Educational Achievement of Elementary School Students from two Cultural Groups as Related to Reasoning Ability and Classroom Learning Environment

By

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Abstract

The purpose of this study was to assess the relationship between thirteen independent variables and the academic achievement of Indian and non-Indian students and to make comparisons between the two cultural groups. The independent variables were classified into three groups: one person characteristic: reasoning ability, five classroom environmental variables: satisfaction, friction, competitiveness, difficulty, and cohesiveness, and seven categorical variables: sex, cultural group, sex x culture interaction, grade, school, grade x school interaction, and school x culture interaction. The dependent variables were five subtests of the Canadian Test of Basic Skills. The sample included 75 Indian and 95 non-Indian students in grades four, six, and eight in three schools, one federal school on a reserve and two provincial (joint) schools.

A stepwise multiple regression program was used to analyze the data. The total group was examined regarding the relationships between the thirteen variables (including cultural group as an independent variable) and the five achievement tests. Because these analyses indicated that cultural group was a significant predictor of achievement, the two cultural groups were separated and separate analyses were made regarding relationships between the remaining ten independent variables and the achievement test scores.

The results indicated that the non-Indian group obtained significantly higher mean achievement test scores than the Indian group on all five C.T.B.S. subtests although there was considerable overlap

between the two groups. Reasoning ability, as measured by Raven's Progressive Matrices, was a significant predictor of all achievement test scores for both Indian and non-Indian students. The Raven's scores contributed less to the variance in Indian students' achievement in Mathematics and Language Skills than to non-Indian students' achievement in the same subtests. It was suggested that Indian students may use different cognitive strategies than non-Indian students to learn Mathematics and Language Skills. Further research was recommended to explore this area.

Two classroom environmental variables, competitiveness and cohesiveness, were significant predictors of achievement scores. Competitiveness was positively related to Indian students' achievement on four subtests. It was recommended that experimental studies be undertaken to attempt to discover causal relationships between competitiveness and achievement. Cohesiveness was positively related to non-Indian students' achievement in Language Skills and Mathematics but was negatively related to Indian students' achievement in Mathematics. When acting together, the five environmental variables explained more of the variance in Indian students' achievement on three subtests than in non-Indian students' achievement on the same tests.

School was a significant predictor of Indian students' achievement in Vocabulary and non-Indian students' achievement in Mathematics. Grade was a significant predictor of achievement in Reading, Language

Skills, and the Composite Score for the Indian group. Sex was a significant predictor of non-Indian students' achievement in Language Skills with females achieving significantly higher scores than males.

Differences in prediction of achievement for the Indian and non-Indian group were discussed in terms of the cumulative deficit hypothesis, sociocultural phenomenon and biographical histories.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

Introduction

Studies of the educational achievement of Indian children have consistently revealed underachievement. Attempts to discover the reasons for this underachievement have generally concentrated on one variable, the Indian student or the culture of the Indian student. Recently, some authors (Fisher, 1969; Lane, 1972) have suggested that educators should change their perspective and look at the educational system, its culture, organization, and climate, for variables related to the underachievement of Indians. A great deal of research on the classroom climate or learning environment has been done with non-Indians over the past few years. These studies have "demonstrated that student perceptions of the classroom learning environment can be measured reliably and that environmental measures are valid predictors of learning" (Anderson and Walberg, 1974, p. 82). Walberg (1970) stated that much of the reliable variance in student achievement is "attributable to the aptitude of the learner and the environment of learning, leaving only a small part to be accounted for by instructional variables and perhaps by interactions between the three factors" (p. 185).

The major purpose of this study was to assess the relationship between several independent variables and the academic achievement of Indian students. The study also investigated the academic achievement of non-Indian students in order to make comparisons between the two racial groups regarding factors related to achievement. Specifically,

this study investigated the academic achievement of 75 Indian and 95 non-Indian students in grades four, six and eight attending three different schools in the spring of 1979. The schools included a federal school on a reserve and two provincial schools.

The study investigated the correlation between academic achievement and 13 variables grouped into three major classifications as follows: (a) Person Characteristics: reasoning ability which was defined as a person's score on Raven's Progressive Matrices. (b) Environmental Variables: students' perceptions of the classroom learning environment which includes their views of the following five class dimensions: satisfaction, friction, competitiveness, difficulty and cohesiveness. (c) Categorical Variables: sex, cultural group, sex x culture interaction, grade, school, grade x school interaction, school x culture interaction.

Evidence of the failure of Canadian schools to meet the educational needs of Indian children is seen in the figures on underenrollment, absenteeism, dropouts, and overageness. Statistics presented in the Hawthorn (1967) report revealed that from 1951 to 1962 there was a 95% loss of the Indian school population between grades 1 and 12 (as opposed to a national non-Indian rate of 12%). Only 12% of Indian students were in their proper age-grade; the average Indian student was 2.5 years behind the average non-Indian student by the end of the eighth grade. The attendance of Indian children in public schools was sporadic and low. Also, in 1963 the proportion of Indian students attending university was 57 out of a total student population

of 45,000. Bowd (1977) stated that

> . . . in the decade since the Hawthorn report there has been some decline in the school drop-out rate and an increase in the number of Native teachers and university graduates, together with the initiation of numerous educational training and development programs. (p. 334)

However, the statistics do not present an encouraging picture. In a report on Indian education in Saskatchewan commissioned by the Federation of Saskatchewan Indians (1973) the authors used 1969-1970 statistics and reported that by grade 4 more than half of the Indian students were two or more years older than the expected age for their grade and that two-thirds of Indian students in grade 8 were two or more years behind. The report stated that less than 5% of Indian students eventually completed grade 12. Frideres (1974) stated that, compared to the general Canadian population, the percentage of native children attending school was about half. Statistics for the 1974-1975 year (in Hoople & Newbery, 1976) showed that 80.9% of all status Indian children dropped out before completing high school and that 1% of all Indian students in Canada were attending university.

It appears that, despite expanded educational opportunities, the Indians have not achieved success in the present educational system. Indian leaders and parents and educators of Indian children are becoming increasingly concerned by the apparent failure of the present educational system to meet the needs of Indian students. While it is clear that individual factors such as intelligence or reasoning ability are important, it seems that an assessment of the school

environmental factors related to learning is also important, in that it may then be possible to manipulate environmental factors to bring about optimal conditions for learning among particular groups of children. Thus the results of this research will be beneficial to educators in planning programs to better meet the academic needs of Indian children. If a greater proportion of Indian children begin to achieve success in the educational system, this will be of benefit to them, to their parents, to the Indian leaders, and to Canadian society as a whole.

Definitions

Indian. For this research, 'Indian' is used not in the strictly legal sense, but to refer to those of Indian ancestry living on the reserve who are affected by the federal government policy of Indian education.

Federal school. This refers to the federal day school which is located on the reserve and is built, staffed, and administered by the Indian Affairs Department of the Government of Canada. The Federal Day School provides education for those Indians on the reserve and for non-Indian children there, such as teachers' children.

Provincial school. For the purpose of this paper, provincial schools are simply non-Indian schools built and operated by institutions other than Indian Affairs, primarily for the benefit of a non-Indian population. They are part of the existing provincial school system. Provincial joint schools or integrated joint schools have mixed classes for Indians and non-Indians.

Reasoning ability. For this study, reasoning ability refers to a person's capacity for "observation and clear thinking" (Raven, 1960, p. 2) and is operationally defined as a person's score on Raven's Progressive Matrices.

Classroom learning environment. The classroom learning environment refers to the social climate of the classroom which includes class group properties that are measurable. These properties include interpersonal relationships among pupils, relationships between pupils and their teacher, relationships between pupils and both the subject studied and the method of learning, and pupils' perceptions of the structural characteristics of the class. Dimensions that are representative of the interpersonal realm include cohesiveness and friction among classmates. The extent to which students like or dislike their class, or their satisfaction, is representative of both pupil-teacher relationships and pupil-subject-method relationships. The pupils' perceptions of the difficulty of the class relate to the subject and method of study. The dimension of competitiveness is representative of structural characteristics of the class and is a central concept in group dynamics. The classroom learning environment is operationally defined as a student's scores on the My Class Inventory (Anderson and Walberg, 1971) sub-tests: satisfaction, friction, competitiveness, difficulty and cohesiveness. The unit of analysis in this study is the individual student and all scores are individual scores.

Learning Environment Inventory. The Learning Environment

Inventory (LEI) was developed by Walberg and Anderson (1968) for the evaluation of the Harvard Project Physics. The LEI is an instrument designed to measure the social climate of learning of a class as perceived by the pupils in it. It is an expansion and improvement of the Classroom Climate Questionnaire which was developed by Walberg. The final version of the LEI contains 105 statements describing typical school classes grouped into 15 scales defined as follows:

1. Cohesiveness. The feeling of intimacy that has developed as a result of several individuals interacting over a period of time.

2. Diversity. The extent to which the class provides for a diversity of pupil interests and activities.

3. Formality. The extent to which behavior within the class is guided by formal rules.

4. Speed. The rate of progress of the class.

5. Environment. The physical environment, including the amount of space available and the type of recreational equipment.

6. Friction. The extent to which conflict may affect the behavior of the class.

7. Goal direction. The recognition of goals and their subsequent acceptance by the group.

8. Favouritism. The extent to which children receive differential attention on the basis of personal teacher preferences.

