to student

questions.

6. As students develop a structure of understanding, teachers should reduce the frequency with which they place themselves in the position of acting as the authority for reinforcement of responses but should increasingly encourage students to use their own understandings as a self-reinforcing mechanism by means of acceptance and clarification.

7. Teachers should avoid using praise and corrective feedback following omitted student responses unless such responses are clearly correct or incorrect by definition, custom, or empirical validation.

8. Teachers should make a conscious effort to develop a classroom climate in which students feel free to ask questions of clarification and state opinions in order to further their understanding. In order to establish this type of climate, teachers should emphasize the use of encouragement, acceptance and clarification of feelings, and acceptance of ideas, and should avoid the use of criticism and sarcasm.

9. Incorrect responses should not go uncorrected, but should either receive corrective feedback or be thrown back to the student for clarification and correction. To allow incorrect responses to go unnoticed is to risk the possibility that, for students who have an incomplete or faulty structure of understanding, this will serve as self-reinforcement of incorrect responses.

10. Reinforcement is only possible following a response; this being the case, every attempt should be made to stimulate active involvement (both overt and covert) and to stimulate overt verbal involvement for purposes of reinforcement and corrective feedback in the early phases of a unit.

Extending the Hough analysis, it can be argued that individual students experience their teacher's reinforcing or aversive behavior in several ways. They receive reinforcement on an individual or one-to-one basis or as a member of a group. There is considerable evidence to support the efficacy of teacher reinforcement in altering student behavior, whether the reinforcement is given to the student individually (Hanley, 1970) or to a group of which the student is a part (O'Leary and Becker, 1967; Oswald, 1968).

Also, Bandura (1969) indicated that all learning which occurs directly can also occur on a vicarious basis. There is, however, disagreement among theorists as to the nature of observational learning and the role played by reinforcement. Traditional reinforcement theorists (Dollard and Miller, 1941; Skinner, 1953) viewed observational learning as matching behavior. The observer matches his responses to modeling cues through differential reinforcement. This imitative behavior takes on secondary reinforcing properties and as a result external reinforcement may no longer be needed (Baer and Sherman, 1964).

Bandura (1969) concluded from his studies that reinforcement plays an important part in the performance of observational learning but not in its acquisition. This reinforcement can be experienced directly by the observer or vicariously through reinforcement of the model. Similarly, aversive consequences whether experienced by the observer directly or vicariously will inhibit the performance of modeling behavior.

It would appear that the effect of a teacher's behavior on pupils in a classroom can be parsimoniously described using principles derived

from models of reinforcement and observational or vicarious learning. Also, most of the hypotheses, stated by Hough, regarding productive classroom behavior, can be extended to encompass observational learning. These theoretical formulations indicate that in studies on classroom interaction, behavior should be investigated from different perspectives but always with the focus being placed on individual pupils. It would appear that in order to obtain a clear picture of the students' classroom environment, it is necessary to consider the different avenues open to him for interaction with the teacher.

One of the major advantages of a reinforcement model is that it is behavioristically oriented. As a result emphasis is placed on overt behavior. Such a model should, therefore, provide a useful conceptual framework for understanding and planning research in which the verbal behaviors of teachers and pupils are observed and measured.

Another chief advantage of the model, proposed by Hough, is its applicability to dyadic interaction between the teacher and individual pupils. As indicated by Hough, a teacher's verbal behavior may not have a uniform effect upon all students in her class. For example, one student may find superficial praise statements such as 'good', 'right', etc. quite reinforcing while another student may view this as perfunctory and therefore nonreinforcing, or even aversive. By extending the Hough analysis to include observational learning, it may be possible to determine the effect of a teacher's verbal behavior whether it is experienced directly or vicariously.

CHAPTER III

RESEARCH PROCEDURES

Selection and Description of the Sample

The classroom sample used in this investigation was drawn from
the Edmonton Public School System. The final sample included 7 grade 4
classes located in 4 different schools. Three of the schools which
included 6 of the classes are located in 'residential areas' in the
eastern and western sections of the city. The seventh class is located
in an 'inner city' area.

Several criteria were established for choosing the sample. These
criteria were:

(1) Grade level -- only grade 4 classes were requested. The request
for this level resulted from both personal and research considerations.
Firstly, the investigator is primarily concerned with students in the
elementary grades and their classroom experiences. This interest is
mainly predicated upon the belief that the first few years of schooling
are extremely important in the development of positive attitudes towards
school and the acquisition of the necessary academic skills for future
progress. It was assumed that grade 4 would be a fairly representa-
tive sample of the elementary grades.

Also, it was estimated that observation in grade 4 classes
would provide an adequate sample of verbal interaction between teachers
and students. This estimate was based on a study done by Furst and
Amidon (reported in Amidon and Hough, 1967) in which they compared

interaction patterns in grades 1 to 6. They found that teachers' talk

was highest in grade 4. They also found that the amount of student

talk was fairly high compared to the other grade levels.

(2) Curriculum Area -- Mathematics classes were requested in which the

Seeing Through Arithmetic (STA) series was being used. In a study noted

previously (Amidon and Furst), the investigators reported that teachers

talked more during Mathematics instruction than Reading or Social

Studies. Also, the STA series provided a fairly comprehensive achieve-

ment test concerning the material studied by the students, during the

first half of the school year.

(3) Type of Classroom Structure -- regular classes in self-contained

classrooms were requested. It was hoped that the use of regular or

heterogeneously grouped students would provide a sample in which student

ability would not be a confounding factor. Self-contained classes were

selected for two reasons. Firstly, the nature of the classroom observa-

tions required that the students remain in relatively confined areas.

Open area structures were considered to be inappropriate because of

extraneous noise, varied seating arrangements, etc. Also, the majority

of studies reported on the Flanders Interaction Analysis Categories

were carried out in self-contained classroom settings. It was felt

that the results of the present study would be more comparable to other

research, if similar classroom settings were used.

(4) Teacher Selection -- it was decided that only volunteering teachers

who were interested in the project would be accepted for the study. The

procedure for choosing each of the 7 teachers was the same. A research

proposal was presented through the University of Alberta's Department

of Field Experiences to the research division of the Edmonton Public
School Board. After reviewing the research proposal the research
division allocated several schools for the study. The investigator
contacted the principals of the schools who in turn contacted their
teachers. Only teachers who expressed an interest in the research area
were accepted. General information regarding the nature of the research
project was given to the teachers. However, details which could have
affected teachers' classroom behavior were omitted. In all 7 classes
the 4 major criteria were met.

Five of the teachers in the sample were females, and 2 were males.
Five of the teachers held B.Ed. degrees, with the remaining 2 having
completed at least 3 years of teacher education. The teachers varied
considerably in the number of years of teaching experience. Two of
them had over 10 years experience, 1 had over 5, 3 had 2 years, and 1
had 1 year. All 7 teachers had taught grade IV Mathematics in the
previous year or years.

MEASUREMENT INSTRUMENTS

Flanders Interaction Analysis Categories (FIAC)

Since a detailed description of this system is given in chapter
2, only a brief statement will be made in this section regarding
modifications made for use in this study.

Two categories of the FIAC were subscripted in order to give more
detailed information on classroom interaction. Category 2 (Praise) was
divided into 2A (superficial praise statements) and 2B (longer and more
enthusiastic praise statements). Category 4 (teacher questions) was

divided into 4A (short, pointed questions) and 4B (general expansive questions). Although these divided categories were used in the collection of the observational data, they were collapsed back to the original form when the data were analyzed. It was found that such divisions added very little additional information.

The use of the FIAC in this study varied from the traditional in that it was used to collect verbal interaction data between teachers and individual students, as well as verbal interaction data between the teachers and the class as a group. This was made possible by the assignment of identification numbers to the students in each class. Each verbal statement made by the teacher or student was coded with 2 numbers; one to identify which FIAC category was being used and the other to identify which student was being spoken to, or which student was addressing the teacher. In cases in which the teacher was addressing the class, as a group, only the category number was coded.

Due to the additional time required for identifying student numbers, verbal interactions were coded every 4 seconds rather than the usual 3. However, as pointed out by Flanders (1970), the rhythm of coding is more important than strict adherence to an arbitrarily defined time interval.

Mathematics Achievement Test

The mathematics test used in the study was a shortened version of the mid-book test that accompanies Gage's Seeing Through Arithmetic (revised 4) series. First, the 7 teachers in the study were contacted to find out if any of the academic work examined in the various subtests

was not covered by their class, during the period from September to the end of December. On the basis of these findings, 6 of the original 20 subtests were deleted. The items in the remaining 14 subtests were then sampled to give a shortened form, which could be given over 2 class periods.

The test was designed in a free response form. The 14 subtests sampled purport to measure skills in computation; problem solving; knowledge of arithmetical operations and properties; numeration; and basic facts.

Although no test statistics were available from the editors, it was felt that the test had acceptable content validity, in that it measures directly the various skills learned by the students. It appeared that the test used would be a much more valid measure of what students had learned in the first half of the school term than a general standardized achievement test. To determine reliability a split-half check was made following the procedure outlined by Gulliksen (1950). Items were split into odd and even categories and then they were correlated. A correlation of .91 was found between the odd and even items. A copy of the test is presented in Appendix A.

Minnesota Student Attitude Inventory

The MSAI was developed by Flanders and his colleagues from the Hoyt-Grim Pupil Attitude Inventory. After an item analysis was completed, 62 items were selected for use in developing an attitude inventory, which was first used by Flanders in his New Zealand study

in 1957. Several refinements and modifications led to the form being used in this investigation. Appendix B contains a copy of the MSAI.

The test is comprised of 40 items measuring student attitudes about teacher attractiveness; teacher competence; teacher fairness in managing rewards and punishment; student problems pertaining to school work, grades, etc.; and general attractiveness of the class for the student.

Basically, it is a Likert scale consisting of 4 choices for each item, ranging from strongly disagree to strongly agree. Thirty of the items are expressed as positive statements and 10 as negative statements. A score of 4 was assigned to the most positive answer and a score of 1 to the least positive. For the 40 items, the range of possible scores would be 40 to 160.

Flanders (1965) indicated that the reliability of the MSAI varies from class to class, and with the sample chosen. On the basis of his research, Flanders reported the range of reliability coefficients to be .68 to .93 with a median of .85.

The procedure for administering the MSAI takes into consideration reading difficulties of students at the grade IV level. As the written items are presented to the pupils, they are also slowly read twice via audiotape. After the presentation of each item, sufficient time is given for the student to choose his answer.

Training and Reliability of Observers

Two observers were trained by the writer to assist in the collection of interaction data. In the first stage of training the observers

were given copies of the Flanders Interaction Analysis Categories (FIAC) and accompanying ground rules to be used in the study. They were also given printed material describing the concepts relevant to the FIAC and its use in classroom research.

After the Flanders Categories had been memorized the observers met together for approximately 15 hours of training. During the first few sessions, the observers practised coding simulated verbal interaction, which was presented on audiotape. Written transcripts were available of the audiotapes so that observers could compare their observations with those of a trained observer.

The observers were then presented with audiotapes of verbal interaction which were pre-recorded in several classrooms. The coding of these tapes provided the observers with an opportunity to compare their observations and to practise using the necessary ground rules for coding difficult passages. Also during this phase, detailed instructions were given regarding procedures for coding the direction of interaction and the identification of students speaking, or being addressed by the teacher.

In the last few sessions, observers coded 'live' classroom interaction. This part of the training gave the observers an opportunity to practise coding simultaneously, the appropriate category number and the student identification number. During this phase, consultations were regularly held to work out difficulties with the format of coding or the ground rules to be followed. Audiotapes recorded during the observational periods were quite helpful in solving coding difficulties.

When it appeared that observers were competent in using coding procedures, a check was made to determine the level of interobserver reliability for all three pairings.

For all reliability checks, two observers coded live verbal interaction independently but at the same time. Correlations were calculated between the category frequencies of the three pairs of observations.

After the initial reliability check indicated that interobserver agreement was at an acceptable level, as arbitrarily defined by Flanders (1970), the observers began data collection. Reliability checks were made throughout the whole observational period. Each pair of observers co-coded at least once in each of the 7 classes. The results of these 21 reliability checks are given in Table 2. These data indicated that the 3 observers were coding reliably in all 7 classes.

TABLE 2

Correlations Between the Coded Observations of Three Observers

Using the Flanders Interaction Analysis Categories

Class Number	Observers 1 & 2	Observers 1 & 3	Observers 2 & 3
1	.95	.94	.97
2	.94	.97	.97
3	.95	.95	.93
4	.95	.94	.94
5	.97	.95	.99
6	.88	.96	.97
7	.97	.96	.98

Collection of the Data

Verbal interaction data were gathered in the 7 classrooms during 20 hours of observation, extending over several months. In 6 of the 7 classes, this period extended from November to February, while in the seventh it extended from October to December. This was necessitated by the intention of the teacher to terminate teaching at Christmas. It was assumed that the shorter period of time, over which observations were made, would not invalidate the data. In this class as in others about 20 hours of observations were collected.

Three observers, including the writer, collected the interaction data using a modified form of the Flanders Interaction Analysis Categories. The writer gathered most of the data in 4 of the classrooms, while the other 2 observers collected it in the remaining 3.

In each classroom, interaction data were gathered for all phases of mathematics instruction including lectures, seat work, board work, question and answer period, etc. During these different phases all verbal interaction which was audible to the observer was coded. For the first few visits to each classroom, observers sat at the rear of the room and coded from that vantage point. After the teacher and students became accustomed to having the observers in the class, they positioned themselves in various points around the room. It was found that this procedure facilitated coding by providing for random coverage of interaction in all quarters of the class. It was of particular value in coding dyadic interaction between the teacher and individual pupils.

Attitude and achievement measures were administered on a group basis. The attitude test took the students about 30 minutes to complete, while the achievement test required 2 periods of approximately 50 minutes each. Tests were given on an individual basis to students absent for the group sitting. Both tests were given near the end of the observational period.

Compilation and Analysis of the Data

From the original data sheets used for coding in the classroom, frequencies for each category of the FIAC were calculated for each student. Similarly, frequencies were calculated for verbal interaction which occurred between the teacher and the class as a unit. These two sets of frequencies were then combined to give a total for all interaction in each category. This latter total represents the type of data derived from using the FIAC in the traditional manner. All frequencies were prorated to account for slight differences in the amount of time each student and/or class was observed. Children who missed more than 5 classes due to illness, etc., were deleted from the sample.

In order to compare the total verbal interaction in each class, percentages were calculated to determine:

(1) the percentage that each class total, on all categories combined, represented of the total for all classes.

(2) the proportion of each classes' frequency in each category to the total frequency for all classes, in each category.

(3) the proportion of each classes' total frequency falling in each of the 9 categories.

Category 10 (Silence or Confusion) was not included in the calculation of relative frequencies. Flanders (1970) suggests that Category 10 is quite grossly defined including both nondefinable interaction, as well as silence. Furthermore, productive silence, such as thoughtful consideration of ideas or opinions, is not discriminated from pauses in the conversation. In this study, it was particularly difficult to determine whether silence represented a pause in the interaction, between the teacher and a student, or whether it represented a change of teacher focus from one student to another.

Also calculated for the total verbal interaction, in each class were: Teacher Response Ratios (TRR), Pupil Initiation Ratios (PIR), and Teacher Question Ratios (TQR).

Percentages were then calculated to determine the proportion of total interaction which occurred (a) between the teacher and individual pupils (dyadic interaction), and (b) between the teacher and the class as a group (group interaction). After determining the proportion of dyadic interaction, percentages and ratios were calculated for individual students, in the same manner as for class totals.

Comparisons were also made between correlations calculated between selected interaction variables and pupils' mathematics and attitude measures when, (a) classes were used as the basic unit of measurement, and (b) individual students were used as the basic unit of measurement.

The following interaction variables, most of which Flanders (1970) found to be most highly correlated with student achievement and attitude towards school, were calculated for each student and for each class as a whole:

1. Teacher Praise -- Per cent of total frequency in Category 2.

2. Teacher Questions -- Per cent of total frequency in Category 4.

3. Teacher Criticism -- Per cent of total frequency in Category 7.

4. Teacher Indirectness -- Per cent of total frequency in Categories 1, 2, 3, and 4.

5. Teacher Restrictiveness -- Per cent of total frequency in Categories 6 and 7.

6. Teacher Talk -- Per cent of total frequency in Categories 1 to 7.

7. Teacher Restrictive Feedback -- Sum of frequencies in the (8-6), (8-7), (9-6) and (9-7) cells. Number of times Categories 8 and 9 were followed by Categories 6 and 7.

8. Pupil Initiation Ratio -- Percentage of student talk (8+9) which falls in Category 9 (Student Talk-Initiated).

9. Teacher Question Ratio -- Per cent of the sum of Categories 4 and 5 which falls in Category 4. Indicates a teacher's tendency to use questions when directing the content part of class instruction.

10. Teacher Response Ratio -- Per cent of the sum of Categories 1, 2, 3, 6, and 7 which fall in Categories 1, 2, and 3. The ratio indicates the tendency of a teacher to react to the ideas and feelings of her students.

Correlations were then calculated between (1) total class interaction variables and class mean scores on Mathematics achievement and school attitude measures, and (2) verbal interaction variables for individual students and their scores on mathematics achievement and school attitude measures.

Summary of Pilot Study

In May and June of 1971, a pilot study was undertaken to investi-

gate the use of the FIAC, in gathering data on dyadic interaction between teachers and individual students.

This preliminary study was conducted in a single, grade 4 class, which met daily for mathematics instruction. The researcher observed the class for a total of 20 hours. Approximately, the first 5 hours were spent identifying students; examining and recording different coding procedures; and generally observing the interaction patterns between the teacher and students. The last 15 hours were spent collecting data with the basic 10 categories of the FIAC.

The major findings of the pilot project indicated that:

(1) the FIAC could be used to gather, simultaneously, data on verbal interaction between the teacher and individual students, as well as interaction between the teacher and the class as a group. It was found however, that the extra burden of coding student identification numbers required that the observational interval be changed from 3 seconds to 4 seconds.

(2) observations from different vantage points in the class did not appear to affect the verbal behavior of the teacher or pupils.

(3) considerable intraclass variation existed in the amount and quality of verbal interaction that each student experienced with the teacher.

(4) data for each student were too limited to make matrix analysis possible. Comparisons of students, therefore, were based on the frequency for each student on each category of the FIAC.

In this project, no investigation was made of the relationship between FIAC variables and pupils' achievement, or attitude towards school.

The results of the pilot study are presented, in tabular form, in Appendix C.

CHAPTER IV

RESULTS

Overview

As indicated by the work undertaken in the area of classroom interaction, it has been assumed by researchers that verbal exchanges between the teacher and her students can be accurately described and measured using group data. Little research has been done to date on the interactive world of the individual student. More information is needed to determine the quality of interaction that each student experiences with his teacher, and to examine the effect of this interaction on various outcome measures, such as achievement and attitude towards school. Hopefully, the results of this study will add some salient data to this end.

In the first part of this chapter, 4 differences between the total interaction for each class are noted. Comparisons are made of the frequency for each category of the FIAC, as well as for the 9 categories combined. Also, the percentage each category represented of the total is indicated for each class. The relative frequencies of each category are examined and general patterns of interaction are discussed.

In the second part of Chapter 4, data indicating the relative proportion of group and dyadic interaction are presented. Differences between the various categories are outlined, as well as, differences between classes.

In the third section, within-class variations are discussed. These variations include the proportion each student received of the total interaction, as well as the proportion each received of the total for each of the 9 categories. Also the proportion each category total contributed to the total for all 9 categories is examined for each student.

In section four, comparisons are made between the use of 'group data' and 'individual data' in the calculation of correlations between selected interaction variables, and mathematics achievement and attitudes towards school. The relative sizes of the correlation coefficients are examined and the significance of them noted. Discrepancies between the two sets of correlations are discussed and related to other research in the area.

Comparison of Classes on Total Interaction

The term 'total verbal interaction', as used in this study, includes the sum of all verbal interaction between the teacher and (a) individual students; and (b) the class as a unit or groups of students. The total interaction data as defined above represent the type of information gathered when the Flanders Categories are used in the traditional manner. To date, the investigator has not found any literature indicating that the categories have been used to measure dyadic interactions between individual students and their teachers.

The findings of this part of the study, as summarized in Table 3 indicated that there were considerable differences among classes in the total amount of verbal interaction. The mean for the 7 classes was

TABLE 3

Total Interaction Frequencies in Each Category

For Classes One to Seven

Category Number	Class Number						
	1	2	3	4	5	G	7
1	11	12	20	13	14	13	13
2	212	297	458	299	323	169	363
3	192	85	99	193	207	59	257
4	1463	1396	1582	1159	1364	1186	2187
5	889	1927	1500	1619	1008	1484	2087
6	1118	1147	1650	1439	1508	G85	1413
7	282	193	170	492	223	247	490
8	1689	1055	1402	1738	1319	667	2215
9	595	424	841	1021	919	770	724
Total for all Categories	6451	6536	7722	7973	6885	5280	9749

Category 1 — Accepts Feeling
Category 2 — Praises or Encourages
Category 3 — Accepts or Uses Ideas of Students
Category 4 — Asks Questions
Category 5 — Lectures or Gives Information
Category 6 — Gives Directions
Category 7 — Criticizing or Justifying Authority
Category 8 — Student Talk — Response
Category 9 — Student Talk — Initiation

7228 with a range of 5280 to 9749. These 2 classes represented 10.4 and 19.3 per cent of the total for all classes.

However, as evidenced by the figures in Table 4, the totals for each class on each of the 9 categories did not always reflect the distribution of overall totals. For example, class 6 which had the lowest total frequency, accounted for 14.5 per cent of category 9 statements, while class 7, which had the highest total frequency accounted for only 13.7 per cent.

In comparing the 7 classes it was found that certain patterns of interaction predominated. Categories 4 (Asks Questions); 5 (Lectures and Gives Information); 6 (Gives Directions); and 8 (Pupil Talk-Response) accounted for a large percentage of the interaction in each class. As indicated by the figures in Table 5, these 4 categories had the highest frequencies in all classes except 6. In class 6, category 9 (Student Talk-Initiated) had a slightly higher frequency than categories 6 or 8.

These data suggest that the teachers in this study used quite 'traditional' approaches to mathematics instruction. A large percentage of the class period was spent lecturing or giving information. Also a considerable amount of the time was taken up asking questions pertaining to the content of the lessons and in giving directions for seat work, etc.

Although there were very few category 1 statements they were quite evenly distributed over the 7 classes. It appears that all teachers in the sample spent little of their time reacting to the feelings of their students. Unfortunately the Flanders system does not provide information regarding the substance of a student's response.

TABLE 4

Percentages Indicating the Proportion of Each Classes' Category

Frequency to the Total Frequency for all Classes

Category Number	Class Number						
	1	2	3	4	5	6	7
1	11.5	12.5	20.8	13.5	14.6	13.5	13.5
2	10.0	14.0	21.6	14.1	15.2	8.0	17.1
3	17.6	7.8	9.1	17.7	19.0	5.4	23.5
4	14.2	13.5	15.3	11.2	13.2	11.5	21.2
5	8.5	18.3	14.3	15.4	9.6	14.1	19.8
6	12.5	12.8	18.4	16.1	16.8	7.6	15.8
7	13.4	9.2	8.1	23.5	10.6	11.8	23.4
8	16.7	10.5	13.9	17.2	13.1	6.6	22.0
9	11.2	8.0	15.9	19.3	17.4	14.5	13.7

See Table 3 for category description

TABLE 5

Percentage of Each Classes' Total Frequency

Falling in Each Category

Category Number	Class Number						
	1	2	3	4	5	6	7
1	0.2	0.2	0.3	0.2	0.2	0.2	0.1
2	3.3	4.5	5.9	3.8	4.7	3.2	3.7
3	3.0	1.3	1.3	2.4	3.0	1.1	2.6
4	22.7	21.4	20.5	14.5	19.8	22.5	22.4
5	13.8	29.5	19.4	20.3	14.6	28.1	21.4
6	17.3	17.5	21.4	18.0	21.9	13.0	14.5
7	4.4	3.0	2.2	6.2	3.2	4.7	5.0
8	26.2	16.1	18.2	21.8	19.2	12.6	22.7
9	9.2	6.5	10.9	12.8	13.3	14.6	7.4

See Table 3 for description of categories

for that reason it is impossible to determine what per cent of the responses related to expressions of feelings.

Less than 6 per cent of each class total was found in category 2. The percentages ranged from 3.2 for class 6 to 5.9 for class 2. Generally, the praise or encouragement was very curt and usually followed a student response elicited by the teacher. In most cases single words such as 'right', 'good', etc. were employed by the teacher.

It is interesting to note that the percentages of category 7 (Criticizing or Justifying Authority) covered about the same range as for category 2. However, when all 7 classes were considered there was little correlation between the 2 categories.

The percentage of category 9 statements (Student Talk-Initiation) ranged from 7.4 to 14.6. Compared to other studies, these percentages are fairly high indicating that the students in the sample initiated a relatively large number of responses despite the dominant role played by each teacher.

Category 3 statements (Accepts or Uses Ideas of Students) accounted for 3 per cent or less of the totals for each class. However, the percentages approximate averages given by Amidon and Furst (reported in Amidon and Hough, 1967). According to Flanders (1970), the extended use of category 3 statements is an important factor in the academic achievement of students. Flanders measured extended use of category 3 by determining how often these statements occurred for more than a single 3 second episode. Analysis of the data for this study revealed that there were very few occasions upon which the teacher expressed category three statements over more than one episode interval. This

finding may have been related in part to the use of a 4 second observational interval rather than the usual 3.

Several ratios used by Flanders to examine more general interaction patterns have been calculated and summarized in Table 6. General norms based on several studies undertaken by Flanders and his colleagues have also been presented in the table. As indicated by the data, the per cent of teacher talk is fairly constant across the 7 classes ranging from 65 per cent for classes 1 and 4 to 76 per cent for class 2. All of these values are below the norms given by Flanders (1970).

One ratio which is an integral part of Flanders' concepts of classroom interaction is the Teacher Response Ratio (TRR). This index purports to measure a teacher's tendency to react to the ideas and feelings of her pupils. It was calculated for each class by dividing the sum of categories 1 (Accepts Feelings), 2 (Praises or Encourages), and 3 (Accepts or Uses Ideas of Pupils), by categories 1, 2, 3, 6 (Gives Directions) and 7 (Criticizing or Justifying Authority). Like most of the ratios it is expressed in per cent. Flanders (1970) suggested that the TRR was a more parsimonious way to indicate the balance of a teacher's initiation and response statements, than the Indirect-Direct ratios (I/D or i/d). Flanders noted that this was particularly true of observations containing less than 1,000 tallies.

As indicated by the figures in Table 6 the TRR's were quite similar in each class and considerably lower than the norm reported by Flanders. In close scrutiny of the data it appears that the very large frequencies in category 6 may have been the prime factor responsible for these low values.

TABLE 6

Percentage of Teacher and Student Talk; Teacher Response Ratios;

Pupil Initiation Ratios; and Teacher Question Ratios Based on

the Total Interaction in Each Class

	Class Number							
Ratios	1	2	3	4	5	6	7	Norms*
Teacher Talk	65	76	72	65	68	69	67	77
Student Talk	35	24	28	35	32	31	33	23
Teacher Response Ratio	23	28	24	21	25	21	25	42
Pupil Initiation Ratio	26	29	35	37	41	56	25	34
Teacher Question Ratio	62	42	52	31	54	54	46	26

All ratios are expressed in per cent

*Norms derived from Flanders' studies

Another ratio, the Pupil Initiation Ratio (PIR) measures the proportion of student talk which is initiated by the student. It is calculated by dividing the total frequency in category 9 (Student Talk-Initiation) by the sum of frequencies in categories 8 (Student Talk-Response), and 9. As indicated by the data in Table 6 there were considerable differences among classes in the size of the PIR's. They ranged from 25 for class 7 to 56 for class 6. Four of the classes had PIR's larger than the expected norm of 34. These findings suggest that students voluntarily initiated a significant number of verbal inter-actions, despite the fact that teachers were fairly direct in their teaching styles.

A third ratio, the Teacher Question Ratio (TQR), is defined by Flanders (1970) as an index representing the tendency of a teacher to use questions when guiding the more content oriented part of class instruction. It is calculated by dividing the sum of frequencies in categories 4 (Asks Questions) and 5 (Lectures or Gives Information) into the frequency in category 4. As shown by the data in Table 6, the TQR's for all classes were well above the norm. They ranged from 31 for class 4 to 62 for class 1. The teachers in the sample, therefore, used an 'above average' number of questions during their instructional period.

Comparison of Group and Dyadic Interation

In this study the direction of verbal interaction as well as the type of interaction was recorded. This was made possible through the assignment of identification numbers to the students in each class. This modification of the Flanders system provided a means for differen-

tiating verbal interaction between the teacher and individual pupils
(dyadic interaction), and verbal interaction between the teacher and
groups of pupils (group interaction).

As indicated by the summary in Table 7, each of the 7 classes had
considerably more dyadic interactions than group interactions. The per
cent of dyadic interactions ranged from 64.4 for class 6 to 77.3 for
class 4. The actual percentage of dyadic interaction may also be a
little higher than these figures suggest. In some cases, the per cent
of group interaction reflects the inability of the observers to identify
the students involved in the verbal exchange. In such situations the
interaction would be coded as group interaction.

As expected by the design of the FIAC, some of the categories had
larger concentrations of dyadic interactions than others. The percen-
tages were high in all categories except 5 and 6. It appears that the
teachers, when lecturing or giving directions, were most frequently
addressing the whole class.

Variation In Dyadic Interaction

Since dyadic interaction represented the vast majority of verbal
interaction occurring between teachers and students, the data for each
category of the FIAC were examined separately. This part of the inves-
tigation provided information on the amount and quality of interaction
participated in by each student.

Due to the massive amount of data gathered, most of the results
are presented in tabular form. In these tables are given the frequency
for each student in each category; percentage of category totals accoun-

TABLE 7

Percentages For Each Class of Dyadic and Group Interactions In

Each Category of the Flanders Interaction Analysis Categories

Class Number		Category Number									
		1	2	3	4	5	6	7	8	9	Total
1	Dyadic	100.0	93.4	81.2	87.3	35.2	52.4	72.7	98.1	99.5	77.2
	Group	0.0	6.6	18.8	12.7	64.8	48.6	27.3	1.9	0.5	22.8
2	Dyadic	91.7	92.6	83.5	73.6	70.5	69.4	88.6	79.5	99.3	76.1
	Group	8.3	7.4	16.5	26.4	29.5	30.6	11.4	20.5	0.7	23.9
3	Dyadic	95.0	90.6	91.9	77.3	51.9	57.4	61.8	84.4	99.4	72.2
	Group	5.0	9.4	8.1	22.7	48.1	42.6	38.2	15.6	0.6	27.8
4	Dyadic	84.6	97.7	97.9	84.7	49.8	68.4	65.9	94.9	99.9	77.3
	Group	15.4	2.3	2.1	15.3	50.2	31.6	34.1	5.1	0.1	22.7
5	Dyadic	85.7	94.1	95.2	81.1	36.5	55.5	78.0	91.0	99.7	74.3
	Group	14.3	5.9	4.8	18.9	63.5	44.5	22.0	9.0	0.3	25.7
6	Dyadic	92.3	78.1	89.8	63.6	32.1	40.4	49.8	75.7	98.6	64.4
	Group	7.7	21.9	10.2	36.4	67.9	59.6	50.2	24.3	1.4	35.6
7	Dyadic	92.3	91.7	92.2	80.3	34.2	47.4	61.5	98.6	99.2	70.9
	Group	7.7	8.3	7.8	19.7	65.8	52.6	38.5	1.4	0.8	29.1

ted for by each student; the percentage of each student's dyadic inter-
action falling in each category; and Teacher Response Ratios, Teacher
Question Ratios, and Pupil Initiation Ratios for each student.

Total dyadic interaction. As indicated by the data in Table 8,
sizeable variations were found in the total amount of verbal interaction
which occurred between the teachers and individual pupils.

The ranges in per cent for the 7 classes were: 0.9-8.1; 2.4-9.5;
1.0-10.1; 1.4-10.0; 1.7-9.8; 1.0-7.0; and 0.9-8.4. When all students
were considered together, it was found that approximately 60 per cent
of the students participated in 2-5 per cent of all dyadic interaction
in their class. Eleven per cent participated in 0-2 per cent, 20 per
cent in the 5-7 per cent, and 9 per cent in the 7-11 per cent range.

The inequality in the total amount of dyadic interaction engaged
in by each student is clearly exemplified in class 3. In this class,
3 students out of a total of 26 accounted for approximately 30 per cent
of all dyadic interaction. Conversely, 10 other students in the class
together accounted for less than 20 per cent of the class total.