9. Cliqueness. Aims at revealing the extent to which subgroups exist in a classroom and their influence on social interaction.

10. Satisfaction. The extent to which students like or dislike their class.

11. Disorganization. The extent to which students consider their class to be disorganized

12. Difficulty. The relative perceived difficulty levels of various courses.

13. Apathy. Compliments the cohesiveness scale, but also indicates if individuals within the class feel any affinity with class activities.

14. Democratic. Indicates the extent to which a "democratic" atmosphere exists within a classroom.

15. Competitiveness. The degree of competitiveness existing within the class.

My Class Inventory. The My Class Inventory (MCI) was developed by Walberg and Anderson for use with elementary level children. The MCI is a downward extension of the LEI. It contains 45 items distributed over the scales, satisfaction, friction, competitiveness, difficulty and cohesiveness.

Achievement. Achievement is defined as the students' scores on four of the Canadian Test of Basic Skills (CTBS) subtests, Vocabulary, Reading, Language Skills, Mathematics Skills plus a Composite score.

CHAPTER II

Review of the Literature

Theory and Theoretical Models

Kurt Lewin's field theory has stimulated the study of social behavior in terms of the environment as well as the person. Lewin's proposition is that human behavior is a function of the person and the environment. This implies that a person's behavior is related both to characteristics within himself and to the social situation in which he presently exists (Wrightsman, 1972). The application of field theory to education implies that learning is related both to characteristics within the learner (his abilities, personality, and so on) and to the learning environment (the climate, organization, culture of the school).

One aspect of the learning environment, the classroom climate, has been studied extensively. Most of the classroom climate studies are based on theoretical models and concepts from social psychology. Two of the preeeminent models are Murray's Need-Press Model and Getzels and Thelen's Classroom as a Social System Model.

> Under Murray's Model, the demands, sanctions, and expectations within an environment (environmental press) give a social system its particular climate. In Getzels and Thelen's model, 'climate' develops as a result of the teacher's transactional style, that is, the way in which he or she balances role requirements and personality needs within the classroom. (Nielsen & Kirk, 1974, p. 57)

Much work has been done in characterizing the learning environment and in measuring its association with other variables in the

classroom. In a series of studies of the Harvard Project Physics, a new high school course, it was reported that student perceptions of the classroom environment could be measured reliably. Walberg (1969b) found that environmental measures were valid predictors of learning. Anderson, Walberg and Welch (1969) concluded that environmental variables can be manipulated. Environmental variables have been found to be predictable from the class size, the biographical characteristics of its members, the mean intelligence, prior interests and achievements of pupils, and instructional variables (Walberg & Ahlgren, 1970). Walberg (1969a) reported significant interactions between environmental variables and class size. Other studies have found relationships between learning environments and class subject content (Anderson, 1971), certain personality factors of teacher interns (Cayne, 1970), and academic self-concepts (House, 1975). Moos (1978) found that different clusters of classroom climate variables were related to student satisfaction, student moods, and teacher satisfaction. Still another study (Randhawa & Michayluk, 1975) found significant differences between social climates of learning in rural and urban classrooms. From these various studies it is clear that the classroom learning environment is a valid concept which can be measured reliably and which is related to other variables in the classroom.

Many contemporary learning theorists focus on the learner and instructional variables related to learning. They give little, if any, emphasis to the climate of learning. Walberg (1970), on the other hand, claimed that there is little variance in

learning left to be accounted for by instructional differences after considering the strong effects of aptitude and the environments of learning during instruction. Walberg has proposed a linear regression model which links the environment with students' aptitudes and instruction in predicting learning outcomes. He suggested that environment has the same relation to instruction as ability has to achievement; that environment has to do with the context of learning and ability with the student, and both are more general, implicit, and enduring than the more specific, explicit, and temporary aspects of instruction and achievement (Anderson & Walberg, 1974, p. 82).

After conducting an extensive review of the literature on the factors which affect the achievement of Indian students in Canadian schools, Clifton (1977) proposed a theoretical model to explain the differential performance of Indian and non-Indian students. He suggested that "Indian students probably have poor academic performance not simply because they are Indians but because they have values, language facilities, cognitive abilities, and patterns of interaction which are not congruent with those expected in the education system" (p. 200). The part of Clifton's model that has most relevance to the present study is his conception of the role of "interaction with others" to academic performance. This aspect can be construed as an environmental variable in that it can be related to the LEI subscales of Cohesiveness and Friction which are representative dimensions of the interpersonal relationships among pupils. It can also be related to the LEI subscales of Formality, Democratic,

Disorganization, and Favoritism, which constitute properties of teacher-pupil interaction. Clifton proposed that interaction with others has both a direct and indirect effect upon academic performance. "This means that differential academic performance between Indian and non-Indian students may result directly from the interaction patterns the students have with their teachers and indirectly through the affective states that develop from such interaction" (p. 200).

In summary, Lewin's field theory suggests the importance of the learning environment as well as the person in the study of variables related to learning or academic achievement. Murray's model suggests that environmental press gives a learning environment its particular climate, while Getzels and Thelen's model suggests that the climate of the learning environment develops from the teacher's transactional style. These two models have provided the rationale for the development of instruments to measure the climate of the learning environment. Walberg proposed a linear regression model for learning which includes instruction, aptitude, the learning environment, and their interactions. Finally, Clifton's theoretical model includes one aspect of the learning environment: interaction with others, which he suggests has an important effect on academic achievement, and that this aspect affects Indians' and non-Indians' achievement differently. In conclusion, these theories and theoretical models suggest that the climate of the learning environment is one important variable in explaining the academic achievement of Indian and non-Indian students.

Factors Related to Academic Achievement

Reasoning ability. The literature of educational research has identified mental ability or intelligence as a significant factor in influencing academic achievement among non-Indian students (Bental, 1966; Keller & Rowley, 1964; McBee & Duke, 1960; Vineyard & Baily, 1960). Measured intelligence typically accounts for 50-60% of the variance in school achievement among non-Indians (Walberg, 1970). Much past research has been directed toward discovering why Indian children do not achieve in school to the same degree as non-Indian students, but very few of these studies used any measures of academic achievement as dependent variables.

One study involving Indian students that did use academic achievement as a dependent variable was carried out by Dankworth (1970). He tested 140 Indian students in grades 7 to 12 in Nevada public secondary schools. Using results from the California Achievement Test and the California Test of Mental Maturity, Short Form (for I.Q.), plus other tests, he examined the relationship between seven variables and achievement. He found that mental ability contributed 48.9% to the variance in achievement being explained, while the other six variables accounted for only 11.7% of the variance. The test of mental ability used in this study contains both verbal and non-verbal components.

Clifton (1977) suggested that there may be "an important achievement component inherent within verbal IQ tests" (p. 191). Therefore it could be argued that the high correlations found between traditional

intelligence tests and achievement tests may be due to their common high verbal components. It has been well documented that Indian students do better on non-verbal tests than on verbal intelligence tests (MacArthur, 1968; Renaud, 1958; West & MacArthur, 1964). MacArthur (1968) found that Raven's Progressive Matrices, a non-verbal test, is a better predictor of intellectual potential than traditional mental tests for Indian students. West & MacArthur (1964) evaluated selected intelligence tests to identify those tests which showed a minimum of cultural bias for two samples of Métis and Indian children. They found that those tests which showed minimum cultural bias also showed significant correlation with academic achievement. For example, scores on the Raven's Progressive Matrices were significantly correlated with grade placement on the California achievement battery. Correlations ranged from .30 to .72 for different grade levels and different samples. This suggests that a non-verbal test of reasoning ability such as the Raven's would explain from 9% to 52% of the variance found in achievement scores for Métis and Indian children.

In summary, an examination of the literature demonstrates that reasoning ability, whether measured by conventional intelligence tests or non-verbal "culture-reduced" tests, is a significant factor in explaining academic achievement among Indian students.

Classroom learning environment. Much work has been done in characterizing the learning environment, in developing instruments for measuring the learning environment, and in measuring its

association with other variables in the classroom. The present review will concentrate mainly on those studies which used self-report pupil questionnaires and reported on cognitive outcomes related to characteristics of the learning environment. The vast majority of these studies involved non-Indian students in junior high and high school classrooms.

A series of studies, based on Getzels and Thelen's theoretical model of the class as a social system, was carried out on Harvard Project Physics using secondary school physics classes. Harvard Project Physics was an experimental course using a variety of new instructional media and emphasizing the philosophical, historical, and humanistic aspects of physics. One of the earlier studies used the Classroom Climate Questionnaire (CCQ) for assessing the pupils' perceptions of the learning environment (Walberg & Anderson, 1968). This study was designed to relate individual perceptions of classroom climate to individual student achievement. The researchers found that different perceptions of classroom climate were associated with different kinds of cognitive growth, that is, achievement and understanding. Students who gained most on the Physics Achievement Test perceived their classes as socially homogeneous, intimate groups working on one goal. The limitations of this study were that the sample size was small (85) and the CCQ was later judged as an unreliable instrument. Subsequent studies of the Harvard Project Physics used a more reliable instrument for assessing classroom climate, the Learning Environment Inventory (LEI). (See p. 5

for references and description of the LEI).