Again in class 4, 4 students' combined frequencies represented
about 35 per cent of their classes' total dyadic interaction.

Category one (Accepts Feeling). In Category 1 are coded state-
ments indicating the teacher's nonthreatening acceptance and clarifi-
cation of a student's feelings. The feelings expressed by the student
may be either positive or negative.

The results of studies, in which the FIAC has been used, indicate
that Category 1 statements are very rare and account for less than 1
per cent of all interaction. According to Flanders (1970), the low

TABLE 8

Total Frequency for Each Student on All Nine Categories Combined; and

Percentage Each Student's Total Represents of the Class Total

Student Number	Class Number													
	1		2		3		4		5		6		7	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%
1	324	6.5	198	4.0	368	6.7	386	6.3	146	2.9	134	4.3	182	2.6
2	212	4.2	143	2.9	554	10.1	615	10.0	146	2.9	217	7.0	205	3.0
3	290	5.8	179	3.6	515	9.4	445	7.3	154	3.0	56	1.8	334	4.9
4	311	6.2	473	9.5	348	6.3	450	7.4	133	2.6	138	4.5	242	3.5
5	155	3.1	176	3.5	371	6.8	214	3.5	212	4.1	110	3.6	161	2.3
6	149	3.0	299	6.0	259	4.7	343	5.6	143	2.8	155	5.0	212	3.1
7	218	4.3	131	2.6	108	2.0	123	2.0	247	5.3	136	4.4	500	7.2
8	214	4.2	306	6.1	56	1.0	311	5.0	138	2.7	82	2.7	167	2.4
9	45	0.9	232	4.6	89	1.6	104	1.7	155	3.0	123	4.0	389	5.6
10	189	3.7	129	2.6	84	1.5	228	3.7	242	4.7	124	4.0	204	3.0
11	119	2.4	265	5.3	104	1.9	135	2.2	146	2.9	102	3.3	353	5.1
12	200	4.0	221	4.4	190	3.5	442	7.3	204	4.0	34	1.1	263	3.8
13	267	5.3	210	4.2	182	3.3	239	3.8	171	3.3	79	2.6	362	5.4
14	291	5.8	118	2.4	88	1.6	187	3.0	505	9.8	193	6.3	186	2.7
15	126	2.5	365	7.3	168	3.1	346	5.6	170	3.3	36	1.2	238	3.4
16	187	3.7	258	5.2	77	1.4	85	1.4	141	2.7	127	4.1	147	2.1
17	202	4.0	392	7.9	60	1.1	178	3.0	113	2.2	66	2.1	177	2.6
18	314	6.3	138	2.8	169	3.1	164	2.6	155	3.0	76	2.5	273	4.0
19	270	5.4	291	5.9	88	1.6	238	3.8	146	2.9	148	4.8	584	8.4
20	272	5.4	132	2.6	87	1.5	153	2.5	167	3.3	81	2.6	67	0.9
21	229	4.6	167	3.3	103	1.9	182	3.0	125	2.4	141	4.6	300	4.3
22	405	8.1	147	2.9	288	5.2	230	3.7	138	2.7	169	5.4	209	3.0
23					134	2.4	363	5.9	88	1.7	176	5.7	195	2.8
24					505	9.2			290	5.7	105	3.4	197	2.8
25					167	3.0			204	4.0	31	1.0	236	3.4
26					347	6.3			328	6.4	98	3.2	207	3.0
27									183	3.6	67	2.2	183	2.7
28									101	2.0	87	2.8	149	2.2

frequency of Category 1 is related to two factors. Firstly, that pupils and teachers in our culture suppress the expression of feelings in the classroom. Secondly, a specific coding rule, devised to clarify observation, diminishes the probability of a statement being coded in Category 1. The rule states that a teacher must identify by name the feeling expressed before Category 1 can be used.

Due to the very small occurrence of Category 1 statements, the frequency for the majority of students was zero. For this reason there was not enough data to warrant presenting them in tabular form.

The number of Category 1 statements found in each of the 7 classes, during approximately 20 hours of observation was: 13(Class 1); 11(Class 2); 19(Class 3); 10(Class 4); 12(Class 5); 11(Class 6); and 11(Class 7). Since Category 1 statements were distributed over so few pupils, the percentages for individual students receiving such statements were very large. For example in Class 1, student 6 received only 2 Category 1 statements from the teacher yet, it represented 15.4 per cent of the classes' total on that category.

When the frequency of Category 1 is compared to the total for all 9 categories, it is found that it represents a very small portion. Student 17, in class 5 had the highest per cent (2.7) of his total dyadic interaction fall in Category 1.

Category 2 (Praise or Encouragement). Coded in Category 2 are teacher statements which praise or encourage pupil behavior. Jokes that release tension; head nodding; and short encouraging statements such as 'yes go on' are included in this category (Flanders, 1970).

In this study Category 2 was subscripted to distinguish between longer more expansive praise and shorter more restricted praise statements of 1 or 2 words. It was found however, that almost all the praise given by the teachers was short and rather perfunctory. For this reason, Category 2 was collapsed back to its original form when the data were analyzed.

In Table 9 are given percentages indicating the proportion of praise statements each student received relative to the total for the class. As shown by the figures the ranges in Classes 1 to 7 were: 0.0-12.9; 1.1-7.0; 0.6-10.2; 2.3-7.6; 0.0-11.5; 0.0-8.0; and 1.3-6.3. Although the ranges for each class were quite comparable in size, they do reflect considerable intraclass variation.

In Class 1 for example, 6 of the 22 students in the class received over 50 per cent of the teacher's praise. Also as indicated by the range for Class 1, student 22 received 26 praise statements from the teacher while student 9 received none.

In Class 2, 8 students received at least 50 per cent of the teacher's praise whereas in class three 21 pupils out of a total of 26 received only 50 per cent.

In Class 4, the teacher's praise was more evenly distributed with 15 students accounting for approximately 60 per cent of the class total.

In Class 5, 20 of the 28 students received over 60 per cent of the total for the class. As in Class 1, one student did not receive any praise during the observation period whereas, student 14 received 11.5 per cent of the class total.

TABLE 9

Frequency For Each Student on Category Two; and Percentage Each

Frequency Represents of the Class Total on Category Two

Student Number	Class Number 1		2		3		4		5		6		7	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%
1	17	8.3	9	3.3	34	8.1	21	7.2	0	0.0	2	1.5	13	4.0
2	9	4.5	13	4.6	43	10.2	22	7.6	5	1.6	7	5.4	9	2.7
3	13	6.5	17	6.1	31	7.5	17	5.7	6	2.0	7	5.4	11	3.2
4	11	5.3	17	6.1	24	5.8	19	6.4	10	3.3	2	1.5	9	2.8
5	3	1.5	13	4.6	22	5.2	11	3.8	8	2.6	4	3.0	4	1.2
6	5	2.3	18	6.6	23	5.5	12	4.2	3	1.0	10	7.7	9	2.7
7	8	3.8	11	4.1	8	2.0	13	4.6	14	4.6	6	4.5	17	5.0
8	13	6.5	19	7.0	11	2.6	14	4.8	8	2.6	2	1.5	13	4.0
9	0	0.0	8	3.1	10	2.3	10	3.3	14	4.6	5	3.9	12	3.7
10	6	3.0	10	3.6	10	2.3	12	4.2	7	2.3	1	0.8	10	2.9
11	5	2.3	14	5.0	13	3.2	13	4.6	5	1.6	2	1.5	13	4.0
12	3	1.5	14	5.0	16	4.0	10	3.5	9	3.0	1	0.8	7	2.1
13	13	6.5	3	1.1	14	3.5	9	3.0	13	4.3	5	3.9	21	6.3
14	17	8.3	7	2.5	7	1.7	7	2.3	35	11.5	5	3.9	8	2.4
15	11	5.3	10	3.6	14	3.5	12	4.2	10	3.3	1	0.7	16	4.9
16	10	4.6	17	6.1	6	1.4	14	4.8	12	3.9	1	0.7	16	4.9
17	10	4.6	18	6.6	8	2.0	12	4.2	4	1.3	5	3.9	11	3.2
18	10	4.6	11	4.1	13	3.2	13	4.6	8	2.6	5	3.9	12	3.7
19	5	2.3	14	5.0	2	0.5	13	4.6	12	3.9	10	7.7	19	5.6
20	6	3.0	7	2.5	4	0.9	8	2.7	12	3.9	2	1.5	6	1.8
21	3	1.5	13	4.6	9	2.1	9	3.1	6	2.0	9	6.9	10	2.9
22	26	12.9	14	5.0	12	2.9	16	5.3	13	4.3	4	3.0	5	1.4
23					11	2.6	7	2.4	8	2.6	10	7.7	16	4.9
24					36	8.7			21	6.9	7	5.4	8	2.4
25					10	2.3			19	6.2	0	0.0	11	3.2
26					26	6.4			13	4.3	4	3.0	21	6.3
27									15	4.9	6	4.5	13	4.0
28									14	4.6	7	5.4	12	3.7

In Class 6, a substantial number of students received very few Category 2 statements from the teacher. In this class, the combined frequency of 10 students represented less than 15 per cent of the class total while another 2 students represented over 15 per cent.

In Class 7, 53 per cent of the students received between 2 and 4 per cent of the total praise, 10 per cent received 0-2 per cent, and 38 per cent received 4-7 per cent.

As evidenced by the findings presented in Table 10 there were also pronounced differences among students in the per cent that Category 2 contributed to their total on all 9 categories. The per cent ranges for Classes 1 to 7 were: 0.0-8.3; 1.4-9.5; 2.7-19.1; 1.9-16.2; 0.0-13.5; 0.0-11.6; and 2.2-11.2. When all classes were grouped together, it was found that for roughly 50 per cent of the students, Category 2 represented between 3 and 7 per cent of their total. For 14 per cent of the students the range was 0-3 per cent, and for the remaining 26 per cent the range was 7-15 per cent.

This dispersion within classes was exemplified by the findings for Class 3. In this Class, 5 students had over 10 per cent of their total dyadic interaction fall in Category 2, while 5 of their classmates had 6 per cent or less. Similarly, in Class 5, praise statements represented less than 4 per cent of 8 students' total interaction, while for another 8 students it represented between 8 and 14 per cent.

Category 3 (Accepts Ideas). Teacher statements which indicate an acceptance or clarification of students' ideas are coded in Category 3.

TABLE 10

Percentage of Each Student's Total Dyadic Interaction

Falling in Category Two

Student Number	Class Number						
	1	2	3	4	5	6	7
1	5.1	4.5	9.1	5.5	0.0	1.9	7.3
2	4.3	8.8	7.7	3.6	3.4	3.4	4.3
3	4.4	9.5	6.1	3.7	3.9	11.6	3.2
4	3.4	3.6	6.9	4.1	7.5	1.2	3.9
5	1.9	7.3	5.8	5.2	3.8	3.4	2.8
6	3.0	6.0	8.9	3.6	2.1	6.4	4.1
7	3.4	8.5	7.8	10.8	5.1	4.5	3.3
8	6.0	6.3	19.1	4.3	6.1	3.0	8.0
9	0.0	3.6	10.8	9.2	9.2	4.0	3.1
10	3.2	7.6	11.4	5.4	2.9	1.0	4.9
11	3.8	5.3	12.7	9.8	3.6	2.4	3.6
12	1.5	6.3	8.2	2.3	4.5	3.7	2.7
13	4.8	1.4	7.9	3.7	7.6	6.3	5.8
14	5.7	6.0	8.2	3.6	6.9	2.6	4.3
15	8.3	2.7	8.3	3.4	5.9	3.4	6.9
16	5.1	6.4	7.8	16.2	8.5	1.0	11.2
17	4.8	4.6	14.0	6.5	3.5	7.5	6.3
18	3.1	7.6	7.8	8.1	5.2	6.6	4.5
19	1.7	4.6	2.7	5.4	8.2	7.1	3.2
20	2.2	5.3	4.5	5.1	7.2	3.1	8.8
21	1.4	7.6	8.4	5.1	4.8	6.1	3.3
22	6.3	9.2	4.2	6.8	9.2	2.2	2.2
23			7.9	1.9	9.1	5.6	8.0
24			7.1		7.2	6.3	4.2
25			5.8		9.3	0.0	4.5
26			7.4		4.0	3.8	10.3
27					8.2	9.3	7.3
28					13.5	8.6	8.2

As shown by the figures summarized in Table 11, the teachers'
acceptance of student ideas varied considerably in each class. The
ranges in the 7 classes were: 0.0-10.2 (Class 1); 0.0-10.0 (Class 2);
0.0-12.3 (Class 3); 0.0-17.3 (Class 4); 0.0-8.1 (Class 5); 0.0-14.1
(Class 6); and 0.0-6.4 (Class 7).

The greatest variation among students were found in classes 4 and
6.   In these two classes 3 or 4 of the students received about 50 per
cent of the total for the class. The results for class 6 are quite
striking in that 11 students each received less than 1 per cent of the
class total. This finding however is based on relatively small frequen-
cies and therefore must be cautiously interpreted.

Significant discrepancies were also found in the other 5 classes.
For example, in Class 3, student 2 received as much acceptance of his
ideas as 10 of his classmates combined. Again in class 1, 6 students
accounted for less than 10 per cent of the class total, while student 3
alone accounted for slightly over 10 per cent.

As indicated by the data in Table 12, Category 3 statements
represented a relatively small portion of most student's total dyadic
interaction. In classes 2, 3, and 6 well over 60 per cent of the
students had less than 2 per cent of their total frequency falling in
Category 3. Percentages for students in classes 5 and 7 were slightly
higher with the majority falling in the 2-4 per cent range. In Classes
1 and 4, students were quite evenly spread over the 0-5 per cent range.
The overall ranges for the seven classes were: 0.0-6.3; 0.0-4.0; 0.0-6.3;
0.0-5.3; 0.0-11.5; 0.0-5.6; 0.0-6.8.

TABLE 11

Frequency For Each Student on Category Three; and Percentage Each

Frequency Represents of the Class Total on Category Three

Student Number	Class Number												
	1		2		3		4		5		6		7	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%
1	12	7.7	6	8.5	2	2.6	18	9.4	5	2.5	2	4.7	4	1.9
2	11	7.2	5	5.9	11	12.3	33	17.3	5	2.5	4	7.1	8	3.3
3	16	10.2	7	10.0	6	6.6	20	10.7	6	3.0	1	2.5	11	4.5
4	9	5.8	6	7.9	2	2.6	19	9.8	7	3.6	2	3.0	8	3.5
5	3	1.9	2	2.3	6	6.6	6	2.9	7	3.6	0	0.0	8	3.3
6	8	4.8	5	6.3	8	8.9	2	1.2	5	2.5	7	14.1	11	4.7
7	8	4.8	2	2.3	4	3.9	4	2.3	7	3.6	2	4.7	12	5.2
8	8	4.8	6	9.0	2	2.6	12	6.3	4	2.1	0	0.0	2	0.9
9	0	0.0	4	5.9	1	1.3	5	2.5	10	5.0	4	7.1	13	5.6
10	3	1.9	4	5.9	1	1.3	6	2.9	16	8.1	1	2.4	8	3.3
11	8	4.8	3	3.9	7	7.2	2	1.2	6	3.2	0	0.0	15	6.4
12	2	1.0	6	7.9	1	1.3	18	9.7	5	2.6	0	0.0	14	5.9
13	13	8.2	0	0.0	7	7.9	11	5.9	6	3.0	0	0.0	7	3.0
14	8	4.8	3	4.0	4	3.9	0	0.0	9	4.6	7	14.1	13	5.3
15	3	1.9	1	2.0	0	0.0	2	1.2	2	1.0	0	0.0	8	3.5
16	5	3.0	2	2.1	1	1.3	1	0.6	8	4.1	0	0.0	3	1.3
17	11	7.2	7	9.9	2	2.6	2	1.2	13	6.6	1	2.4	6	2.3
18	13	8.2	0	0.0	0	0.0	2	1.2	6	3.0	0	0.0	7	2.8
19	0	0.0	3	4.2	0	0.0	4	1.9	0	0.0	0	0.0	20	8.4
20	5	3.0	1	2.0	3	2.9	1	0.6	9	4.4	1	2.4	4	1.5
21	10	6.1	0	0.0	1	1.4	2	1.2	8	4.1	2	4.7	4	1.5
22	5	2.9	0	0.0	7	7.9	6	2.9	5	2.7	2	4.7	8	3.2
23					1	1.5	13	6.8	3	1.5	7	14.1	12	5.2
24					8	9.2			6	3.0	1	2.5	11	4.4
25					1	1.3			11	5.3	0	0.0	9	4.0
26					3	3.0			12	6.1	0	0.0	0	0.0
27									13	6.6	4	7.1	7	2.8
28									3	1.6	1	2.4	6	2.3