In another study of Harvard Project Physics, Walberg (1969b) used the LEI and related its scales to various learning criteria. He found that the environmental scale of Difficulty was the single best predictor (using simple correlations) of the cognitive posttests. The partial correlations revealed that the learning environment variables accounted for significant variance (.39, .28, .37) in the cognitive posttests after variance in the control variables (IQ, physics achievement, science interest) was removed.

In another study, Walberg (1969c) replicated the work on the effects of classroom climate on learning and investigated the effects of student biographical characteristics, personality, and intelligence on learning for the class as a whole. He found that the sets of biographical items and the learning environment scales each predicted a little less than 25 percent of the variance in the learning criteria; IQ by itself accounted for about 12 percent of the variance. Other findings were that student personality characteristics, teacher inexperience with the course, class size and the proportion of girls in the class did not predict the criteria.

In a study of 57 physics classes, Walberg (1970) investigated the pattern of environmental variables that would best predict gains in physics achievement. He found that for both boys and girls, the pattern suggests that intellectual challenge and group cohesiveness are the best predictors of gains, that is, high scores on difficulty, low scores on friction. The boys gained less in environments

perceived as high on favoritism and disorganization. Anderson (1970) examined the effects of class properties on individual learning gains in 113 physics classes. Positive effects on learning were reported for the Cohesiveness and Difficulty scales; Friction bore a negative relationship to learning.

The Walberg and Anderson (1972) study involved sixty-four grade 9 and 10 classes in eight different subject areas. The results were similar to those of other studies. In classes that students rated the environment higher on Cohesiveness, Environment, Satisfaction and Democracy and lower on Speed, Friction, Favoritism, Cliqueness, Disorganization and Apathy, the students tended to score higher on the standardized achievement tests. The incremental predictive validity (accounting for achievement variance beyond that accounted for by IQ) of the environment scales was significant. These results may be questionable in that class mean IQ was an estimate based upon only approximately five individual scores in the class.

The Moos and Moos (1978) study used the Classroom Environment Scale (CES) to measure the psychosocial environment in 19 classes in a high school. The CES was developed by Trickett and Moos; the rationale used for the development of the CES was basically derived from Murray's conceptualization of environmental press. Details about the development and correlates of the CES are given in Trickett and Moos (1973) and Moos and Trickett (1974). In the 1978 study, Moos and Moos related the social environments of the classes to student absenteeism rates and to average final grades and found significant

relationships. Students and teachers perceived classrooms in which teachers gave higher average grades as high in Involvement and low in Teacher Control. The results involving final grades are subject to question in that final grades were given by the teacher and thus may be subject to teacher bias. Classes with high absenteeism rates were seen as high in Competition and Teacher Control and low in Teacher Support. Involvement measures the extent to which students have attentive interest in class activities and participate in discussions. Teacher Control measures how strict the teacher is in enforcing the rules. The authors suggested that the relationships may be mediated by student background characteristics (such as IQ) and the subject matter of the class. Teacher support measures the amount of help, concern and friendship the teacher directs towards the students. These findings on absenteeism rates as related to climates are particularly relevant.

In another study, Trickett and Moos (1974) used the CES to link student satisfaction and mood to the social environment of the high school classrooms. Classrooms in which students reported a great deal of content learning combined an effective concern with students as people with an emphasis on students working hard for academic rewards (competition) within an organized context. Both Trickett and Moos's (1974) and Walberg's (1969b) results suggest that environments must be intellectually challenging to encourage growth in achievement and understanding. Students may learn more in classrooms that emphasize competition and difficulty, but they are apparently also absent

more often from these classrooms. Thus, emphasis on competition may encourage learning among some students at great personal cost to others (Moos and Moos, 1978).

House (1975) conducted a study involving 1,079 ninth grade algebra and math students to determine if scores on LEI could predict scores on a Brookover-type scale for self-concept of academic achievement. Previous studies by Brookover had established that students' self-concepts of academic ability were significantly related to school achievement. Therefore, House proposed to examine the effects of classroom climate on academic self-concept and subsequent learning outcomes. She found that favoritism was negatively related to self-concept and that cliquishness and friction were positively related to self-concept. The findings relating cliquishness and friction to self-concept are contrary to those found in previous research relating these factors to achievement. There may be intervening variables to explain these findings such as the importance of peer group membership to adolescent self-concept.

Another study investigated the relationships between classroom climate, IQ, biographical data and achievement in 48 grade nine and ten Math classes (O'Reilly, 1975). From his findings, the author concluded that although input (IQ, biographical data), process (LEI), and output (achievement) are all intercorrelated, process variables have an independent effect on achievement.

All studies reviewed thus far that related classroom climate to learning were conducted in high schools and in fact the majority of

classroom climate research has been done in high schools. A few studies that did involve elementary school students will now be reviewed.

The Beady (1975) study included 30 elementary schools, each with a student body of over fifty percent black students. The researcher used a revised teacher, student, and principal questionnaire developed by Brookover, Gigliotti, Henderson, and Schneider to measure academic climate variables. The academic climate variable, student reported sense of futility, was identified as the single independent variable which accounted for most of the variance among the achievement levels of the schools in the sample. This variable was a measure of the students' perception of their ability to control or influence the "system" around them, particularly those aspects which influence achievement. A coefficient of .71 between sense of futility and achievement was found. Socioeconomic status did not significantly account for variance in achievement beyond that accounted for by academic climate variables.

Similar findings were reported in another study which involved fourth graders in 24 schools (Brookover and Schneider, 1975). The researchers found that the most important climate variable was students' reported sense of futility which accounted for 44.9% of the variation in achievement not in common with SES, race, or rural-urban location. Sense of futility included student perceptions of teachers' and students' feelings of hopelessness and lack of caring about academic achievement. There are limitations in this study.

First, the authors define achievement as the school mean achievement for fourth-grade students, which doesn't explain whether these were standardized achievement test scores or final grade scores. Secondly, the types of questionnaires administered are not described although it might be assumed that they are the questionnaires developed by Brookover which were mentioned in the Beady (1975) study.

Still another study of 49 teachers and 25 grade seven and eight classes had similar results (Koenigs, Fiedler, and deCharms, 1977). The authors used a variety of test instruments. These authors reported that in classrooms where pupils have more influence, achievement is greater. The findings of these studies done in elementary schools are in agreement with the findings of studies done in high schools (Moos & Moos, 1978; Walberg & Anderson, 1972). Thus students seem to perform better in environments which they perceive as democratic or in which they feel that they have some influence and involvement in decisions and thus they do not feel hopeless.

The research relating classroom climate variables to academic achievement has not been extended to studies of Indian students' achievement. Therefore, the literature reviewed will include studies and essays from which inferences regarding environmental variables can be made.

In a study of 42 Indian and Eskimo ninth graders in integrated classes, Kleinfeld (1973) found that students' perceptions of classroom climate consistently showed a moderately strong relationship to their verbal participation in each academic subject. She suggested

that teachers should create a warm, supportive classroom climate to encourage Native verbal participation. No attempt was made to relate verbal participation to academic achievement.

The Federation of Saskatchewan Indians' report (1973) involved the interviewing of 132 Indian drop-outs in order to obtain information about Indian students' reasons for dropping out of school. While they found that home problems were judged to be an important reason for withdrawing from school, racial discrimination and a general and direct dislike for school were also important reasons. The authors suggested that "the dominant etiology of the school attrition problem is to be found within school situations, rather than imposed by factors from without the school." The report concluded that "Indian students fully believe that they will sooner or later lose to an immense, impersonal, faceless bureaucracy. They expect to lose individually and 'en masse,' and they are accustomed to having practically no moral support in this losing enterprise" (p. 217). If the findings and conclusions of this report were reinterpreted in terms of the classroom climate variables of the LEI, it could be inferred that these drop-outs would have perceived the school situation as low in Satisfaction, Cohesiveness, Democracy and high in Apathy, Friction and Favoritism. These perceptions of the classroom climate are associated with low achievement as indicated by previous research.

In a review of studies related to academic performance and school integration in the United States, Maynor (1970) found that these studies "agreed that disadvantaged students - especially blacks -

were more strongly influenced by the student environment than were advantaged students and that this relationship increased over time" (p. 35). The Coleman (1966) report was an extensive survey, done in the United States, which investigated the critical factors relating to the education of minority children. It found that whatever measure was chosen to investigate the achievement of the minority child, attitudinal variables (self-concepts, success in school, sense of control of the environment) had the strongest relationship to achievement. The report concludes:

> A pupil attitude factor, which appears to have a stronger relationship to achievement than do all the "school" factors together, is the extent to which an individual feels that he has some control over his own destiny. . . . The responses of pupils to questions in the survey show that minority pupils . . . have far less conviction than whites that they can affect their own environments and futures. (p. 22)

Franklyn's (1974) study of 54 Indian-Métis and 54 non-Indian grade nine students in the Northwest Territories investigated whether attitudinal variables and ethnic status combine to produce an effect on school performance. He found that while the Indian-Métis and non-Indians expressed similar alienative attitudes toward the school, they differed on the dimension of Normlessness.

> This finding indicates that the Indian-Métis students, more than their non-Indian counterparts, believe that socially unapproved behaviors (making false statements to teachers and educational authorities; using illigitimate means to acquire acceptable grades) are justifiable to achieve the important goals and values stressed in the school setting. (p. 162-3)

Franklyn suggested two possible explanations for this finding. One reason may be related to the organizational structure of the school. He suggested that if the Indian-Metis student sees the goals of the school as unimportant, "and if sanctions are imposed for not achieving those goals, then utilizing socially unacceptable behavior patterns to meet the objectives of the school may appear justifiable" (p. 164). Another reason Franklyn suggests for the finding that some of the values of the schools are rejected by the Indian-Métis is that some of these values may represent the subjection of cultural values to the requirements of the institution. That is, if the student accepts the values of the school, he must reject his cultural and family beliefs. In view of Franklyn's findings, it seems advisable that educators look at the organizational structure of schools in order to discover its nature and effect on the Indian-Métis students. The climate of the school and the values it transmits should also be examined in order to make the values more compatible with or acceptable to the Indian-Métis student. Franklyn also found that non-Indian students did significantly better than Indian-Métis students in three subtests of the achievement test used (the Grade IX Alberta Battery of Junior High School Achievement Tests), despite the attempt to control for academic aptitude. Franklyn suggested that "inflexible curricula and psychological unreadiness are the chief factors causing lowered educational achievement by the Indian-Métis in comparison to non-Indian students" (p. 166).

Frideres (1974) suggested four disruptive influences on the

educational and social development of Indian children. These factors included: the switch from federal schools to provincial schools after beginning in a federal school as a distinct cultural group, discrimination, age differences, and competition. Frideres suggested that "competition may make a child psychologically uncomfortable and adversely affect his academic performance" (p. 37). Research has indicated that some Indian cultures stress cooperative rather than competitive behavior. Miller and Thomas (1972) found Blackfoot Indian children aged 7-11 superior to urban whites on certain tasks demanding cooperation. In terms of classroom climate variables and their effect on performance, it is expected that Indian students would perform better in a climate perceived as cooperative rather than competitive.

Elliott (1970) claimed that the competition for achievement is greater in integrated (non-federal) schools than in federal schools. If the integrated school has a majority of high socioeconomic status students and if the Indian students are low socioeconomic and in the minority, there is further evidence to substantiate this claim. In a study of 2,677 fifth graders in Wisconsin, Walberg, Sorenson, and Fischback (1972) found that the greater the fraction of high-SES children in the fifth grade, the less competitive the high-SES children perceive the school, but the more competitive the low-SES find it (low-SES children in minority). These authors used the MCI to measure classroom climate. This suggests that Indian students, of low SES, who are in the minority in an integrated school, will

probably perceive that school as competitive.

In summary, the literature relating classroom learning environments to academic achievement indicates that classroom climate variables account for substantial variance in measures of student learning in non-Indian elementary and high schools. Also, a review of the literature pertaining to the academic achievement of Indian students suggests that classroom environmental variables are related to their achievement in school.

Other variables. There are many other variables, as well as reasoning ability and classroom learning environments, that have been related to academic achievement of non-Indian and Indian students. In a study of 1,400 non-Indian seventh grade students, McBee and Duke (1960) found that significant differences in achievement were attributable to differences in motivation on the Arithmetic, reading and science tests (but not on the language or social studies test). Motivation was measured by use of the scholastic motivation scale from the Brown-Holtzman Survey of Study Habits and Attitudes. On the other hand, Dankworth (1970) found that achievement motive did not make a significant contribution in explaining the variance found in achievement for a group of Indian students. Dankworth used two different methods to measure achievement motivation: McClelland's projective measure and the Ai (Achievement via independence) scale of the California Psychological Inventory. McBee and Duke suggested that their measure of motivation may be unreliable and thus their findings relating motivation to achievement may not be valid.

Chadwick, Bahr, and Stauss (1977) conducted a study of 147 Indian students attending public secondary schools in Seattle, Washington. The purpose of the study was to assess the relationship between academic achievement and five factors: self-concept, achievement motivation, anti-Indian discrimination, culture conflict, and family instability. The findings of this study suggest that achievement motivation (as measured by an original 8-item scale) and culture conflict (measured by 5 different indicators) are the most important correlates of academic achievement among urban Indian students. A problem with this study is that the authors used grade-point averages as the measure of academic achievement and grades are not reliable measures of achievement because of possible teacher bias in giving the grades.

Bowd (1972) examined the relative importance of vocabulary, general intelligence, language background and socioeconomic status in determining the educational achievement, in terms of grade level, of several Indian groups. Grade level was taken as an indicator of present achievement or ability as distinct from potential achievement. His study included Indian and Metis boys, aged 12-14, from four cultural groups in Western Canada and a sample of white boys from Calgary. Bowd found that vocabulary, as measured by the Mill Hill Vocabulary Scale, appears as the prime determinant of grade level for the Indian child. Among the sample of white children studied, "it was general intelligence (as measured by Raven's Standard Progressive Matrices) rather than verbal skills which determined

grade level" (p. 74). It should be mentioned that grade level is not likely as good a measure of present achievement as standardized achievement tests and this may account for some of Bowd's findings.

In summary, a review of the literature reveals that there are numerous factors which affect the academic performance of Indian and non-Indian students. In terms of Lewin's theory, these various factors can be grouped under the two general factors of person and environment. Characteristics of the person which affect academic achievement would include reasoning ability, achievement motive, values, verbal ability, language used, feelings of alienation and self-concept. Environmental variables would include family, community and school environment characteristics such as values, interaction with others, the extent to which goals may be blocked, the students' sense of control over environment, discrimination, socioeconomic status, and amount of support. Previous research reveals that although these numerous factors do affect achievement, they vary in the strengths of influence and also in the direction of influence on achievement. That is, a factor may have a direct or indirect effect on achievement. For purposes of this study, one person characteristic variable and one environmental variable was chosen. The number of variables chosen was limited because of restrictions based on the type of data analysis used and the sample selection procedure. The person characteristic of reasoning ability was chosen in that it has been empirically identified as the most significant 'person' factor influencing academic achievement and theoretically the influence is

direct. The environmental variables related to the classroom learning environment were chosen both because they have been shown to influence achievement and also because they are more subject to manipulation that either family or community environmental variables.

Hypotheses

On the basis of relevant theory and research, the following hypotheses are made.

1. Cultural group will be a significant predictor of achievement test scores. Based on statistics, on Clifton's (1977) review, and Franklyn's (1974) study, it is expected that there will be differences between the Indian and non-Indian group in terms of performance on standardized achievement tests and that the non-Indian group will obtain significantly higher scores.

2. Reasoning ability, as measured by Raven's Progressive Matrices, will be a significant predictor of achievement test scores. It has been well documented that intelligence as measured by standard IQ tests accounts for substantial variance in school achievement among non-Indian students (McBee & Duke, 1960; Walberg, 1970) and among Indian students (Dankworth, 1970). It has also been demonstrated that non-verbal tests of intelligence correlate highly with achievement among non-Indian students (Bowd, 1972) and explain a substantial amount of the variance in achievement scores for Indian students (West & MacArthur, 1964). Raven's Progressive Matrices is a non-verbal test of intelligence (or reasoning ability as defined by Raven). Therefore, it is expected that Raven's Matrices scores will be a

significant predictor of achievement test scores for both Indian and non-Indian students.

3. Each of the five scale scores of the MCI will, by itself, be a significant predictor of the achievement test scores. Research studies have found the following relationships between achievement and classroom climate variables: (a) Cohesiveness is positively related to achievement (Anderson, 1970; Walberg, 1970; Walberg & Anderson, 1968, 1972); (b) Friction is negatively related to achievement (Walberg, 1970, 1971; Walberg & Anderson, 1968, 1972); (c) Difficulty is positively related to achievement (Anderson, 1970; Walberg, 1969b, 1970, 1971); (d) Satisfaction is positively related to achievement (Walberg & Anderson, 1972); (d) The findings on competitiveness were different for different subjects. The Trickett and Moos (1974) study suggests that competitiveness is positively related to achievement for non-Indian students. The relationship may be negative for Indian students (Frideres, 1974; Miller & Thomas, 1972). Based on these findings, it is expected that for both Indian and non-Indian students, there will be a significant and positive relationship between achievement and the MCI scales of Cohesiveness, Difficulty, and Satisfaction and a negative relationship between achievement and Friction. It is expected that the relationship between achievement and competitiveness will be positive for non-Indian students and negative for Indian students. Based on the review by Maynor (1970), it is also expected that the relationships found between the classroom climate variables and achievement will be stronger for Indian students than for non-Indian

students. In other words, the MCI scale scores, when acting together, will explain more of the variance in achievement scores for Indian than for non-Indian students.

4. Type of school, Federal or Provincial, will be a significant predictor of achievement scores for the group of Indian students. This hypothesis is based on Elliott's (1970) claim that competition for achievement is greater in integrated schools than in federal schools and the finding that low-socioeconomic students who are in the minority in an integrated school will perceive that school as competitive (Walberg et al, 1972). Also, Frideres (1974) suggested that competition may adversely affect an Indian child's performance and research indicates that some Indian cultures stress cooperative rather than competitive behavior (Miller & Thomas, 1972). Based on these findings, it is expected that Indian students will perceive the provincial schools as more competitive than the federal school and that this perception will adversely affect their performance in the provincial schools.