TABLE 12

Percentage of Each Student's Total Dyadic Interaction

Falling in Category Three

Student Number	Class Number						
	1	2	3	4	5	6	7
1	3.7	3.0	0.7	4.6	3.4	1.9	2.4
2	5.0	2.9	2.0	5.3	3.4	1.7	3.8
3	5.5	4.0	1.2	4.5	3.9	2.3	3.2
4	2.9	1.2	0.7	4.1	5.3	1.2	3.4
5	1.9	0.9	1.6	2.6	3.3	0.0	4.8
6	5.1	1.5	3.1	0.6	3.5	4.8	5.3
7	3.4	1.2	3.3	3.6	2.6	1.8	2.4
8	3.7	2.1	4.3	3.9	3.1	0.0	1.3
9	0.0	1.8	1.4	4.6	6.3	3.0	3.4
10	1.6	3.3	1.4	2.4	6.6	1.0	3.8
11	6.3	1.1	6.3	1.6	4.3	0.0	4.3
12	0.8	2.5	0.6	4.2	2.5	0.0	5.3
13	4.8	0.0	3.9	4.7	3.5	0.0	1.9
14	2.6	2.4	4.1	0.0	1.8	3.8	6.8
15	2.4	0.4	0.0	0.7	1.2	0.0	3.4
16	2.6	0.6	1.6	1.4	5.7	0.0	2.0
17	5.6	1.8	4.0	1.3	11.5	1.9	3.1
18	4.1	0.0	0.0	1.4	3.9	0.0	2.5
19	0.0	1.0	0.0	1.5	0.0	0.0	3.4
20	1.7	1.1	3.0	0.7	5.2	1.5	5.3
21	4.2	0.0	1.2	1.3	6.4	1.8	1.2
22	1.1	0.0	2.5	2.4	3.8	1.5	3.6
23			1.0	3.5	3.4	4.2	6.3
24			1.7		2.1	1.3	5.4
25			0.7		5.2	0.0	4.0
26			0.8		3.7	0.0	0.0
27					7.1	5.6	3.6
28					3.1	1.4	3.7

Category 4 (Asks Questions). Asking questions represented a large portion of each teacher's total talk. In most cases, as noted in Table 7, these questions were directed toward individual pupils rather than to the class as a whole.

The percentage of questions directed at each student relative to the class total are reported in Table 13. The ranges for the different classes were: 0.7-9.4 (Class 1); 1.6-9.9 (Class 2); 0.0-12.9 (Class 3); 1.4-10.2 (Class 4); 1.4-12.4 (Class 5); 1.3-6.6 (Class 6); and 0.7-11.7 (Class 7).

When the data for all classes were considered together, it was found that 105 students out of 177 received between 2 and 5 per cent of the total for their class. Twenty-one students received between 0 and 2 per cent, and the remaining 41 ranged from 5 to 13 per cent.

The largest within class variation was found in class 3. In this class, 3 students together received over 30 per cent of all the teacher's questions. Compared to these students the combined frequencies of 15 other students in the class represented only about 29 per cent of all Category 4 statements.

The least variation was found in class 6 in which 20 of the 28 students each accounted for 2-5 per cent of the class total.

As shown by the figures in Table 14 teacher questions composed a large percentage of each student's total dyadic interaction. The percentages for the 7 classes fell in the following ranges: 15.7-32.5; 10.1-29.3; 0.0-31.9; 9.4-20.7; 11.6-28.1; 13.1-54.2; and 15.4-35.7.

For over half of the students in Classes 1, 6, and 7 teacher questions accounted for 20-30 per cent of their total interaction. For

TABLE 13

Frequency For Each Student on Category Four; and Percentage Each

Frequency Represents of the Class Total on Category Four

Student Number	Class Number 1		2		3		4		5		6		7	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%
1	51	4.0	29	2.8	4	0.3	80	8.1	32	2.9	21	2.8	37	2.1
2	50	3.9	20	1.9	158	12.9	98	10.0	41	3.7	29	3.8	44	2.5
3	69	5.4	41	4.0	126	10.3	100	10.2	43	3.9	21	2.8	99	5.7
4	77	6.0	102	9.9	79	6.5	63	6.4	33	3.0	42	5.5	61	3.5
5	30	2.3	43	4.2	109	8.9	37	3.7	38	3.4	22	3.0	44	2.5
6	36	2.8	80	7.7	53	4.3	50	5.1	18	1.6	33	4.4	41	2.3
7	57	4.5	38	3.7	22	1.8	23	2.4	65	5.9	32	4.3	124	7.1
8	45	3.5	50	4.8	10	0.8	35	3.5	36	3.2	11	1.5	38	2.2
9	9	0.7	60	5.9	0	0.0	17	1.7	39	3.5	35	4.6	60	3.4
10	42	3.3	29	2.9	14	1.2	39	4.0	28	2.5	33	4.4	54	3.1
11	23	1.8	60	5.9	26	2.1	31	3.2	23	2.1	26	3.5	76	4.3
12	60	4.7	22	2.2	41	3.3	67	6.8	44	4.0	10	1.3	80	4.5
13	54	4.3	45	4.4	31	2.6	32	3.3	33	3.0	19	2.5	88	5.0
14	90	7.0	18	1.8	22	1.8	22	2.3	137	12.4	31	4.1	40	2.3
15	24	1.9	71	6.9	23	1.9	69	7.0	32	2.9	14	1.8	56	3.2
16	61	4.8	44	4.2	17	1.4	14	1.4	26	2.4	35	4.6	44	2.5
17	53	4.1	90	8.7	11	0.9	23	2.3	17	1.5	17	2.3	62	3.5
18	93	7.3	27	2.6	54	4.4	29	2.9	37	3.3	19	2.5	75	4.3
19	89	6.9	77	7.4	28	2.3	47	4.8	28	2.5	38	5.0	205	11.7
20	77	6.0	17	1.6	22	1.8	14	1.5	38	3.5	25	3.3	13	0.7
21	70	5.5	31	3.0	17	1.4	21	2.2	30	2.7	41	5.4	84	4.8
22	120	9.4	35	3.4	44	3.6	30	3.1	19	1.7	50	6.6	44	2.5
23					29	2.4	41	4.2	22	2.0	38	5.1	46	2.6
24					127	10.4			78	7.1	37	4.9	70	4.0
25					47	3.8			49	4.5	17	2.3	46	2.6
26					109	8.9			62	5.6	15	2.0	53	3.0
27									41	3.7	24	3.1	42	2.4
28									16	1.4	21	2.8	29	1.6

TABLE 14

Percentage of Each Student's Total Dyadic Interaction

Falling in Category Four

Student Number	Class Number						
	1	2	3	4	5	6	7
1	15.7	14.4	1.0	20.7	21.9	15.7	20.1
2	23.4	13.7	28.4	16.0	28.1	13.1	21.6
3	23.8	23.0	24.5	22.5	27.9	37.2	29.7
4	24.6	21.6	22.8	14.0	24.8	30.2	25.1
5	19.4	24.5	29.4	17.1	17.9	20.2	27.6
6	24.2	26.6	20.3	14.6	12.6	21.6	19.3
7	26.2	29.3	20.0	18.9	23.7	23.6	24.9
8	20.9	16.2	17.0	11.1	26.0	13.6	22.7
9	20.0	25.9	0.0	16.1	25.4	28.3	15.4
10	22.2	22.8	17.1	17.1	11.6	27.0	26.6
11	19.0	22.8	25.3	23.0	15.8	25.6	21.5
12	30.1	10.1	21.5	15.1	21.8	29.6	30.2
13	20.4	21.4	17.1	13.5	19.3	23.4	24.3
14	30.9	15.7	24.7	11.9	27.1	16.0	21.6
15	19.0	19.5	13.6	19.9	18.8	37.9	23.6
16	32.5	16.9	21.9	16.2	18.4	27.5	29.6
17	26.2	22.9	18.0	12.9	15.0	26.4	35.2
18	29.6	19.6	31.9	17.6	23.9	24.6	27.5
19	32.8	26.3	31.5	19.7	19.2	25.7	35.1
20	28.2	12.8	25.8	9.4	22.9	30.8	19.3
21	30.8	18.5	16.9	12.0	24.0	28.9	28.0
22	29.6	23.5	15.4	13.0	13.7	29.4	20.9
23			21.8	11.3	25.0	21.8	23.3
24			25.2		26.9	35.0	35.7
25			28.1		24.2	54.2	19.3
26			31.5		18.9	15.2	25.7
27					22.4	35.2	23.0
28					15.6	24.3	19.4

the same fraction of students in Classes 2, 3 and 5, Category 4 statements represented between 15-25 per cent, while in Class 4 they represented between 10 and 20 per cent.

The data reveal that even in these central bands of frequencies, there are considerable discrepancies in the percentages for different students. Such differences become strikingly more evident when students at either end of the distribution are considered.

For example, in Class 3, the frequency of Category 4 for students 1 and 9 represented only 1.0 and 0.0 per cent respectively of their total interaction. Conversely, for students 18 and 19 Category 4 represented over 31 per cent of their total.

Category 5 (Lectures or Gives Information). Giving factual information, expressing opinions on subject matter, lecturing, and interjecting thoughts are all classified as Category 5 statements. It was found in this study that a majority of Category 5 responses were directed at students during seat work sessions.

As indicated by the data summarized in Table 15, most of the students in the sample received between 1 and 4 per cent of the total interaction in their class. Eighteen students received less than 1 per cent, and 55 received between 4 and 12 per cent.

The greatest discrepancy among students was found in Class 5. Student 14, in this class, received 21.7 per cent of all Category 5 statements made by the teacher. On the other hand, the combined frequencies of 4 other students accounted for less than 4 per cent.

In Class 3, 5 students each received less than 1 per cent of Category 5 statements while student 3 received 10.3 per cent and student

TABLE 15

Frequency For Each Student on Category Five; and Percentage Each

Frequency Represents of the Class Total on Category Five

Student Number	Class Number												
	1		2		3		4		5		6		7	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%
1	18	5.8	66	4.9	74	9.6	39	4.8	13	3.5	24	5.0	14	2.0
2	15	4.8	48	3.5	99	12.7	83	10.3	8	2.2	42	8.9	26	3.6
3	5	1.5	14	1.0	82	10.5	40	5.0	13	3.5	4	0.8	48	6.8
4	35	11.0	154	11.3	66	8.5	27	3.4	2	0.5	22	4.7	25	3.4
5	3	1.0	53	3.9	55	7.1	26	3.2	17	4.6	25	5.2	20	2.8
6	0	0.0	45	3.3	20	2.6	72	8.9	6	1.6	12	2.6	21	3.0
7	8	2.4	18	1.3	10	1.2	9	1.1	33	8.9	14	2.9	23	3.3
8	11	3.6	70	5.2	2	0.3	20	2.4	5	1.4	12	2.6	17	2.3
9	2	0.5	57	4.2	25	3.2	0	0.0	1	0.3	9	1.8	54	7.6
10	11	3.4	24	1.8	13	1.7	41	5.1	6	1.6	31	6.5	26	3.6
11	3	1.0	80	5.9	5	0.7	3	0.4	7	2.0	16	3.4	44	6.2
12	11	3.4	59	4.3	32	4.2	68	8.4	11	3.0	6	1.3	15	2.1
13	14	4.6	66	4.9	17	2.2	28	3.4	22	6.0	21	4.4	53	7.4
14	24	7.7	33	2.4	6	0.8	24	3.0	80	21.7	35	7.3	31	4.3
15	5	1.4	143	10.5	14	1.8	75	9.3	11	3.0	6	1.3	30	4.3
16	10	3.1	95	7.0	5	0.6	0	0.0	9	2.4	24	5.0	9	1.3
17	6	2.0	132	9.7	2	0.3	18	2.3	1	0.3	14	2.9	30	4.2
18	27	8.7	44	3.2	29	3.7	21	2.6	4	1.1	12	2.6	30	4.2
19	27	8.6	51	3.8	11	1.4	73	9.0	4	1.1	22	4.7	76	10.6
20	35	11.0	46	3.4	9	1.2	22	2.8	7	1.8	11	2.3	1	0.2
21	13	4.1	46	3.4	9	1.1	28	3.4	7	1.9	14	2.9	23	3.2
22	33	10.5	15	1.1	43	5.5	40	5.0	11	2.8	33	7.0	18	2.5
23					17	2.2	50	6.2	1	0.3	12	2.6	27	3.7
24					56	7.2			20	5.4	9	1.9	13	1.8
25					28	3.5			21	5.7	4	0.8	14	2.0
26					49	6.2			36	9.8	19	3.9	0	0.0
27									9	2.4	5	1.0	18	2.5
28									4	1.1	17	3.6	8	1.1

2, 12.9 per cent. In Class 1 similar discrepancies were found. In this Class 6 students out of 22 accounted for more than one-half of the class total.

Percentages indicating the proportion of each student's total interaction falling in Category 5 are presented in Table 16. As shown by the figures the range for the 7 classes were: 0.0-12.7 (Class 1); 7.9-39.1 (Class 2); 4.0-28.4 (Class 3); 0.0-30.5 (Class 4); 0.7-15.8 (Class 5); 7.0-25.0 (Class 6); and 0.0-17.0 (Class 7).

As shown by these ranges the distributions within each class varied significantly. For 50 per cent of the students in Classes 1 and 5, Category 5 statements represented between 2 and 8 per cent of their total dyadic interaction. For approximately one-half of the students in Classes 3 and 4 the range was 5-20 per cent. The ranges for the same proportion of students in Classes 2, 6 and 7 were: 25-40; 14-21; and 5-15 per cent respectively.

These data suggest that most students in Class 2 had a considerably higher percentage of their total interaction in Category 5 than students in the other 6 classes. Undoubtedly part of the reason for this finding is related to the teaching style of the teacher. As noted in Table 7, the teacher in Class 2 lectured most of the time to individual students rather than to the class as a group.

Category 6 (Gives Directions). Teacher statements are coded in Category 6 if it appears to the observer that the teacher is telling the student to do something and expects compliance. Flanders (1970), maintains that Category 6 statements tend to enhance the authority of the teacher and that excessive use of this type of initiation will

TABLE 16

Percentage of Each Student's Total Dyadic Interaction

Falling in Category Five

Student Number	Class Number						
	1	2	3	4	5	6	7
1	5.6	33.3	20.2	10.1	8.9	17.6	7.9
2	7.1	33.3	17.8	13.5	5.5	19.4	12.4
3	1.7	7.9	15.9	9.1	8.4	7.0	14.5
4	11.1	32.5	19.0	6.1	1.5	16.3	10.1
5	1.9	30.0	14.9	11.9	8.0	22.5	12.4
6	0.0	15.1	7.8	21.0	4.2	8.0	9.9
7	3.4	13.4	8.9	7.2	12.0	10.0	4.7
8	5.2	23.0	4.3	6.3	3.8	15.2	10.0
9	3.3	24.7	28.4	0.0	0.7	7.1	14.0
10	5.6	18.5	15.7	18.0	2.5	25.0	12.5
11	2.5	30.2	5.1	2.5	5.0	15.9	12.6
12	5.3	26.6	17.1	15.4	5.4	18.5	5.8
13	5.4	31.4	9.2	11.6	12.9	26.6	14.6
14	8.2	27.7	6.8	13.1	15.8	17.9	16.7
15	3.6	39.1	8.3	21.6	6.5	17.2	12.8
16	5.1	36.6	6.3	0.0	6.4	18.6	6.1
17	3.2	33.6	4.0	10.3	0.9	20.8	17.0
18	8.7	31.5	17.0	12.8	2.6	16.4	11.1
19	10.0	17.5	12.3	30.5	2.7	15.0	13.0
20	12.7	35.1	10.6	14.5	3.9	13.8	1.8
21	5.6	27.7	8.4	15.2	5.6	9.6	7.7
22	8.1	10.2	15.0	17.4	7.6	19.9	8.6
23			12.9	13.9	1.1	7.0	13.6
24			11.2		6.9	8.8	6.5
25			16.5		10.3	12.5	5.9
26			14.0		11.0	19.0	0.0
27					4.9	7.4	9.7
28					4.2	20.0	5.2

create highly dependent students, who are unable to do their school work without direct teacher supervision.