5. Sex will not be a significant predictor of achievement scores. Although Chadwick et al. (1977) found that for urban Indian high school students, females had better grades than males, it is not reported whether these differences were significant. In the literature, there are no reported sex differences in achievement scores for elementary school students.

6. Grade will not be a significant predictor of achievement scores. There is no evidence in the literature pertaining to elementary school students' achievement to suggest that grade will

predict achievement scores when these achievement scores are standardized.

CHAPTER III

Method

Subjects

The population used for this study included all grade four to eight students in three schools attended by the Indian children from one reserve in north-central Saskatchewan. The sample of 170 subjects consisted of 75 Indian and 95 non-Indian students in grades 4, 6, and 8 from three schools. The schools were a federal day school on the reserve and two provincial schools in two nearby towns. For purposes of identification the reserve school shall be named School 1, and the provincial schools shall be named School 2 and School 3. All Indian subjects were residents of the one reserve. A breakdown of the sample by school, grade, and cultural group is as follows:

	Grade			
Schools				Totals
School 1	17	16	10	43
School 2	3 (21)*	10 (15)	5 (18)	18 (54)
School 3	1 (9)	6 (9)	7 (23)	14 (41)
Totals	21 (30)	32 (24)	22 (41)	75 (95)

*Parenthetical number = non-Indian students

The particular reserve was chosen on the basis of accessibility and willingness to cooperate. Schools were selected on the basis of

attendance by reserve students and willingness to cooperate. The particular grades were selected because of existing achievement testing programs being conducted in the two provincial schools. All available students in each selected grade were tested in each school. Eight Indian students in the School 3 were discarded because they were not living on the reserve and thus, by definition, did not fit into the sample.

Measures

Standard Progressive Matrices. The Standard Progressive Matrices was used to measure reasoning ability. The Standard Progressive Matrices is a non-verbal test "of a person's present capacity to form comparisons, reason by analogy, and develop a logical method of thinking regardless of previously acquired information" (Raven, 1948, p. 12). The Standard Matrices consists of 60 problems arranged in five sets of 12 each, of increasing (but overlapping) difficulty. The matrix item is a "two-dimensional" analogies problem. Items consist of visual patterns or series of figures related in a variety of ways. The subject is directed only to select the design that completes the pattern. The figures are altered from left to right according to one principle, from top to bottom by another. The subject must identify these principles and apply them to determine the needed design. Several studies have shown that Raven's Progressive Matrices test is suitable as a non-verbal test of intellectual ability for Indians (MacArthur, 1968; West and MacArthur, 1964; Wilson, 1973). Re-test reliability scores range from .83 to .93 (Raven, 1960).

My Class Inventory (MCI). Students' perceptions of the classroom learning environment were measured with the My Class Inventory (MCI), which is a downward extension of the Learning Environment Inventory (LEI). Several reliabilities are available for the LEI. For individuals, the reliability coefficients indicating internal consistency range from .54 to .86 for each scale. Test re-test correlations for each scale range from .43 to .73. The LEI was successfully utilized in a variety of experimental and correlational studies, described by Anderson and Walberg (1974). The MCI contains 45 items distributed over the scales Satisfaction, Friction, Competitiveness, Difficulty and Cohesiveness. This instrument is for use with 8-12 year olds, who agree or disagree with each item on a two-point scale. Individual scale reliabilities range from .54 to .77. The MCI has been used in a variety of studies (Cayne, 1970; Payne, Ellett, Perkins and Shellenberger, 1977; Walberg, 1971; Walberg, Sorenson and Fischbach, 1972).

Canadian Test of Basic Skills. Achievement scores were derived from the Canadian Test of Basic Skills (CTBS) subtests. The subtests used were measures of Vocabulary, Reading, Language Skills, Mathematics, and a Composite score.

Biographical data. Biographical data regarding cultural group, age, sex and grade, were obtained from school records.

Procedure

The CTBS was administered by the homeroom teachers in the two Provincial schools and the scores were then forwarded to the researcher.

The same test was administered by the researcher and an assistant graduate student to the Indian students in the federal school following the instructions in the Teacher's Guide. All CTBS tests were completed within a three-week period before April 1, 1979.

The Progressive Matrices were administered by the researcher or an assistant to each class. Each class was given as much time as needed to complete the test and standard instructions given in the Guide (Raven, 1960, p. 8-9) were used in each class.

The MCI was given at another time to each class and was administered by the researcher or an assistant. Each class was given as much time as needed to complete the inventory. Instructions for the MCI, which were printed on the first page, were read aloud in each class while students followed in their test booklets. Simple clarification of word meanings was provided upon request. Indecisive subjects were encouraged to answer in terms of "most of the time," or "on most days." Because the test contains few items, students were told of the importance of answering every item. Students were also told that there were no right or wrong answers and they were encouraged to answer items in terms of what they thought.

CHAPTER IV

Results

Preliminary Computations

The MCI yields scores from 9-27 on each of the subscales. A high score indicates agreement with that scale. Subjects' perceptions of the classroom learning environment were the individual's raw scores on each of the five MCI subscales. See Appendix A for table of mean MCI scores by grade and school. See Appendix B for means and standard deviations of MCI scale scores for two groups.

The Standard Progressive Matrices yields a raw score of 0-60; a person's score on the scale is the total number of problems he solves correctly. Raw scores on the Progressive Matrices were converted to percentiles using the table for the children's group test given in the Guide to the Standard Progressive Matrices (Raven, 1960). In order to remove the effects of age on the scores, percentiles were then converted to standard scores with a mean of 100 and a standard deviation of 16. See Appendix B for means and standard deviations of Raven's scores for two groups.

The CTBS scoring key provides grade equivalent scores for each subject. These scores were converted to percentiles for each subject using the appropriate tables for each grade level as given in the Teacher's Guide. In order to remove the effects of grade, percentiles were then converted to standard scores with a mean of 100 and a standard deviation of 16. See Appendix C for mean achievement scores by grade and school.

In order to test the relationships between the independent variables and the dependent variables, zero-order correlations were computed for the total group and are presented in Table 1. Categorical variables were coded for computer analysis using effect coding as described in Kerlinger and Pedhazur (1973, p. 121). Those categorical variables which required more than one vector for coding are not presented in Table 1 as the correlations are not interpretable.

Table 1

Bivariate Correlations between Nine Independent Variables and the Five Achievement Scales for the Total Group

Variable	Vocabulary	Reading	Language	Mathematics	Composite
Sex	.13*	.06	-.13*	.07	.06
Culture	.53**	.48**	.38**	.44**	.53**
Culture x Sex	.04	.04	.003	.02	.05
Ravens	.53**	.53**	.48**	.50**	.58**
Satisfaction	-.12	-.07	-.13	-.07	-.12
Friction	.20**	.18*	.15*	.16*	.20**
Competitiveness	.09	.04	.06	.13	.10
Difficulty	-.07	-.12	-.04	-.20*	-.13
Cohesiveness	-.23**	-.15*	-.08	-.16*	-.20**

*$p < .05$
**$p < .01$

As expected, the variables culture and Raven's scores were strongly

related to all achievement variables. Contrary to expectations, sex was related to both vocabulary and language. Of the five MCI scores, only three were significantly associated with achievement scores. Friction was positively related to all the achievement variables but the direction of association is opposite to that expected. Cohesiveness was related to four of the achievement scales but was negatively related which is also contrary to the direction hypothesized. Difficulty was negatively related to mathematics achievement which is also the opposite direction to that expected.

Multiple Regression Analyses

Hypothesis 1 stated that culture would be significant predictor of achievement scores. In order to determine whether culture was a significant predictor of achievement scores when it had to compete with the other independent variables in explaining achievement, the data for the total group were submitted to stepwise multiple regression analysis, as specified in Nie, Hull, Jenkins, Steinbrenner and Bent, 1975. Each of the five CTBS subtests was used as the dependent or criterion variable in five separate regressions. The independent or predictor variables were Raven's score, the five MCI scores and the categorical variables of cultural group, sex, culture x sex, grade, school, grade x school, and culture x school. The results of these analyses indicated that culture was a significant predictor of all five achievement scores thus hypothesis 1 is confirmed. In four of the regression analyses, culture was the second variable to enter the equation, after

the Raven's score entered. For the regression on the dependent variable, language skills, culture entered the equation fourth, after Raven's, a grade x school coded vector, and sex. Means and standard deviations of achievement scores for the two groups are given in Table 2. On all five achievement tests, the non-Indian group obtained significantly higher mean scores than the Indian group. Because culture was a significant predictor of achievement scores, the total group was divided into the two cultural groups and separate regression analyses were run for Indians and non-Indians to discover if the predictor variables affected the criterion variables in a differential manner for the two cultural groups.

Table 2

Means and Standard Deviations of Achievement Scores for Indian and Non-Indian Group

	Group					
	Indian			Non-Indian		
Achievement Scale	$\bar{X}$	S.D	N	$\bar{X}$	S.D	N
Vocabulary	85.17	12.60	71	102.19	14.11	95
Reading	87.80	13.49	71	102.90	13.97	95
Language Skills	90.58	12.07	69	102.15	14.96	95
Mathematics	88.35	13.78	68	103.43	15.98	94
Composite	85.86	12.74	71	102.90	14.44	95

To test the relationships between the independent variables and the dependent variables for the two groups, zero-order correlations were computed for each cultural group and are presented

in Table 3 along with the intercorrelations between the dependent variables and the intercorrelations between the independent variables. Again, those categorical variables which required more than one vector for coding are not presented in Table 3 as the correlations are not interpretable.

As expected, the Raven's scores were significantly related to all achievement scores for both Indians and non-Indians. An interesting result was that the correlation between Ravens and Mathematics for Indians is quite a bit lower than the correlation between Ravens and other achievement scores and is also lower than the correlation between Ravens and Mathematics for non-Indians. Contrary to expectations, sex was related to one achievement score, Language Skills, but only for the Indian group. In the Indian group, only one of the MCI classroom envrionment scales, Cohesiveness, was significantly related to two achievement scores, Vocabulary and Mathematics, and the negative relationships were contrary to the direction expected. For the non-Indian group, only one of the MCI scales, Difficulty was significantly related to the achievement scales of Reading, Mathematics, and the Composite score and the negative relationships are contrary to the direction of relationship expected. Although only one MCI scale was associated with achievement for each group, all five MCI scales were retained for regression analyses as the investigator was interested in comparing differential contributions of these environmental scales to achievement scores for the two groups.

Table 3

Correlation Matrix for Seven Independent and Five Dependent Variables (Indians above the Diagonal, Non-Indians below)

	1	2	3	4	5	6	7	8	9	10	11	12
1. Sex		-.05	.08	-.09	.19	.01	.01	.12	.01	-.21*	.10	-.00
2. Raven's	-.05		-.06	-.12	-.30*	.17	-.13	.42**	.45**	.39**	.26*	.47**
3. Satisfaction	-.11	-.01		-.41**	-.30**	-.08	.50**	-.21	-.12	-.07	-.07	-.13
4. Friction	.17	-.02	-.51**		.36**	.08	-.36**	.09	.12	.08	.19	.12
5. Competitiveness	-.06	-.05	.03	.16		-.04	.09	.12	-.04	.09	.16	.08
6. Difficulty	.09	-.14	-.37**	.16	-.10		-.06	..06	.03	.05	-.08	.00
7. Cohesiveness	-.08	-.08	.45**	-.45**	.06	-.23*		-.30*	-.13	-.003	-.29*	-.21
8. Vocabulary	.10	.43**	.09	.06	.04	-.12	.08		.68**	.57**	.60**	.86**
9. Reading	.04	.43**	.13	.01	.06	-.19*	.10	.77**		.60**	.48**	.85**
10. Language Skills	-.16	.43**	-.04	.03	.02	-.06	.11	.61**	.67**		.45**	.80**
11. Mathematics	.02	.51**	.07	-.05	.09	-.26**	.17	.69**	.68**	.69**		.75**
12. Composite	.03	.51**	.05	.04	.08	-.19*	.09	.85**	.87**	.82**	.87**	

Note = correlations are zero-order bivariate correlations
*$p < .05$
**$p < .01$

Stepwise multiple regression analysis was used to examine the contributions of successive terms in the prediction equation for the two groups. In multiple regression analysis it is preferable that the intercorrelations between the independent variables be as low as possible (Kerlinger & Pedhazur, 1973, p. 442). The correlation matrix presented in Table 3 shows that for the independent variables, only 11 out of 42 correlations are statistically significant. Also, those correlations that are significant tend to be rather low.

The present multiple regression analyses employed a predetermined order for the addition of successive predictors. Such a method was used because efficient prediction of achievement was not the major concern; rather, the investigator wished to study the proportion of variance accounted for by each of the predictor variables and their interactions. Also the investigator wished to discover whether the predictor variables affected the criterion variables in a differential manner for the two cultural groups.

The analyses for each group were done using two different orders of predictors. For both orders, the Raven's score was entered first. For the 1st ordering, the categorical variables were entered next, followed by the five classroom environment variables. This procedure provided a conservative test of the effects of classroom social climate on achievement, since much of the predictable criterion variance had been removed prior to the introduction of each MCI scale.

For the 2nd ordering of variables, the MCI scales were entered after Raven's, and were followed by the categorical variables. Results of the multiple regression analyses are given in Tables 4, 5, 6, 7, and 8. Because the results given in Tables 4 to 8 are rather complicated and difficult to follow, a one-page summary of these tables is presented in Table 9.

Hypothesis 2 stated that reasoning ability, as measured by Raven's Progressive Matrices, would be a significant predictor of achievement test scores. The results shown in Tables 4, 5, 6, 7, and 8 reveal that for both Indians and non-Indians, the Raven's scores make a significant contribution in explaining achievement. Thus hypothesis 2 is confirmed. Also, with the exception of the Indian group's achievement in Language Skills and Mathematics, the Raven's score is the single most important factor in predicting achievement. The summary of the multiple regression analysis on Language Skills for Indian students in Table 6a reveals that 60.5% of the variation in Indian students' Language achievement is accounted for by the predictor variables. The Raven's scores contribute 16.4% to this total while grade contributes 13.5% and the grade x school interaction contributes 17.3% in the 1st ordering of the variables. The only other significant contribution is made by the MCI scale of competitiveness which contributes 5.6%. In comparison, Table 6b shows that for the non-Indian group's Language achievement, the Raven's score contributes

nearly half (17.1%) of the total amount of variation accounted for (36.8%).

Table 7a reveals that only 39% of the variation in Indian students' Mathematics achievement was accounted for by the predictor variables. This total variation accounted for is lower than that for any of the other Indian students' achievement scores. For Mathematics achievement, the Raven's score contributes only 8.3% to the total variation while in the first ordering of variables, the classroom environment scale of Cohesiveness contributes 10.7%. In the second ordering of variables, the MCI scales of Cohesiveness and Competitiveness make substantial contributions to the total variation accounted for (8.3% and 8.0% respectively). For both orders of variables the environmental scores taken together make a significant contribution (26.2% and 24.5%) and contribute more to the total variance than the Raven's scores.

Hypothesis 3, predicting that the five scale scores of the MCI would make significant contributions in explaining achievement, is only partially supported. An examination of Tables 4 to 8 reveals that only two environmental scales, Competitiveness and Cohesiveness make significant contributions to achievement scores and that the contributions made are not significant for all achievement scores nor for both groups in all cases. Table 4a reveals that competitiveness contributes 6.4% to the total variation (55.5%) accounted for in the first ordering of variables for Indian students' achievement

Table 4a

Summary of Multiple Regression Analysis for Indians

on Dependent Variable Vocabulary

Analysis of Variance for the Multiple Linear Regression

Source of Variation	df	SS	MS	F
Due to regression	15	3714.63	247.64	2.83
Residual	34	2975.05	87.50	

Summary of Regression Analysis for 1st Order of Variables

Source	df	R	R2	R2 Change	F
Total Regression	15		.555		
Raven's	1	.463	.214	.214	16.35**
V4	1	.465	.216	.002	
V5	1	.504	.254	.038	
Grade	2			.040	1.53
V6	1	.518	.268	.014	
V7	1	.553	.305	.037	
School	2			.051	1.96
V8	1	.566	.320	.015	
V9	1	.569	.324	.004	
V10	1	.628	.395	.071	
V11	1	.631	.399	.004	
Grade x School	4			.094	1.78
Sex	1	.639	.409	.010	<1
Satisfaction	1	.649	.421	.012	<1
Friction	1	.650	.422	.001	<1
Competitiveness	1	.697	.486	.064	4.92*
Difficulty	1	.711	.505	.019	1.45
Cohesiveness	1	.745	.555	.050	3.82
MCI	5			.147	2.25
Residual	34		.445		

Summary of Multiple Regression Analysis for 2nd Order of Variables

Source	df	Prop. of Variance		F
Total Regression	15	.555		
Raven's	1	.214		16.35**
Satisfaction	1	.018		1.38
Friction	1	.007		<1
Competitiveness	1	.049		3.75
Difficulty	1	.026		1.99
Cohesiveness	1	.035		2.68
MCI	5		.135	2.06
Grade	2	.040		1.51
School	2	.089		3.42*
Grade x School	4	.072		1.38
Sex	1	.005		
Residual	34	.445		

*$p < .05$.
**$p < .01$.

Table 4b

Summary of Multiple Regression Analysis for Non-Indians on Dependent Variable Vocabulary

Analysis of Variance for the Multiple Linear Regression

Source of Variation	df	SS	MS	F
Due to regression	12	6288.14	524.01	3.44
Residual	74	11285.68	152.51	

Summary of Regression Analysis for 1st Order of Variables

Source	df	R	R2	R2 Change	F
Total Regression	12		.358		
Raven's	1	.433	.187	.187	21.49**
V4	1	.452	.204	.017	
V5	1	.453	.205	.001	
Grade	2			.018	2.07
School	1	.454	.206	.001	<1
V8	1	.509	.259	.053	
V10	1	.538	.289	.030	
Grade x School	2			.083	4.76*
Sex	1	.540	.291	.002	<1
Satisfaction	1	.548	.301	.010	1.15
Friction	1	.577	.333	.032	3.68
Competitiveness	1	.578	.334	.001	<1
Difficulty	1	.579	.336	.002	<1
Cohesiveness	1	.598	.358	.022	2.53
MCI	5			.067	1.53
Residual	74		.642		

Summary of Multiple Regression Analysis for 2nd Order of Variables

Source	df	Prop. of Variance		F
Total Regression	12	.358		
Raven's	1	.187		21.49**
Satisfaction	1	.004		<1
Friction	1	.019		2.18
Competitiveness	1	.001		<1
Difficulty	1	.000		<1
Cohesiveness	1	.024		2.76
MCI	5		.048	1.09
Grade	2	.025		1.43
School	1	.001		<1
Grade x School	2	.096		5.52**
Sex	1	.001		<1
Residual	74	.642		

*$p < .05$.
**$p < .01$.