The frequency data presented in Table 17 indicate that 110 of the 177 students received between 2 and 5 per cent of their teacher's directions. Twenty-four students received between 0 and 2 per cent of the total, and 43 students received between 5 and 11 per cent. The ranges for the individual classes were: 2.2-9.1 (Class 1); 2.6-10.0 (Class 2); 1.0-10.2 (Class 3); 1.2-10.8 (Class 4); 1.4-6.2 (Class 5); 0.0-9.0 (Class 6); and 1.3-9.8 (Class 7).

Fairly large within-class variation was found in classes 6 and 3. In Class 6, 4 students each received less than 1 per cent of the teacher's directions while student 1 received 9 per cent or 25 such statements. Similarly in Class 3, 3 students accounted for approximately 30 per cent of the class total. Also in Class 4, 3 students accounted for over 30 per cent of the class total.

The figures in Table 18 reveal that the per cent Category 6 contributed to each student's overall total, for all 9 categories, varied considerably in each class. The ranges in the 7 classes were: 6.3-30.0; 10.4-22.7; 10.1-26.6; 6.4-22.1; 9.2-28.7; 0.0-18.5; and 5.5-17.5.

For the majority of students in Classes 6 and 7, teacher directions represented between 6 and 12 per cent of their total dyadic interaction. For Classes 2, 3 and 5 the majority of students were in the range from 12-20 per cent. Finally for Classes 1 and 4 the ranges were 5-12 and 12-16 per cent respectively.

Category 7 (Criticizing or Justifying Authority). As in the case of Category 6, Category 7 is used to code teacher statements which are

TABLE 17

Frequency For Each Student on Category Six; and Percentage Each

Frequency Represents of the Class Total on Category Six

Student Number	Class Number													
	1		2		3		4		5		6		7	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%
1	38	6.5	45	5.7	97	10.2	85	9.7	30	3.6	25	9.0	17	2.5
2	23	3.9	25	3.2	71	7.5	90	10.2	24	2.9	21	7.6	21	3.2
3	32	5.6	40	5.0	86	9.0	76	8.6	22	2.6	4	1.4	21	3.2
4	21	3.7	80	10.0	71	7.4	95	10.8	25	3.0	11	4.0	23	3.5
5	26	4.4	22	2.8	59	6.2	28	3.1	40	4.8	14	4.9	9	1.3
6	27	4.7	54	6.8	42	4.4	47	5.3	41	4.9	11	4.0	19	2.8
7	20	3.4	27	3.4	22	2.3	20	2.3	51	6.1	14	4.9	65	9.8
8	18	3.1	56	7.0	10	1.0	44	4.9	22	2.6	11	4.0	16	2.3
9	14	2.3	32	4.0	18	1.9	19	2.2	14	1.7	9	3.1	28	4.1
10	32	5.5	28	3.5	13	1.4	24	2.8	47	5.6	15	5.4	26	3.8
11	15	2.6	32	4.0	10	1.1	19	2.1	32	3.8	10	3.6	23	3.5
12	18	3.1	24	3.0	25	2.6	53	6.0	29	3.5	2	0.9	16	2.4
13	27	4.7	30	3.8	43	4.5	33	3.8	23	2.7	5	1.8	41	6.1
14	26	4.4	26	3.2	16	1.6	29	3.3	52	6.2	21	7.6	16	2.4
15	18	3.1	52	6.5	44	4.7	32	3.6	28	3.3	0	0.0	22	3.3
16	14	2.5	51	6.4	20	2.1	10	1.2	28	3.3	10	3.6	15	2.2
17	13	2.2	41	5.1	16	1.6	17	1.9	25	3.0	7	2.7	11	1.7
18	46	8.1	21	2.6	24	2.5	24	2.8	36	4.3	9	3.1	18	2.7
19	53	9.1	41	5.1	17	1.8	15	1.7	25	3.0	13	4.7	40	5.9
20	29	5.0	24	3.0	18	1.9	21	2.4	22	2.6	4	1.3	12	1.7
21	27	4.7	21	2.6	20	2.1	30	3.4	16	1.9	6	2.2	44	6.6
22	42	7.3	26	3.2	35	3.6	28	3.1	32	3.8	19	6.7	32	4.7
23					27	2.8	44	5.0	12	1.4	9	3.1	23	3.5
24					92	9.7			48	5.7	13	4.7	15	2.3
25					22	2.3			28	3.4	0	0.0	29	4.4
26					38	4.0			43	5.1	9	3.1	25	3.7
27									20	2.4	0	0.0	26	3.8
28									22	2.6	6	2.2	17	2.5

TABLE 18

Percentage of Each Student's Total Dyadic Interaction

Falling in Category Six

Student Number	Class Number						
	1	2	3	4	5	6	7
1	11.6	22.7	26.4	22.1	20.5	18.5	9.1
2	10.6	17.6	12.9	14.6	16.4	9.7	10.3
3	11.0	22.2	16.8	17.1	14.3	7.0	6.4
4	6.8	16.9	20.3	21.2	18.8	8.1	9.7
5	16.5	12.7	15.9	13.0	18.9	12.4	5.5
6	18.2	18.1	16.1	13.6	28.7	7.2	8.8
7	9.0	20.7	20.0	16.2	18.6	10.0	13.1
8	8.2	18.3	17.0	14.0	16.0	13.6	9.3
9	30.0	13.9	20.3	18.4	9.2	7.1	7.1
10	16.7	21.7	15.7	10.7	19.4	12.0	12.5
11	12.7	12.2	10.1	13.9	21.6	9.8	6.6
12	9.0	10.8	13.3	12.0	14.4	7.4	6.2
13	10.2	14.3	23.7	14.0	13.5	6.3	11.3
14	8.8	21.7	17.8	15.5	10.3	10.9	8.6
15	14.3	14.2	26.5	9.1	16.5	0.0	9.4
16	7.7	19.8	26.6	12.2	19.9	7.8	10.2
17	6.3	10.4	26.0	9.7	22.1	11.3	6.3
18	14.8	15.2	14.2	14.9	23.2	11.5	6.6
19	19.4	13.9	19.2	6.4	17.1	8.8	6.8
20	10.5	18.1	21.2	13.8	13.1	4.6	17.5
21	11.9	12.6	19.3	16.5	12.8	4.4	14.6
22	10.4	17.3	12.1	12.1	22.9	11.0	15.1
23			19.8	12.3	13.6	4.9	11.9
24			18.3		16.6	12.5	7.7
25			12.9		13.9	0.0	12.4
26			10.9		13.1	8.9	12.0
27					10.9	0.0	13.9
28					21.9	7.1	11.2

expected to produce compliance on the part of the student. It includes

statements intended to change pupil's behavior from nonacceptable to

acceptable patterns, or statements justifying what the teacher is doing

through excessive self-reference (Flanders, 1970). According to Flanders,

Category 6 statements tend to foster in students a dependency upon the

teacher.

As shown by the summary in Table 19 most of the students received

between 0 and 5 per cent of their class total on Category 7 statements.

There were however, striking differences within different classes.

For example, in classes 1, 2, and 3, 18 students received less than 1

per cent of Category 7 statements, whereas 15 students received between

10 and 15 per cent.

Similarly in Class 4, the combined frequencies of 4 students

represented more than 35 per cent of their class total. Category 7

statements were more evenly distributed in Classes 5, 6 and 7 with most

students falling in the 2-5 per cent range.

In Table 20 are presented percentages indicating the proportion

that Category 7 represented of each student's total interaction with

his teacher. As shown by the figures, the per cent ranges for each class

were: 0.0-11.6; 0.0-8.9; 0.0-9.8; 0.0-23.9; 0.0-13.3; 0.0-10.5; and 0.0-

12.9.

The degree of variability, perhaps can best be shown by the

following examples. In Class 4, Category 7 represented less than 7 per

cent of the total interaction for 4 students, while for students 14 and

20 it represented 16.7 and 23.9 per cent respectively.

In Class 1, 4 students received no Category 7 statements at all,

TABLE 19

Frequency For Each Student on Category Seven; and Percentage Each

Frequency Represents of the Class Total on Category Seven

Student Number	Class Number												
	1		2		3		4		5		6		7	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%
1	32	15.4	12	7.0	11	10.3	13	4.1	1	0.6	4	3.0	19	6.3
2	21	10.3	1	0.8	3	2.4	40	12.3	4	2.3	22	18.2	2	0.7
3	3	1.6	0	0.0	4	3.4	19	5.9	0	0.0	3	2.1	13	4.3
4	14	6.6	24	13.9	1	1.1	36	11.1	2	1.1	14	11.7	8	2.7
5	5	2.2	6	3.7	7	6.8	7	2.1	20	11.5	5	4.0	2	0.7
6	0	0.0	8	4.4	8	7.7	9	2.7	19	10.9	6	5.1	5	1.6
7	9	4.4	10	5.6	0	0.0	0	0.0	3	1.7	10	8.1	64	21.4
8	5	2.3	27	15.9	0	0.0	29	8.8	2	1.2	2	2.0	7	2.2
9	0	0.0	3	1.6	1	1.1	1	0.4	0	0.0	7	6.1	30	10.0
10	8	3.7	3	1.6	2	2.3	9	2.7	9	5.2	0	0.0	6	1.8
11	5	2.2	11	6.6	0	0.0	4	1.4	11	6.0	2	2.0	6	1.9
12	8	3.7	0	0.0	0	0.0	18	5.7	6	3.5	1	1.0	6	1.9
13	5	2.2	18	10.5	0	0.0	13	4.1	13	7.5	1	1.0	8	2.7
14	0	0.0	0	0.0	2	2.3	31	9.6	5	2.9	2	2.0	1	0.4
15	0	0.0	0	0.0	17	15.7	6	1.8	3	1.7	0	0.0	2	0.8
16	2	0.8	5	2.6	1	1.1	0	0.0	2	1.1	9	7.1	0	0.0
17	10	4.7	6	3.3	0	0.0	14	4.3	6	3.4	0	0.0	3	1.1
18	8	3.9	6	3.5	2	2.3	1	0.3	5	2.9	1	1.0	25	8.2
19	26	12.5	20	11.4	8	8.0	1	0.4	11	6.3	1	1.1	23	7.8
20	32	15.4	6	3.3	1	1.2	37	11.3	16	9.4	1	1.0	0	0.0
21	3	1.6	7	4.1	6	5.9	10	3.2	16	9.2	6	5.1	16	5.3
22	14	6.6	0	0.0	12	11.4	8	2.4	4	2.4	5	4.0	5	1.5
23					4	3.8	18	5.4	1	0.6	7	6.1	1	0.4
24					8	8.0			4	2.3	1	1.1	5	1.6
25					0	0.0			0	0.0	1	1.1	6	1.9
26					5	5.1			8	4.6	6	5.1	24	7.8
27									2	1.1	1	1.0	10	3.3
28									1	0.6	0	0.0	4	1.5

TABLE 20

Percentage of Each Student's Total Dyadic Interaction

Falling in Category Seven

Student Number	Class Number						
	1	2	3	4	5	6	7
1	9.7	6.1	2.9	3.4	0.7	2.8	10.4
2	9.9	1.0	0.5	6.5	2.7	10.3	1.1
3	1.1	0.0	0.7	4.3	0.0	4.7	3.9
4	4.3	5.0	0.3	8.0	1.5	10.5	3.4
5	2.9	3.6	1.9	3.1	9.4	4.5	1.4
6	0.0	2.5	3.1	2.6	13.3	4.0	2.3
7	4.1	7.3	0.0	0.0	1.1	7.3	12.9
8	2.2	8.9	0.0	9.2	1.5	3.0	4.0
9	0.0	1.2	1.4	1.1	0.0	6.1	7.7
10	4.0	2.2	2.9	3.9	3.7	0.0	2.7
11	3.8	4.2	0.0	3.3	7.2	2.4	1.7
12	3.8	0.0	0.0	4.2	3.0	3.7	2.2
13	1.8	8.6	0.0	5.6	7.6	1.6	2.3
14	0.0	0.0	2.7	16.7	1.0	1.3	0.6
15	0.0	0.0	9.8	1.7	1.8	0.0	1.0
16	0.9	1.7	1.6	0.0	1.4	6.9	0.0
17	4.8	1.4	0.0	7.7	5.3	0.0	1.9
18	2.6	4.3	1.4	0.7	3.2	1.6	9.0
19	9.4	6.7	9.6	0.5	7.5	0.9	4.0
20	11.6	4.3	1.5	23.9	9.8	1.5	0.0
21	1.4	4.2	6.0	5.7	12.8	4.4	5.3
22	3.3	0.0	4.2	3.4	3.1	2.9	2.2
23			3.0	4.8	1.1	4.2	0.6
24			1.7		1.4	1.3	2.4
25			0.0		0.0	4.2	2.5
26			1.6		2.4	6.3	11.4
27					1.1	1.9	5.5
28					1.0	0.0	3.0

whereas for 4 others these statements represented over 9 per cent of their total dyadic interaction.

Category 8 (Student Talk-Response). Student talk which is elicited by the teacher is classified in Category 8. Since the statements are in direct response to the teacher's questions, directions, etc., the students have limited freedom to express their own ideas.

In this study it was found that Category 8 represented a sizeable portion of each student's dyadic interaction. This finding is probably closely related to the large number of questions used by the teachers in their instructional approach.

As shown by the summary in Table 21 roughly 60 per cent of all students accounted for between 2 and 4 per cent of their class total. Sixteen per cent accounted for 0-2 per cent, and 24 per cent between 5 and 14 per cent of their class total.

When each class is examined closely, differences among students become more evident. In both classes 2 and 3, about 40 per cent of all Category 8 statements were made by 5 students. Conversely, in Class 3, the combined frequencies of 10 students accounted for less than 20 per cent of the class total.

In Class 5, 4 students together gave as many Category 8 responses as 12 of their classmates combined. Similarly, in Class 2, the combined frequencies of students 15 and 17 represented over 20 per cent of their classes' total. Compared to this, another 12 students' combined frequency accounted for just over 20 per cent.

As indicated by the percentages in Table 22 Category 8 statements represented a large portion of many students' total dyadic interaction.