Table 5a

Summary of Multiple Regression Analysis for Indians on Dependent Variable Reading

Analysis of Variance for the Multiple Linear Regression

Source of Variation	df	SS	MS	F
Due to regression	15	5425.17	361.68	3.43
Residual	34	3583.65	105.40	

Summary of Regression Analysis for 1st Order of Variables

Source	df	R	R2	R2 Change	F
Total Regression	15		.602		
Raven's	1	.527	.278	.278	23.73**
V4	1	.588	.346	.068	
V5	1	.592	.351	.005	
Grade	2			.073	3.08
V6	1	.605	.366	.015	
V7	1	.613	.376	.010	
School	2			.026	1.10
V8	1	.632	.400	.024	
V9	1	.660	.435	.035	
V10	1	.689	.474	.039	
V11	1	.710	.504	.030	
Grade x School	4			.128	2.73*
Sex	1	.717	.514	.010	<1
Satisfaction	1	.723	.523	.009	<1
Friction	1	.723	.523	.000	
Competitiveness	1	.752	.566	.043	3.68
Difficulty	1	.775	.600	.034	2.98
Cohesiveness	1	.776	.602	.002	<1
MCI	5			.088	1.50
Residual	34		.398		

Summary of Regression Analysis for 2nd Order of Variables

Source	df	Prop. of Variance	F
Total Regression	15	.602	
Raven's	1	.278	23.73**
Satisfaction	1	.006	<1
Friction	1	.017	1.45
Competitiveness	1	.010	<1
Difficulty	1	.022	1.88
Cohesiveness	1	.004	<1
MCI	5	.059	1.01
Grade	2	.099	4.23*
School	2	.033	1.41
Grade x School	4	.126	2.69*
Sex	1	.008	<1
Residual	34	.445	

*$p < .05$.
**$p < .01$.

Table 5b

Summary of Multiple Regression Analysis for Non-Indians on Dependent Variable Reading

Analysis of Variance for the Multiple Linear Regression

Source of Variation	df	SS	MS	F
Due to regression	12	5827.08	485.59	3.29
Residual	74	10916.32	147.52	

Summary of Regression Analysis for 1st Order of Variables

Source	df	F	R2	R2 Change	F
Total Regression	12		.348		
Raven's	1	.428	.183	.183	20.79**
V4	1	.462	.214	.031	
V5	1	.464	.215	.001	
Grade	2			.032	1.82
School	1	.465	.216	.001	<1
V8	1	.513	.263	.047	
V10	1	.527	.277	.014	
Grade x School	2			.061	3.47*
Sex	1	.527	.277	.000	
Satisfaction	1	.541	.292	.015	1.70
Friction	1	.562	.316	.024	2.73
Competitiveness	1	.562	.316	.000	
Difficulty	1	.577	.333	.017	1.93
Cohesiveness	1	.590	.348	.015	1.70
MCI	5			.071	1.61
Residual	74		.652		

Summary of Multiple Regression Analysis for 2nd Order of Variables

Source	df	Prop. of Variance	F
Total Regression	12	.348	
Raven's	1	.183	20.79*
Satisfaction	1	.015	1.70
Friction	1	.011	1.25
Competitiveness	1	.000	
Difficulty	1	.008	<1
Cohesiveness	1	.017	1.93
MCI	5	.051	1.17
Grade	2	.029	1.65
School	1	.000	
Grade x School	2	.084	4.77*
Sex	1	.000	
Residual	74	.652	

*$p < .05$.
**$p < .01$.

Table 6a

Summary of Multiple Regression Analysis for Indians on Dependent Variable Language Skills

Analysis of Variance for the Multiple Linear Regression

Source of Variation	df	SS	MS	F
Due to regression	15	4297.56	286.50	3.48
Residual	34	2803.02	82.44	

Summary of Regression Analysis for 1st Order of Variables

Source	df	R	R2	R2 Change	F
Total Regression	15		.605		
Raven's	1	.405	.164	.164	14.14**
V4	1	.544	.296	.132	
V5	1	.547	.299	.003	
Grade	2			.135	5.83**
V6	1	.558	.312	.013	
V7	1	.573	.329	.017	
School	2			.030	1.29
V8	1	.694	.481	.152	
V9	1	.694	.482	.001	
V10	1	.702	.492	.010	
V11	1	.709	.502	.010	
Grade School	4			.173	3.73*
Sex	1	.711	.506	.004	<1
Satisfaction	1	.725	.526	.020	1.72
Friction	1	.730	.533	.007	<1
Competitiveness	1	.767	.589	.056	4.83*
Difficulty	1	.777	.603	.014	1.21
Cohesiveness	1	.778	.605	.002	<1
MCI	5			.099	1.71
Residual	34		.395		

Summary of Regression Analysis for 2nd Order of Variables

Source	df	Prop. of Variance		F
Total Regression	15	.605		
Raven's	1	.164		14.14**
Satisfaction	1	.001		<1
Friction	1	.037		3.19
Competitiveness	1	.016		1.38
Difficulty	1	.009		<1
Cohesiveness	1	.013		1.12
MCI	5		.076	1.31
Grade	2	.154		6.64**
School	2	.044		1.90
Grade x School	4	.164		3.53*
Sex	1	.004		<1
Residual	34	.395		

* $p < .05$.
** $p < .01$.

Table 6b

Summary of Multiple Regression Analysis for Non-Indians on Dependent Variable Language Skills

Analysis of Variance for the Multiple Linear Regression

Source of Variation	df	SS	MS	F
Due to regression		7285.68	607.14	3.59
Residual		12531.59	169.35	

Summary of Regression Analysis for 1st Order of Variables

Source	df	R	R2	R2 Change	F
Total Regression	12		.368		
Raven's	1	.413	.171	.171	20.12**
V4	1	.413	.171	.000	
V5	1	.438	.192	.021	
Grade	2			.021	1.24
School	1	.448	.200	.008	<1
V8	1	.495	.245	.045	
V10	1	.529	.280	.035	
Grade x School	2			.080	4.71*
Sex	1	.566	.320	.040	4.71*
Satisfaction	1	.566	.321	.001	<1
Friction	1	.572	.327	.006	<1
Competitiveness	1	.573	.328	.001	<1
Difficulty	1	.574	.329	.001	<1
Cohesiveness	1	.606	.368	.039	4.59*
MCI	5			.048	1.13
Residual	74		.632		

Summary of Multiple Regression Analysis for 2nd Order of Variables

Source	df	Prop. of Variance		F
Total Regression	12	.368		
Raven's	1	.171		20.12**
Satisfaction	1	.001		<1
Friction	1	.001		<1
Competitiveness	1	.001		<1
Difficulty	1	.001		<1
Cohesiveness	1	.043		5.06*
MCI	5		.047	1.11
Grade	2	.020		1.18
School	1	.011		1.29
Grade x School	2	.077		4.53*
Sex	1	.042		4.94*
Residual	74	.632		

*p <.05.
**p <.01.

Table 7a

Summary of Multiple Regression Analysis for Indians

on Dependent Variable Mathematics

Analysis of Variance for the Multiple Linear Regression

Source of Variation	df	SS	MS	F
Due to Regression	15	3312.24	220.82	1.45
Residual	34	5175.28	152.21	

Summary of Regression Analysis for 1st Order of Variables

	df	R	R2	R2 Change	F
Total Regression	15		.390		
Raven's	1	.287	.083	.083	4.64*
V4	1	.295	.087	.004	
V5	1	.300	.090	.003	
Grade	2			.007	<1
V6	1	.303	.092	.002	
V7	1	.311	.096	.004	
School	2			.006	<1
V8	1	.313	.098	.002	
V9	1	.330	.109	.011	
V10	1	.334	.111	.002	
V11	1	.334	.112	.001	
Grade x School	4			.016	<1
Sex	1	.356	.128	.016	<1
Satisfaction	1	.386	.149	.021	1.17
Friction	1	.422	.178	.029	1.62
Competitiveness	1	.491	.241	.063	3.52
Difficulty	1	.532	.283	.042	2.35
Cohesivness	1	.625	.390	.107	5.98*
MCI	5			.262	2.93*
Residual	34		.610		

Summary of Regression Analysis for 2nd Order of Variables

Source	df	Prop. of Variance		F
Total Regression	15	.390		
Raven's	1	.083		4.64*
Satisfaction	1	.005		<1
Friction	1	.028		1.56
Competitiveness	1	.080		4.47*
Difficulty	1	.049		2.74
Cohesiveness	1	.083		4.64*
MCI	5		.245	2.74*
Grade	2	.007		<1
School	2	.032		<1
Grade x School	4	.017		<1
Sex	1	.007		<1
Residual	34	.610		

*p <.05.