TABLE 21

Frequency For Each Student on Category Eight; and Percentage Each

Frequency Represents of the Class Total on Category Eight

Student Number	Class Number												
	1		2		3		4		5		6		7
	F	%	F	%	F	%	F	%	F	%	F	%	F	%
1	93	5.6	21	2.5	77	6.5	118	7.1	29	2.4	12	2.5	64	2.9
2	68	4.1	20	2.3	139	11.7	153	9.3	28	2.3	21	4.2	71	3.3
3	96	5.8	41	4.9	144	12.2	127	7.7	43	3.6	8	1.6	92	4.2
4	99	6.0	66	7.8	79	6.7	122	7.4	37	3.1	26	5.1	78	3.6
5	62	3.7	27	3.2	89	7.5	71	4.3	44	3.7	17	3.4	49	2.2
6	62	3.7	75	8.9	49	4.1	97	5.9	25	2.1	29	5.6	88	4.0
7	75	4.5	13	1.5	14	1.2	51	3.1	60	5.0	27	5.4	158	7.2
8	77	4.6	24	2.9	16	1.3	53	3.2	27	2.3	7	1.5	64	2.9
9	18	1.1	57	6.8	8	0.7	47	2.8	36	3.0	26	5.2	102	4.7
10	69	4.2	25	3.0	18	1.5	54	3.3	30	2.5	17	3.4	68	3.1
11	41	2.4	43	5.2	17	1.4	50	3.0	27	2.3	27	5.4	128	5.8
12	74	4.4	21	2.5	40	3.3	89	5.4	54	4.5	2	0.5	95	4.3
13	107	6.5	35	4.1	29	2.4	65	4.0	38	3.2	17	3.4	90	4.1
14	110	6.6	14	1.7	17	1.4	30	1.8	161	13.4	19	3.7	53	2.4
15	60	3.6	80	9.5	30	2.6	94	5.7	49	4.1	11	2.2	84	3.9
16	69	4.2	33	3.9	19	1.6	40	2.4	29	2.4	14	2.7	54	2.5
17	64	3.9	92	11.0	14	1.2	58	3.5	23	1.9	14	2.7	42	1.9
18	90	5.4	23	2.7	34	2.8	62	3.8	38	3.2	16	3.2	60	2.8
19	63	3.8	59	7.0	16	1.3	55	3.3	38	3.2	29	5.7	174	8.0
20	74	4.4	8	1.0	17	1.4	31	1.9	41	3.4	17	3.4	25	1.1
21	74	4.4	38	4.5	19	1.6	52	3.1	30	2.5	21	4.2	96	4.4
22	117	7.1	24	2.9	37	3.1	71	4.3	26	2.2	30	5.9	89	4.1
23					31	2.6	62	3.8	17	1.4	27	5.4	56	2.5
24					96	8.1			86	7.2	25	4.9	67	3.1
25					43	3.6			54	4.5	5	1.0	74	3.4
26					93	7.9			66	5.5	15	2.9	78	3.6
27									39	3.2	21	4.2	38	1.7
28									25	2.1	4	0.7	47	2.1

TABLE 22

Percentage of Each Student's Total Dyadic Interaction

Falling in Category Eight

Student Number	Class Number						
	1	2	3	4	5	6	7
1	28.7	10.6	20.8	30.5	19.9	9.3	35.4
2	31.9	13.7	25.1	24.9	19.2	9.7	34.6
3	33.1	23.0	28.0	28.6	27.9	14.0	27.6
4	31.9	13.9	22.8	27.0	27.8	18.6	32.4
5	39.8	15.5	23.9	33.2	20.8	15.7	30.3
6	41.4	25.1	18.8	28.2	17.5	18.4	41.5
7	34.5	9.8	13.3	41.4	21.9	20.0	31.6
8	35.8	7.9	27.7	16.9	19.8	9.1	38.7
9	40.0	24.7	9.5	44.8	23.2	21.2	26.3
10	36.5	19.6	21.4	23.9	12.4	14.0	33.2
11	34.2	16.4	16.5	36.9	18.7	26.8	36.1
12	36.8	9.5	20.9	20.1	26.7	7.4	36.0
13	40.1	16.4	15.8	27.4	22.2	21.9	24.9
14	37.6	12.0	19.2	16.1	31.9	9.6	28.4
15	47.6	21.8	18.2	27.0	28.8	31.0	35.5
16	36.8	12.8	25.0	47.3	20.6	10.8	36.7
17	31.7	23.6	24.0	32.3	20.4	20.8	23.9
18	28.6	16.3	19.9	37.8	24.5	21.3	22.1
19	23.3	20.1	17.8	23.2	26.0	19.5	29.9
20	27.1	6.4	19.7	20.3	24.8	21.5	36.8
21	32.2	22.7	18.1	28.5	24.0	14.9	32.1
22	28.9	16.3	12.9	30.9	19.1	17.6	42.4
23			22.8	17.1	19.3	15.5	28.4
24			19.0		29.7	23.8	33.9
25			25.9		26.3	16.7	31.2
26			26.8		20.1	15.2	37.7
27					21.3	31.5	20.6
28					25.0	4.3	31.3

The ranges in the 7 classes were: 23.3-41.4; 6.4-25.1; 9.5-28.0; 16.1-47.3; 12.4-31.9; 4.3-31.5; and 22.1-41.5.

For approximately 60 per cent of the students in Classes 2, 3 and 6 the percentage of Category 8 was in the 15-25 per cent range. For Classes 1 and 7 the majority of students fell in the 30-40 per cent range, while in Class 6 the range was 20-30 per cent. Students in Class 4 were quite evenly distributed over the total percentage range from 16.1-47.3

Closer examination of Table 22 reveals that the distribution of Category 8 responses is far from normal. For example, in Class 6, 10 students had between 0 and 15 per cent of their total dyadic interaction fall in Category 8, while only 3 students had percentages in the 25-35 per cent range. Conversely, in Class 3, Category 8 accounted for 25-30 per cent of the dyadic interaction of 6 students, whereas only 3 were in the 5-15 per cent range.

Category 9 (Student Talk-Initiated). Talk which is voluntarily initiated by students is classified in Category 9. It includes such verbal behaviors as: expression of ideas, initiation of new topics, development of opinions, and the raising of questions.

As shown by the data in Table 23, the per cent ranges for classes 1 to 7 were: 0.5-10.6; 1.0-16.6; 0.8-12.6; 0.2-12.5; 1.3-10.8; 0.5-9.6; and 0.8-12.4. However, when all classes were considered together, it was found that over one-half of all students initiated between 1 and 4 per cent of all Category 9 statements in their class.

The degree of variability among students is well exemplified in Classes 2, 3, and 4. In Class 2, students 8 and 12 together, initiated

TABLE 23

Frequency for Each Student on Category Nine; and Percentage Each

Frequency Represents of the Class Total on Category Nine

Student Number	Class Number													
	1		2		3		4		5		6		7	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%
1	63	10.6	11	2.5	66	9.0	12	1.2	36	3.9	41	5.4	13	1.9
2	17	2.8	11	2.5	30	4.1	95	9.3	31	3.4	67	8.8	24	3.4
3	56	9.5	18	4.4	36	4.9	45	4.4	21	2.3	9	1.2	35	4.9
4	47	7.9	25	6.0	25	3.4	67	6.6	17	1.9	18	2.3	29	4.1
5	24	4.1	10	2.3	22	2.9	30	2.9	37	4.0	24	3.1	23	3.2
6	11	1.8	15	3.6	57	7.7	51	5.0	26	2.8	46	6.0	19	2.6
7	35	5.8	13	3.0	29	3.9	2	0.2	41	4.5	30	3.9	34	4.8
8	38	6.5	53	12.5	6	0.8	105	10.3	32	3.4	35	4.6	10	1.4
9	3	0.5	10	2.3	25	3.4	6	0.6	40	4.4	29	3.8	89	12.4
10	17	2.8	4	1.0	12	1.6	41	4.0	99	10.8	25	3.3	8	1.1
11	21	3.5	21	5.0	25	3.4	12	1.2	35	3.8	17	2.3	48	6.7
12	26	4.3	70	16.6	35	4.7	117	11.5	43	4.7	10	1.3	30	4.2
13	34	5.7	14	3.2	41	5.5	47	4.6	22	2.4	11	1.5	54	7.5
14	18	3.0	16	3.7	14	2.0	43	4.2	26	2.8	73	9.6	24	3.4
15	6	1.0	8	2.0	25	3.5	57	5.6	35	3.8	4	0.5	15	2.1
16	16	2.7	14	3.2	6	0.8	6	0.6	27	2.9	33	4.4	6	0.8
17	34	5.7	7	1.7	6	0.8	35	3.4	21	2.3	7	1.0	11	1.5
18	27	4.6	8	1.8	11	1.5	11	1.1	20	2.2	14	1.8	46	6.4
19	9	1.5	27	6.4	6	0.8	30	3.0	28	3.1	34	4.5	27	3.7
20	17	2.8	22	5.3	12	1.6	19	1.8	22	2.4	19	2.5	7	1.0
21	29	4.9	11	2.7	22	3.0	29	2.8	12	1.3	42	5.6	22	3.1
22	48	8.1	35	8.2	92	12.6	32	3.2	28	3.1	25	3.3	11	1.5
23					15	2.0	128	12.5	23	2.5	64	8.5	16	2.2
24					77	10.4			25	2.7	12	1.6	8	1.1
25					17	2.3			22	2.4	4	0.5	46	6.4
26					24	3.3			88	9.6	31	4.1	6	0.8
27									43	4.7	6	0.8	30	4.2
28									16	1.7	30	3.9	27	3.7

approximately 30 per cent of all Category 9 statements. Similarly, in Classes 3 and 4, 3 students accounted for more than 30 per cent of their class total. Comparatively, in both classes 3 and 4, the combined frequencies of at least 12 students represented only 20 per cent of the total for their class.

The findings summarized in Table 24 indicate that there was significant intraclass variation in the per cent that Category 9 contributed to the total dyadic interaction for each student. This variation is clearly evident in the following percentage range for each class: 3.3-19.4 (Class 1); 1.8-31.6 (Class 2); 5.4-32.1 (Class 3); 1.8-35.2 (Class 4); 5.1-40.9 (Class 5); and 2.9-22.9 (Class 7).

For the majority of students in classes 3 and 7, the percentage of Category 9 statements was in the 5-15 per cent range. In classes 2, 4 and 5 the majority fell in the ranges: 0-10; 10-20; and 15-25 respectively

The percentages for students in classes 1 and 6 were quite evenly distributed over the total range from the lowest to the highest percentage. For example, in Class 1, the frequencies of 2 students fell in the 0-5 per cent range; 8 in the 5-10 per cent range; 4 in the 10-15 per cent range; and 8 in the 15-20 per cent range.

Teacher Response Ratio (TRR). The TRR is defined by Flanders (1970), as an index of a teacher's tendency to react to the feelings and ideas of her students. Mathematically, the TRR is calculated by dividing the sum of Categories 1, 2 and 3 by the sum of Categories 1, 2, 3, 6 and 7. The resulting ratio is multiplied by 100 to express it in per cent. The ratio basically indicates the degree to which teachers

TABLE 24

Percentage of Each Student's Total Dyadic Interaction

Falling in Category Nine

Student Number	Class Number						
	1	2	3	4	5	6	7
1	19.4	5.3	17.9	3.2	24.7	30.6	7.3
2	7.8	7.8	5.4	15.4	21.2	30.9	11.9
3	19.3	10.3	7.0	10.2	13.6	16.3	10.6
4	15.0	5.3	7.2	14.9	12.8	12.8	12.1
5	15.5	5.5	5.8	14.0	17.5	21.3	14.5
6	7.1	5.0	21.9	14.9	18.2	29.6	8.8
7	15.9	9.8	26.7	1.8	15.0	21.8	6.9
8	17.9	17.3	10.6	33.8	22.9	42.4	6.0
9	6.7	4.2	28.4	5.7	26.1	23.2	22.9
10	8.7	3.3	14.3	18.0	40.9	20.0	3.8
11	17.7	7.9	24.1	9.0	23.7	17.1	13.6
12	12.8	31.6	18.4	26.6	21.3	29.6	11.6
13	12.6	6.4	22.4	19.5	12.9	14.1	14.9
14	6.2	13.3	16.4	23.2	5.1	37.8	13.0
15	4.8	2.3	15.2	16.6	20.6	10.3	6.4
16	8.5	5.2	7.8	6.8	19.1	26.5	4.1
17	16.7	1.8	10.0	19.4	18.6	11.3	6.3
18	8.7	5.4	6.4	6.8	12.9	18.0	16.8
19	3.3	9.3	6.8	12.8	19.2	23.0	4.6
20	6.1	17.0	13.6	12.3	13.1	23.1	10.5
21	12.6	6.7	21.7	15.8	9.6	29.8	7.3
22	11.9	23.5	32.1	14.0	20.6	14.7	5.0
23			10.9	35.2	26.1	36.6	8.0
24			15.2		8.6	11.3	4.2
25			10.1		10.8	12.5	19.3
26			7.0		26.8	31.6	2.9
27					23.5	9.3	16.4
28					15.6	34.3	17.9

respond to the talk of their pupils. For example, a high TRR suggests that a teacher responds to student talk by accepting or praising the feelings and ideas expressed by them.

A low TRR indicates that a teacher limits pupil talk by giving directions, criticizing, and justifying her authority. Flanders (1970) reported that a TRR of 42 was about average.

The TRR's for all students in the sample are given in Table 25. As indicated by the data the means for all 7 classes were below the expected value of 42. The ranges for the 7 classes were: 0-50; 6-52; 8-64; 10-60; 12-63; 0-100; and 12-57. The TRR's in some cases are misleading in that insufficient frequencies are found in the categories upon which the ratio is based. For example, in Class 6, student 25 had a TRR of zero. This indicates that for this student the sum of Categories 1, 2 and 3 was zero.

It appears from the data that the teacher in Class 7 responded to the ideas and feelings of her students relatively more often than did the other teachers. In Class 7 over 50 per cent of the students had TRR's greater than the norm.

Despite several extreme ratios, the general trend toward significant intraclass variation persisted. For example, in Class 1, 25 per cent of the students had TRR's of less than 25 while another 25 per cent had TRR's of over 45.

Again in Class 7, about one-third of all students had TRR's between 50 and 60, while the TRR's for another third of the pupils were in the 30-40 range.

TABLE 25

Teacher Response Ratio For Each Student

Student Number	Class Number						
	1	2	3	4	5	6	7
1	30	21	27	28	14	22	34
2	31	40	42	30	26	26	43
3	45	38	14	28	35	53	42
4	36	18	26	23	40	16	36
5	17	33	31	33	21	13	54
6	34	27	38	25	12	5	45
7	35	26	35	47	28	30	18
8	48	24	59	27	37	18	33
9	0	27	37	41	63	36	31
10	24	33	40	36	29	17	41
11	38	28	64	41	25	20	50
12	16	52	40	30	30	20	49
13	45	6	34	30	36	45	36
14	48	32	40	10	44	32	55
15	44	18	20	27	28	100	52
16	50	24	27	60	40	14	57
17	41	35	40	31	40	46	54
18	28	30	38	38	27	33	31
19	6	23	8	50	25	44	48
20	16	22	26	13	36	44	12
21	30	32	30	23	30	48	56
22	37	35	34	37	33	33	17
23			26	25	48	52	44
24			32		36	67	44
25			20		51	0	52
26			40		33	21	37
27					57	90	30
28					43	60	33
Class Mean	31.8	28.4	35.7	31.9	34.5	35.9	40.5

Teacher Question Ratio (TQR). The TQR is defined as an index representing the tendency of a teacher to use questions when directing the more content oriented part of class instruction. The TQR, which is expressed in per cent, is calculated by dividing the frequency in Category 4 by the sum of frequencies in Categories 4 and 5. The average TQR reported by Flanders (1970) is 26.

As shown by the TQR's in Table 26, only 2 students out of 177 had TQR values below the norm. These data suggest that all teachers in the sample used a large number of questions during their instructional period. It should be noted however, that the TQR's in this part of the study were calculated from dyadic interaction. This calculation tended to inflate the size of the TQR's since a large percentage of Category 5 statements were classified as group interactions.

As in the case of the TRR, there are several TQR's which are based on limited frequencies and therefore have values of either 0 or 100.

As indicated by the findings there were considerable differences between classes in the size of the TQR's. For example in Class 1, 21 of the 22 students had TQR's of 70 or more, while in Class 2, only 1 TQR reached the 70 per cent level.

The within class ranges for classes 1-7 were: 6.9-100; 27-75; 0-85; 38-100; 60-98; 41-84; and 15-100. Although the TQR's were much higher in some classes than others, there were still quite prominent variations among the students in each of the classes. For instance in Class 7, 50 per cent of the students had TQR's between 65 and 75, while approximately 25 per cent had TQR's between 85 and 95.

TABLE 26

Teacher Question Ratio For Each Student

Student Number	Class Number						
	1	2	3	4	5	6	7
1	74	31	5	67	71	46	72
2	83	27	60	54	84	41	63
3	93	75	60	71	77	84	67
4	70	30	54	69	94	66	72
5	91	45	43	60	70	47	15
6	100	64	75	41	75	74	66
7	88	68	70	72	67	70	83
8	80	42	83	65	88	46	70
9	82	51	0	100	98	80	53
10	79	55	50	49	82	52	68
11	88	43	80	92	77	62	63
12	85	27	56	50	80	64	84
13	78	41	65	53	60	48	63
14	80	37	80	47	63	47	56
15	83	33	62	48	74	70	64
16	87	32	80	100	74	60	85
17	91	41	85	56	94	55	67
18	78	38	65	58	90	61	71
19	77	60	74	39	89	60	73
20	69	27	70	38	84	71	93
21	82	40	65	45	81	75	79
22	78	70	50	43	66	60	71
23			62	45	96	75	64
24			70		80	80	84
25			64		70	81	77
26			70		63	45	100
27					82	83	70
28					80	55	78
Class Mean	82.5	44.4	61.5	55.3	78.9	62.8	70.4

<u>Pupil Initiation Ratio (PIR)</u>. The PIR indicates the proportion of student talk which is self-initiated. It is found by dividing the frequency in Category 9 by the sum of frequencies in Categories 8 and 9. Like the TRR and TQR, it is expressed in per cent. The mean expected value, reported by Flanders (1970), is 34.

As indicated by the data in Table 27, the PIR's in classes 5 and 6 were much higher than in the other 5 classes in the sample. In both of these classes, 22 out of the total class of 28, were equal to or above the norm. Classes 1 and 7 had the lowest PIR's with only 4 or 5 students with values above the norm of 34 per cent.

The range of PIR's within each class were as follows: 9-40 (Class 1); 7-70 (Class 2); 18-71 (Class 3); 4-67 (Class 4); 14-80 (Class 5); 22-91 (Class 6); and 7-47 (Class 7). As reflected by these ranges there were noteworthy intraclass differences in the size of the PIR's. For example, in Class 4, the PIR's for approximately one-half of the students ranged from 30-40 per cent. However, there were 5 students at the lower end of the distribution who had PIR's of 15 per cent or less. There were also 4 or 5 students at the top of the distribution with PIR's between 55 and 70 per cent.

Comparison of Correlational Studies

In several studies reported by Flanders (1970), significant correlations were found between selected interaction variables derived from the FIAC and pupil achievement, and attitude towards school. In all of these studies group data were used. Interaction variables were calculated from the totals for each class and then correlated with class mean scores on achievement and attitude measures.

TABLE 27

Pupil Initiation Ratios For Each Student

Student Number	Class Number						
	1	2	3	4	5	6	7
1	40	34	46	9	56	77	15
2	20	35	18	40	53	76	24
3	36	32	20	26	33	53	28
4	32	27	24	35	31	42	27
5	28	30	20	30	46	59	32
6	15	17	54	34	51	55	18
7	32	50	65	4	40	53	18
8	33	70	27	67	54	83	14
9	14	15	73	11	53	53	47
10	20	14	40	43	80	60	11
11	34	33	60	20	56	39	27
12	26	77	47	57	44	83	24
13	24	30	59	42	37	39	37
14	14	53	46	60	14	80	31
15	9	9	45	31	42	27	15
16	19	30	24	13	50	72	10
17	35	7	30	38	50	33	21
18	23	27	25	15	34	47	43
19	13	31	27	37	42	54	14
20	19	71	41	40	35	53	22
21	28	23	54	36	30	67	19
22	30	60	71	31	51	29	11
23			33	67	58	71	23
24			45		23	32	9
25			28		30	44	39
26			21		57	67	7
27					52	22	44
28					40	91	37
Class Mean	24.7	35.2	40.1	34.2	44.2	55.8	23.8

Part of the emphasis of this study was centred on a comparison
of correlations between interaction variables and pupil achievement,
and school attitude when, (a) group data were used; and (b) individual
data were used. The procedures used in calculating correlations based
on group data were exactly the same as those employed by Flanders.

The correlations based on individual data were considerably more
tedious to calculate. First, interaction variables derived from the
FIAC were calculated for each student in all 7 classes. The individual
scores on these variables were then correlated with each student's
score on the mathematics achievement test and the Minnesota Student
Attitude Inventory. It should be noted that the verbal interaction from
which the variables were calculated included only dyadic interaction.
No attempt was made to include interaction which occurred between the
teacher and the class as a group. The verbal interaction variables
used in this part of the study have been defined in Chapter III.

As evidenced by the figures in Tables 28 and 29, there was very
little correspondence between the correlations based on group data and
those based on individual data. Surprisingly, in many cases the
correlations are in opposite direction of magnitude. Various charac-
teristics of the data may be responsible for these discrepancies.

Firstly, most of the correlations do not differ significantly
from zero, therefore their accuracy must be questioned. Statistically,
these low probabilities reflect the size of the sample being used and
the size of correlation coefficient.

Another reason for the differences may be related to the nature
of the interaction data. The group data used in this part of the study

TABLE 26

Correlations Between Selected FIAC Variables and Scores on

Mathematics Achievement For Group and Individual Data

Interaction Variable	Dyadic Interaction (Individual Data)							All Students Combined	Total Interaction (Group Data)
	Class Number								
	1	2	3	4	5	6	7		
Teacher Praise	-0.18	-0.05	-0.61*	-0.50*	-0.58*	.14	-0.38*	-0.23*	.37
Teacher Questions	-0.50*	-0.35	-0.76*	-0.49*	-0.76*	.53*	-0.16	-0.34*	.21
Teacher Criticism	-0.16	-0.35	-0.25	-0.26	-0.01	.31	-0.29	-0.11	.47
Teacher Indirectness	-0.43	-0.31	-0.75*	-0.48	-0.71*	.43*	-0.16	-0.31*	.29
Teacher Restrictiveness	-0.16	-0.31	-0.55*	-0.52*	-0.32	.16	.08	-0.19*	.52
Teacher Restrictive Feedback	.07	-0.02	-0.36	-0.21	-0.00	.04	-0.28	0.00	.60
Teacher Talk	-0.41	-0.34	-0.74*	-0.46*	-0.72*	.27	-0.05	-0.33*	.34
Teacher Response Ratio	.06	.44*	.21	.29	-0.04	-0.03	-0.20	.10	-0.57
Teacher Question Ratio	.24	.06	.17	-0.02	.48*	.34	-0.35	.12	-0.14
Pupil Initiation Ratio	.24	.07	.54*	.14	.49*	-0.19	.38*	.10	-0.06

$*p < .05$

TABLE 29

Correlations Between Selected FIAC Variables and MSAI

Scores For Group and Individual Data

Interaction Variable	Dyadic Interaction (Individual Data) Class Number							All Students Combined	Total Interaction (Group Data)
	1	2	3	4	5	6	7		
Teacher Praise	.29	.05	-0.30	.22	-0.22	-0.04	-0.30	.06	.55
Teacher Questions	-0.18	-0.23	-0.32	.05	-0.10	-0.32	-0.25	-0.14	-0.10
Teacher Criticism	.09	.09	0.00	-0.01	.04	-0.01	-0.44*	-0.04	.09
Teacher Indirectness	-0.05	-0.15	-0.33	.16	-0.13	-0.22	-0.23	-0.07	.13
Teacher Restrictiveness	.14	.04	-0.23	.19	.32	-0.02	-0.34	.11	.78
Teacher Restrictive Feedback	.17	.06	.05	.13	.30	-0.17	-0.44	.19*	.85
Teacher Talk	-0.02	-0.07	-0.31	.11	.02	-0.08	-0.26	-0.02	.20
Teacher Response Ratio	.16	.18	.02	.10	-0.48*	.15	.38*	.06	-0.68
Teacher Question Ratio	.01	-0.24	-0.02	.22	-0.36	-0.32	-0.37	-0.03	--
Pupil Initiation Ratio	.17	.32	.04	-0.02	.14	.14	.19	.05	--

*$p < .05$

included all verbal interaction, which took place between the teacher and her class, regardless of whether it was of a dyadic or group nature. On the other hand, the individual data were based solely on dyadic interaction. However, this difference in the source of interaction data should not have a marked effect on most of the FIAC variables since a large proportion of the interaction in each class occurred between the teacher and individual students. This was particularly true of some of the interaction variables used, such as variable 1, which simply represented the percentage of tallies falling in category 2.

A third reason for the difference in coefficients could be related to the statistical characteristics of the variables correlated. Possibly, the group data do not adequately reflect the within-class variations, which were present in each class. The group data used may have been quite insensitive to the distribution of interaction scores, as well as achievement and attitude scores. Conversely, individual data, as the label implies, takes into account the exact distribution of interaction within classes, as well as the distribution of scores on the attitude and achievement measures.

It appears from the data in Tables 28 and 29, that large differences existed in the magnitude and direction of correlations in the 7 different classes. For example, there was a correlation of .29 between teacher's praise and pupil attitude scores, in class 1, while in class 3, the correlation was -0.30.

These findings suggest that due to the variance in correlations from class-to-class, single values derived from either group or individual data, may be quite misleading. It would seem that in order

to get a meaningful assessment of the correlation between FIAC variables and pupil achievement, and attitude measures, each class would have to be investigated separately.

The reason for the great variance among classes is not obvious. Although, causation cannot be inferred from correlation, it may be that teachers' interaction with students had various effects. For example, in class 1, teacher praise may have served as a social reinforcer for students, thereby resulting in more acceptant views of the teacher and school. Conversely, most students in class 3 may have perceived their teacher's praise as perfunctory and therefore nonreinforcing, or even aversive. Such perceptions may have fostered in the students negative feelings toward the teacher and/or school in general.

As indicated by the summary in Tables 28 and 29, quite a number of sizeable correlations were found between the group interaction variables and pupil achievement and attitude scores. However, only 2 of these coefficients were significant at the .05 level. Several of the correlations were quite surprising in light of Flanders' concepts regarding teaching styles and their effect upon pupil outcome measures.

The two highest correlations were between measures of teacher restrictiveness (variables 5 and 7) and the mathematics and attitude scores. Flanders (1970) reported negative correlations for these same variables in 4 out of 5 different grade levels. It is also noteworthy that the TRR variable and mathematics achievement correlated quite highly in a negative direction. Based on Flanders' work, a sizeable positive correlation was expected. Conversely, a negative correlation was expected between teacher criticism (variable 3) and mathematics

achievement. However, the findings indicated that the correlation was quite high (.47) and in a positive direction.

It also appears from the findings, based on the group data, that classes which have higher PIR's have lower mean scores on achievement and attitudes towards school. Again these findings are at odds with expectations based on Flanders' research.

Few of the correlations based on total individual data were significant at the .05 level. As indicated by Table 28, interaction variables 1-7 correlated negatively with mathematics achievement. Two of these correlations represent findings which are quite striking. It appears that teacher praise (variable 1) and teacher indirectness (variable 4) are both negatively correlated with pupil achievement. In view of Flanders' work these findings were not anticipated. However, as noted previously, these correlations are not too meaningful when discrepancies among classes are considered.

The negative correlation between variable 4 (sum of categories 1, 2, 3, and 4) and mathematics achievement is consistent with other correlations in Table 28 but not with previous work done by Flanders and his colleagues.

As shown in Table 28 the TRR, TQR and PIR ratios had low correlations with achievement but in a positive direction.

As indicated by the correlation summarized in Table 29, there appears to be little relationship between total individual scores on the 10 interaction variables and pupil attitude towards school. Of the 10 coefficients, only 1 was significant at the .05 level.

The 3 interaction variables correlating the highest with pupil attitude were: Teacher Questions (-0.14); Teacher Restrictiveness (.11); and Teacher Restrictive Feedback (.19). The latter two correlations are consistent with those calculated from group data, but they do not support the findings of Flanders (1970).

Summary of Findings

1. Considerable differences existed between classes in the total amount of verbal interaction which occurred over the observational period. Differences were also found in the way in which the total interaction was distributed over the 9 categories.

2. A large proportion of the verbal interaction in each classroom occurred between the teacher and individual students. Only Categories 5 (Lectures), and 6 (Gives Directions) had relatively high percentages of group interaction.

3. Sizeable intraclass variations were found in dyadic interaction. The amount and type of interaction involving each student and his teacher varied greatly.

4. Correlations between selected FIAC variables and pupil achievement in mathematics, and attitude towards school were quite different when based on individual data and class data. Correlations calculated on either individual or group data did not support the findings reported by Flanders (1970). Large differences were found in the size of the correlations in each of the 7 classes.

CHAPTER V

SUMMARY AND DISCUSSION

Summary of the Study

The general purpose of the present research was to explore the
need for considering dyadic interaction in studies using the Flanders
Interaction Analysis Categories (FIAC). The specific objectives were:
(1) to determine the percentage of 'group' and 'dyadic' interaction in
grade 4 classes.
(2) to determine the variability of dyadic interaction within grade 4
classes.
(3) to compare correlations between selected FIAC variables and pupil
achievement in mathematics, and pupil attitude towards school when
(a) 'group' data are used, and (b) individual data are used.

The sample used in the investigation was drawn from the Edmonton
Public School system and included 7 classes of grade 4 pupils.

The data on verbal interaction were collected by 3 observers
using a modified version of the FIAC. These data were gathered, in each
class, during 20 hours of observation spread over several months.

Near the end of the observational period, the students in each
class were administered a mathematics achievement test based on the
'Seeing Through Arithmetic' text, and the Minnesota Student Attitude
Inventory (MSAI).

The FIAC data were analyzed to determine the proportion of group
and dyadic interaction; interclass variation in total interaction; and

intraclass variation in dyadic interaction. Also, correlations were calculated between several FIAC variables and mathematics achievement, and attitude towards school. Correlations were calculated for both group and individual data.

The results of the investigation revealed that considerable differences in verbal interaction existed, both between classes and within classes. When the total verbal interaction for each class was examined, it was found that most of the verbal exchanges occurred between the teacher and individual pupils (dyadic interaction), rather than between the teacher and the total class (group interaction).

The results of the correlational study indicated that large differences in the size and direction of correlation coefficients existed when data were based on individual and group scores. Also little correspondence was found between the correlations in the present study and those reported by Flanders (1970).

Discussion

Special characteristics of the study. In most types of exploratory studies procedures and analyses are usually extended or altered to bring some new information to light. In all cases the researcher must be able to ascertain the amount of change necessary to increase knowledge, without losing sight of the conceptual framework in which he is working.

In this study procedures, traditionally used in collecting verbal interaction data with the FIAC, were altered in order to gain some information on the classroom environment of individual children.

Some of the major changes will be discussed in this section because the writer feels that they provide a context in which the findings can be appraised.

The most important change in this study involved the coding procedures used in collecting the interaction data. Usually, the observer when collecting data with the FIAC is required to identify and encode the verbal behavior of teacher and students every 3 seconds. In this study the direction of verbal interaction was also coded through the use of student identification numbers.

The observer then, was required to identify the student involved in each dyadic interchange with the teacher. Since more time was required to assign 2 coding numbers, the coding interval was changed from the standard 3 seconds to 4 seconds. As indicated by the high interobserver reliabilities, the added burden of identifying students did not lower agreement between observers.

Another modification involved the type of classroom events which were coded. Generally the FIAC has been used for gathering interaction data during lectures or class discussion periods. In this study however, the FIAC was used to gather data during all phases of instruction including lectures, discussions, seat work, quizzes, etc. This procedure was used in order to gather as much information as possible on the total school environment experienced by each student.

The collection of interaction data during all phases of class instruction required another modification in coding procedures. Commonly, observers using the FIAC code from the rear of the room. The main reason given for this placement is that it makes the students and teachers less aware that they are being observed.

In this study, observers moved around the classroom, from day-to-day and coded from different vantage points. During each visit however, they remained stationary. It was felt by the writer that this procedure provided equal coverage of interaction between the teacher and all students. This method of collecting FIAC data was tested during the pilot study and appeared to have little adverse effect upon normal classroom discourse.

Several procedural changes were also made in decoding and analyzing the data. The major change was the proration of the interaction data for individual pupils. Each student's total frequency in each category was prorated to bring all values to a common base. This transformation of frequencies allowed for slight discrepancies in the number of hours each student was observed.

Another factor which should be kept in mind when interpreting the data is that Category 10 (Silence or Confusion) was not included in the analysis of the data. Flanders (1970) suggested that Category 10 is very gross and fuzzy since it incorporates many different types of classroom behavior. For example, he notes that nonproductive confusion is not separated or distinguished from thoughtful analysis and other productive pauses.

Also the ground rules for using Category 10 require a great deal of inference on the part of the observer. It is difficult to determine if a pause is part of a verbal interaction chain or whether it indicates that the interaction has terminated.

In examining the data collected in this study, no attempt was made to analyze the total FIAC matrix for each student. This decision

was based on the analysis of the data collected during the pilot study. It was found that many students did not have enough frequencies in some cells of the 10 x 10 matrix to make interpretation possible. Although this reduces the power of the FIAC, it was felt that enough data were available to make valid comparisons among students.

Findings of the study. The findings of this study indicated that the large percentage of verbal interaction which occurred in the classrooms was dyadic in nature. The only exceptions were Categories 5 and 6 in which a sizeable portion of the interaction occurred between the teacher and the class as a group.

The data further revealed that the proportion of dyadic and group interaction was quite consistent across all classes. In all classes except 6, dyadic interaction represented between 71 and 77 per cent of all interaction which took place.

Undoubtedly, the observation of all aspects of class interaction inflated the proportion of dyadic over that which would be expected if the FIAC had been used in the traditional manner. For example, in this study many of the dyadic interactions occurred during seat work periods. Although the change in procedure for collecting the data make comparisons with other FIAC studies rather difficult, the writer feels that this shortcoming is far outweighed by the value of the additional information which becomes available.

Analysis of the dyadic interaction indicated that students within the same class experienced quite different verbal interchange with their teacher. These differences existed not only in the amount of time each student interacted with the teacher, but also in the type or classification of verbal messages exchanged.

However, when these two types of variation are compared it is found that the greatest variation occurred within categories rather than across categories. For example, a student may have received only one-half as many praise statements (Category 2), as his classmate, yet each student's frequency in Category 2 may have represented the same percentage of their total interaction.

When the total sample was considered, it was found that classes 5 and 7 had much less intraclass variation than the others in nearly all categories of the FIAC. Conversely, classes 3 and 4 had significantly higher variability across all categories. These data suggest, that for some reason, teachers in classes 5 and 7 spread their interaction across students more evenly than did other teachers in the sample.

Some of the findings for individual children were quite astounding and difficult to appreciate in light of the teachers' experience and training. In nearly all classes there were 1 or 2 children who accounted for strikingly low percentages of the interaction for their class. For example, in class 6, there were 3 children who were engaged in less than 40 verbal interactions with their teacher during the total observational period. This means that these 3 children experienced less than 3 minutes of verbal interchange with their teachers during 20 hours of mathematics instruction.

A significant amount of intraclass variation was also found for Teacher Response Ratios, Teacher Question Ratios, and Pupil Initiation Ratios. Generally, the pattern of interaction as indicated by these 3 ratios was quite similar in each class. For most students, the TRR was below the expected values reported by Flanders while the TQR and PIR were

above. The relative values of the TRR's and TQR's suggest that the
teachers were not very responsive to the ideas and feelings expressed
by their students, and that they asked a large number of questions during
the part of class instruction dealing with content. The relatively large
PIR's indicate that a large percentage of pupil talk was self-initiated.

Although the TRR, TQR, and PIR norms, reported by Flanders,
provide a general reference point they are not directly applicable to
dyadic data. Since they are based on total class interaction, they will
tend to underestimate the expected value for dyadic data.

For example, the numerator of the TRR (Categories 1 + 2 + 3)
represents almost completely dyadic interaction, whereas the denomi-
nator (Categories 1 + 2 + 3 + 6 + 7) has a large percentage of group
interaction in Categories 6 and 7. TRR's for dyadic interaction should
by higher in value than for total interaction since the numerator
remains almost the same, while Categories 6 and 7 are diminished in
size, when their group component is subtracted.

Similarly the TQR (4 ÷ 4 + 5) norms for dyadic interaction should
be somewhat higher than those for total interaction. The majority of
statements in Category 4 are dyadic in nature whereas, the majority of
Category 5 statements involves teacher-group interactions.

The norms for the PIR's (8 ÷ 8 + 9) should be quite comparable
since both categories involved, have a very high percentage of dyadic
interaction.

These differences are obvious when comparisons are made between
the TRR's, TQR's, and PIR's for class totals (Table 6) and for dyadic
totals (Tables 25, 26, and 27). Although such differences make compari-

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sons with Flanders work difficult, it is internal consistency which is of primo concern in this study.

One rather unpredictable finding was the lack of association between the TRR's and PIR's for individual students. According to Flanders (1970), there should be a fairly strong positive relationship between teacher responsiveness and pupil initiation. However, in viewing the data from the correlational study it was found that a small negative correlation existed between the two. Apparently, at an individual level, pupil initiation is not contingent upon teacher acceptance.

The results of the correlational study are very surprising and almost impossible to interpret. For example, the correlations between achievement and the first 7 variables were positive and fairly high for group data but negative and moderately high for total individual data. Conversely, correlation between achievement and the last 3 FIAC variables were negative for the group data but positive for the total individual data.

The 'group' based and 'individual' based correlations between the FIAC variables and MSAI scores were also quite disparate. Although the majority of them were very small, the correlations between teacher restrictiveness and MSAI scores were very high for the group data. For the individual data they were much smaller although they did represent the strongest relationships between any of the 10 FIAC variables and MSAI scores.

Several factors, which were discussed in some detail in Chapter IV, may have been responsible for the differences. Firstly, the

correlations for the group data are based on only 7 pairs of scores. As a result the accuracy of the coefficient is open to question. Secondly, the group data and the individual data used in the calculation of correlations were slightly different in character.

The group data for the FIAC variables were drawn from the class frequency on total interaction (Group interaction + dyadic interaction). The data for the individual FIAC variables were drawn from individual totals on dyadic interaction. In the latter case, group interaction was omitted.

Despite this difference, some of the correlations are quite comparable since the total interaction used in calculating the FIAC variable are primarily dyadic in nature.

For example, FIAC variable 8 or Pupil Initiation Ratio $(8 \div 8 + 9)$, is primarily composed of dyadic interaction. For this reason the class total on Categories 8 and 9 should be almost equal to the sum of the frequencies for each individual in the class.

When correlations for each class were compared, surprisingly large differences were found. Due to this large variation, neither the correlations, based on group data or total individual data, adequately represented the association between FIAC variables and pupil achievement, and attitude towards school. It was concluded from these results that the most meaningful way of examining such associations would be at the class level. The data therefore, would reflect the type of dyadic interaction each student experienced with his teacher, and the relationship it had with outcome measures.

Also if future research substantiates that individual children react differently to various patterns of classroom interaction, it

may be most fruitful to focus on individual children in studies of
teacher effectiveness.

It was found for several reasons that the results for this study
were very difficult to integrate with findings reported by Flanders
(1970). Firstly, the results for each project which he directed, varied
considerably. Therefore very few reasonable conclusions can be made
regarding consistent relationships between FIAC variables and pupil
achievement and attitude towards school.

Other factors which make comparisons difficult include differ-
ences in sample selection, subject content, grade level, testing
procedures, length of observation, and procedures for data collection.

Implications of the study. The general findings of this study
point to the need for more consideration of dyadic interchanges in
studies on classroom interaction. This is particularly true at a time
when unparalleled emphasis is being placed on the individual student
and his learning environment.

Hopefully, this investigation will give some impetus to
researchers who are interested in exploring the world of the individual
child and his place in it. Through this type of research new insights
may be gained into school environments, teaching patterns, etc., which
foster growth in individual pupils. For example, it may be discovered
that some children bloom under the tutorship of a very direct teacher,
while others may wilt.

The results of this study also lend significant weight to the
contention held by Good and Brophy (1970) regarding interaction research.
They maintain that most research done on classroom interaction is based

on 2 erroneous assumptions. Firstly, that classroom interaction can best be conceptualized as interaction between the teacher and the class as a group rather, than as dyadic interaction between the teacher and individual pupils. Secondly, that a teacher's interaction with the students in her class is evenly distributed so that the class mean is an adequate measure of how the teacher interacts with each of her pupils. Undoubtedly, the findings of this investigation demonstrate the need for researchers to consider the variance which exists within classrooms.

It has also been demonstrated in this study that the FIAC is an instrument which can be reliably used for collecting data on dyadic interaction. This finding should increase the usefulness of the FIAC as a research tool and also as a feedback instrument for the pre-service and in-service training of teachers.

Before any far-reaching statements can be made regarding the nature of dyadic interaction in the classroom, considerable additional information must be gathered. For example, more studies must be under-taken to determine intraclass variations in dyadic interaction for different grade levels, different subject areas, etc.

If the findings of such exploratory studies indicate that fairly wide spread intraclass variations do exist, then more specific types of questions should be investigated. Such questions might pertain to the relationship between dyadic interaction and the psychological character-istics of teachers and/or pupils; or to the relationship between dyadic interaction and pupil growth.

Relation of the findings to Hough's model of teacher influence. Hough (1967), maintains that indirect teaching behaviors serve as rein-

forcers for student behavior which they follow. Therefore, it would be expected that student behavior conducive to productive learning, would be increased, if it were reinforced by the teacher through praise, acceptance, etc.

In this study it was found that, for most students, a negative relationship existed between indirect teacher statements (Categories 1, 2, 3, and 4), and pupil achievement and attitude towards school. It must be remembered however, that analysis of the data did not provide information regarding the sequence of verbal behavior. As a result, no conclusions can be drawn about the relationship between behavioral chains and pupil outcomes.

In this study, as in other studies undertaken by Flanders, most of the interaction variables are expressed as percentages of overall totals, rather than as absolute frequencies. This treatment of the data is based on the premise put forth by Flanders, that the balance of initiation (directness) and response (indirectness) is more important than the total amount of interaction falling in each category. For example, 2 teachers may be equally responsive to their students, as indicated by their Teacher Response Ratios, yet one teacher may involve her students in twice as many interactions.

In terms of Hough's model, the total amount and consistency of interaction appears to be as important as the balance between initiation and response. In future studies, attention to the total frequency for each category may be fruitful in identifying teachers' behavioral patterns which promote student growth.

Undoubtedly, the main finding of this research indicated that inequalities existed in the amount, and nature of interaction between

teachers and individual pupils. This finding has important implications when applied to Hough's model.

Hough suggests that students need opportunities to respond, before they can be reinforced, and that such reinforcements foster learning. In this study it was found that some children had very few opportunities to respond, thus limiting the amount of reinforcement open to them.

Another important point made by Hough is that individual students may react differently to their teacher's pattern of verbal interaction. For example, one student may find his teacher's criticism (Category 7) crushing, while another may readily accept it. For this reason, it may be invalid to investigate the effects of a teacher's behavior on student growth, from a class perspective. This factor may, in part, explain the large differences, between classes, in the correlation between the FIAC variables, and pupil outcome measures.

The findings of this present research indicate that in future studies, in the area of classroom interaction, dyadic interaction between individual students and their teachers should be considered. It may be discovered that the only productive way to investigate relationships between teacher-pupil interaction, and pupil outcomes, is through detailed behavioral analysis of individual pupils.

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APPENDIX A

Mathematics Achievement Test Adapted

From STA Mid Book Test

TEST 1

Use digits to write each numeral.

a. two thousand seven hundred four _____

b. fifteen thousand sixty _____

c. three hundred fifty million _____

d. four million nine thousand _____

TEST 2

Give the answer to these exercises.

a. m=0x4 _____   g. m=0÷6 _____

b. 1x8=m _____   h. m=7-0 _____

c. 3-3=m _____   i. 1x11=m _____

d. m=0÷6 _____   j. 82÷1=m _____

e. m=2+0 _____   k. m=64x1 _____

f. 1÷1=m _____

TEST 3

Give the answer to these problems.

a. After Jim received 5 model cars, he had 17 cars in all. How many

cars did Jim have before he received the 5? _____

b. There were 67 records on a shelf. After Ken removed some of them,

40 records were on the shelf. How many of the records did Ken

remove? _____

c. Mrs. Banks made 48 sandwiches. After she sold some of them, she

had 15 sandwiches left. How many sandwiches did she sell?

_____

d. 54 people were at a club meeting. After some of them went home,
there were 36 people at the meeting. How many people went home?

_____

TEST 4

Give the answer to these exercises.

a. h=9x4 _____   d. 5x5=h _____

b. 3x9=h _____   e. h=7x4 _____

c. h=4x5 _____

TEST 5

Give answers to these exercises.

a. 21÷7=r _____   d. 24÷3=r _____

b. 35÷5=r _____   e. 20÷4=r _____

c. 32÷8=r _____

TEST 6

Give answers to these exercises.

a. 7x6=v _____   d. v=6x8 _____

b. v=7x7 _____

c. 5x8=v _____

TEST 7

Give answers to these exercises.

a. 54÷9=x _____   d. 81÷9=x _____

b. x=40÷5 _____   e. x=56÷7 _____

c. 49÷7=x _____

TEST 8

Give answers to these exercises.

a. $6 \times 70 = d$ _____

b. $d = 8 \times 300$ _____

c. $d = 7 \times 500$ _____

d. $9 \times 300 = d$ _____

e. $d = 5 \times 600$ _____

f. $d = 7 \times 40$ _____

TEST 9

Give answers to these exercises.

a. $c = 60 \times 80$ _____

b. $80 \times 40 = c$ _____

c. $30 \times 60 = c$ _____

d. $90 \times 70 = c$ _____

e. $c = 70 \times 20$ _____

f. $50 \times 80 = c$ _____

TEST 10

Give answers to these exercises.

a. $25 + 31 = x$ _____

b. $x = \$.87 + \$.17$ _____

c. $12 + 50 + 24 = x$ _____

d. $x = 41 + 97 + 84$ _____

e. $x = 73 + 31 + 45$ _____

TEST 11

Give answers to these exercises.

a. $475 + 103 = n$ _____

b. $\$8.42 + \$6.38 = n$ _____

c. $6326 + 7401 = n$ _____

d. $n = 418 + 153 + 287$ _____

e. $321 + 562 + 817 + n$ _____

TEST 12

Give answers to these exercises.

a. $t = 85 - 62$ _____

b. $\$.21 - \$.19 = t$ _____

c. $92 - 44 = t$ _____

d. $51 - 17 = t$ _____

e. $t = 78 - 40$ _____

TEST 13

Give Answers to these exercises.

a. 425-314=w _____

b. $5.56-$1.38=w _____

c. w=672-263 _____

d. 1298-199=w _____

e. w=$85.02-$33.98 _____

TEST 14

Give answers to these exercises.

a. 24+y=203 _____

b. y+877=1000 _____

c. 742=y-350 _____

d. 1256=635+y _____

e. 249+y=681 _____

APPENDIX B

Minnesota Student Attitude Inventory

1. I get along well with this teacher.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

2. This teacher has lots of fun with us.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

3. This teacher is good at thinking things through.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

4. This teacher is very fair with kids who get in trouble.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

5. I'm usually afraid that I will fail my tests.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

6. This teacher lets us all have turns doing the jobs that are fun.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

7. I think this teacher picks on some boys and girls unfairly.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

8. This teacher lets us discuss things in class.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

9. This teacher will always listen to both sides of an argument.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

10. This teacher is quick to see what mixes you up in your schoolwork.

    SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

11. This teacher makes sure we understand our work.

    SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

12. This teacher is always fair with each boy and girl.

    SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

13. I worry about getting good grades.

    SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

14. This teacher is one of the best I have ever had.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

15. I get pretty tired of this class.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

16. This teacher certainly knows how to teach.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

17. I never worry about taking tests.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

18. This teacher really understands boys and girls my age.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

19. This teacher knows a lot.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

20. I find it easy to talk with this teacher.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

21. Our teacher makes everything seem interesting and important.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

22. I worry about getting my work done.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

23. This teacher makes sure not to hurt your feelings.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

24. I really like this class.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

25. This teacher keeps order with a fair and firm hand.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

26. This teacher makes it fun to study things.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

27. This teacher doesn't listen to what SOME boys and girls have to say.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

28. Our teacher helps us when we have problems with our work.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

29. This teacher likes children.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

30. I wish I could have this teacher next year.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

31. This teacher punishes me for things I didn't do.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

32. Sometimes worrying about my schoolwork makes me feel sick.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

33. Our teacher gives us a chance to show what we are good at.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

34. I worry about giving the wrong answers in this class.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

35. This teacher gives us a chance to show what we are good at.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

36. Schoolwork is very hard for me.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

37. When I'm in trouble I can count on this teacher to help.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

38. This teacher likes to hear students' ideas.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

39. This teacher makes sure no children get left out of things.

   SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

40. Our teacher makes sure that each of us gets a chance to talk.

SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

APPENDIX C

Interaction Data Gathered On Individual

Students During Pilot Study

Frequency of Tallies In Each Category For Each Student

Student Number				Category					
	1	2	3	4	5	6	7	8	9
1	0	17	21	59	7	26	10	59	42
2	0	10	13	58	4	13	9	50	13
3	0	9	3	74	31	15	6	62	12
4	0	6	13	42	23	18	4	40	21
5	1	13	6	89	13	11	13	68	16
6	2	5	10	72	18	20	27	58	41
7	0	4	11	30	9	24	22	24	25
8	1	7	7	43	3	20	12	41	11
9	1	4	9	31	1	10	28	29	31
10	0	7	7	48	0	9	11	50	5
11	0	5	8	54	0	19	39	48	10
12	0	12	16	37	0	26	10	44	36
13	0	8	12	33	18	18	20	34	48
14	0	5	11	39	0	9	5	47	11
15	0	7	16	53	5	17	9	49	19
16	0	9	11	55	5	24	10	38	34
17	0	8	6	104	9	31	13	69	7
18	1	4	3	26	0	3	2	25	12
19	0	5	11	35	1	33	0	36	25
20	0	12	14	64	2	42	7	62	31
21	0	14	6	27	8	6	0	26	6
22	0	11	4	34	0	15	5	36	10
23	0	9	18	60	3	27	18	72	50
24	0	8	5	46	4	16	8	38	12
25	0	7	9	41	2	11	0	39	2
26	0	6	3	61	3	8	6	46	5
27	0	13	13	65	2	19	31	57	21