**p <.01.

Table 7b

Summary of Multiple Regression Analysis for Non-Indians

on Dependent Variable Mathematics

Analysis of Variance for the Multiple Linear Regression

Source of Variation	df	SS	MS	F
Due to regression	12	9271.98	772.66	4.49
Residual	74	12711.68	171.78	

Summary of Regression Analysis for 1st Order of Variables

Source	df	R	R2	R2 Change	F
Total Regression	12		.422		
Raven's	1	.502	.252	.252	32.31**
V4	1	.524	.275	.022	
V5	1	.528	.279	.004	
Grade	2			.026	1.67
School	1	.558	.311	.032	4.10*
V8	1	.586	.344	.033	
V10	1	.588	.346	.002	
Grade x School	2			.035	2.24
Sex	1	.588	.346	.000	
Satisfaction	1	.589	.346	.000	
Friction	1	.591	.349	.003	<1
Competitiveness	1	.594	.353	.004	<1
Difficulty	1	.615	.378	.025	3.21
Cohesiveness	1	.649	.422	.044	5.64*
MCI	5			.076	1.95
Residual	74		.578		

Summary of Multiple Regression Analysis for 2nd Order of Variables

Source	df	Prop. of Variance		F
Total Regression	12	.422		
Raven's	1	.252		32.31**
Satisfaction	1	.004		<1
Friction	1	.000		
Competitiveness	1	.008		1.03
Difficulty	1	.024		3.08
Cohesiveness	1	.044		5.64
MCI	5		.080	2.05
Grade	2	.025		1.60
School	1	.030		3.85
Grade x School	2	.033		2.12
Sex	1	.000		
Residual	74	.578		

*$p < .05$.
**$p < .01$.

Table 8a

Summary of Multiple Regression Analysis for Indians on Dependent Variable Composite

Analysis of Variance for the Multiple Linear Regression

Source of Variation	df	SS	MS	F
Due to regression	15	4745.54	316.37	3.54
Residual	34	3038.54	89.37	

Summary of Regression Analysis for 1st Order of Variables

Source	df	R	R2	R2 Change	F
Total Regression	15		.610		
Raven's	1	.527	.278	.278	24.24**
V4	1	.566	.321	.043	
V5	1	.574	.329	.008	
Grade	2			.051	2.22
V6	1	.575	.331	.002	
V7	1	.590	.348	.017	
School	2			.019	<1
V8	1	.633	.401	.053	
V9	1	.634	.402	.001	
V10	1	.641	.411	.009	
V11	1	.649	.421	.010	
Grade x School	4			.073	1.59
Sex	1	.653	.426	.005	<1
Satisfaction	1	.667	.445	.019	1.66
Friction	1	.670	.449	.004	<1
Competitiveness	1	.731	.535	.086	7.50**
Difficulty	1	.759	.577	.042	3.66
Cohesiveness	1	.781	.610	.033	2.88
MCI	5			.183	3.19*
Residual	34		.390		

Summary of Regression Analysis for 2nd Order of Variables

Source	df	Prop. of Variance	F
Total Regression	15	.610	
Raven's	1	.278	24.24**
Satisfaction	1	.006	<1
Friction	1	.023	2.01
Competitiveness	1	.050	4.36*
Difficulty	1	.037	3.23
Cohesiveness	1	.010	<1
MCI	5	.126	2.20
Grade	2	.097	4.23*
School	2	.046	2.01
Grade x School	4	.061	1.33
Sex	1	.003	<1
Residual	34	.390	

*$p < .05$.
**$p < .01$.

Table 8b

Summary of Multiple Regression Analysis for Non-Indians

on Dependent Variable Composite

Analysis of Variance for the Multiple Linear Regression

Source of Variation	df	SS		F
Due to regression	12	7576.37	631.36	4.35
Residual	74	10749.45	145.26	

Summary of Regression Analysis for 1st Order of Variables

Source	df	R	R2	R2 Change	F
Total Regression	12		.413		
Raven's	1	.501	.251	.251	31.77**
V4	1	.517	.267	.016	
V5	1	.522	.273	.006	
Grade	2			.022	1.39
School	1	.526	.277	.004	<1
V8	1	.573	.328	.051	
V10	1	.592	.350	.022	
Grade x School	2			.073	4.62*
Sex	1	.592	.350	.000	
Satisfaction	1	.594	.352	.002	<1
Friction	1	.611	.374	.022	2.78
Competitiveness	1	.612	.375	.001	<1
Difficulty	1	.624	.389	.014	1.77
Cohesiveness	1	.643	.413	.024	3.04
MCI	5			.063	1.59
Residual	74		.587		

Summary of Multiple Regression Analysis for 2nd Order of Variables

Source	df	Prop. of Variance		F
Total Regression	12	.413		
Raven's	1	.251		31.77**
Satisfaction	1	.001		<1
Friction	1	.010		1.27
Competitiveness	1	.003		<1
Difficulty	1	.008		1.01
Cohesiveness	1	.027		3.42
MCI	5		.049	1.24
Grade	2	.028		1.77
School	1	.004		<1
Grade x School	2	.082		5.19**
Residual	74	.587		

*p <.05.
**p <.01.

Table 9

Increments in Achievement Variance (R^2) Accounted for by Complete Regression Models for Indian and Non-Indian Students

	Achievement Variance[a]																				
	First Ordering of Variables										Second Ordering of Variables										
Group	Rav	Gra	Sch	G x S	Sex	S	F	Com	D	Coh	Rav	Sat.	Fr.	Comp.	Dif	Coh	Gra	Sch	G x S	Sex	Total R^2
Vocabulary																					
Indian	21.4**	4.0	5.1	9.4	1.0	1.2	.1	6.4*	1.9	5.0	21.4**	1.8	.7	4.9	2.6	3.5	3.9	8.9*	7.2	.5	55.5
Non-Ind.	18.7**	1.8	.1	8.3*	.2	1.0	3.2	.1	.2	2.2	18.7**	.4	1.9	.1	.0	2.4	2.5	.1	9.6**	.1	35.8
Reading																					
Indian	27.8**	7.3	2.6	12.8*	1.0	.9	.0	4.3	3.4	.2	27.8**	.6	1.7	1.0	2.2	.4	9.9*	3.3	12.6*	.8	60.2
Non-Ind.	18.3**	3.2	.1	6.1*	.0	1.5	2.4	.0	1.7	1.5	18.3**	1.5	1.1	.0	.8	1.7	2.9	.0	8.4*	.0	34.8
Language Skills																					
Indian	16.4**	13.5**	3.0	17.3*	.4	2.0	.7	5.6*	1.4	.2	16.4**	.1	3.7	1.6	.9	1.3	15.4*	4.4	16.4*	.4	60.5
Non-Ind.	17.1**	2.1	.8	8.0*	4.0	.1	.6	.1	.1	3.9	17.1**	.1	.1	.1	.1	4.3*	2.0	1.1	7.7*	4.2*	36.8
Mathematics																					
Indian	8.3*	.7	.6	1.6	1.6	2.1	2.9	6.3	4.2	10.7*	8.3*	.5	2.8	8.0*	4.9	8.3*	.7	3.2	1.7	.7	39.0
Non-Ind.	25.2**	2.6	3.2*	3.5	.0	.0	.3	.4	2.5	4.4*	25.2**	.4	.0	.8	2.4	4.4	2.5	3.0	3.3	.0	42.2
Composite Score																					
Indian	27.8**	5.1	1.9	7.3	.5	1.9	.4	8.6**	4.2	3.3	27.8**	.6	2.3	5.0*	3.7	1.0	9.7*	4.6	6.1	.3	60.9
Non-Ind.	25.1**	2.2	.4	7.4*	.0	.2	2.2	.1	1.4	2.4	25.1**	.1	1.0	.3	.8	2.7	2.8	.4	8.2*	.0	41.3

[a] In percentages

*$p < .05$.

**$p < .01$.

in Vocabulary. When the competitiveness scale was entered fourth in the equation, it accounted for 4.9% of the total variation which was no longer a significant contribution. Table 6a reveals that for Indian students' Language achievement, Competitiveness makes a significant contribution (5.6%) to the total variation (60.5%) in the first ordering of variables but again fails to reach significance when entered sooner in the equation. Table 6b reveals that for non-Indian students' Language Skills achievement, the environmental scale of cohesiveness makes a significant contribution (3.9% in 1st and 4.3% in 2nd order) to the total variance accounted for (36.8%).

An examination of Tables 7a and 7b reveals that Cohesiveness is a significant predictor in explaining Mathematics achievement for both Indians and non-Indians. For Indians, Cohesiveness contributes 10.7% in the first order and 8.3% in the 2nd order of variables out of a total variance of 39%. Competitiveness contributes a significant 8.0% in the 2nd order. For non-Indians, Cohesiveness contributes 4.4% in both regressions out of a total variance of 42.2%. An interesting result is that the direction of the relationship between Cohesiveness and Mathematics achievement is different for the two groups. An examination of the zero-order correlations in Table 3 reveals that for Indians the relationship is negative while for non-Indians the relationship is positive.

Tables 8a and 8b reveal that Competitiveness makes a significant

contribution to explaining the total variance accounted for in Composite achievement scores for Indians but not for non-Indians. Thus, competitiveness contributes 8.6% to the total variance of 61% in the first order and 5% in the second order. In looking again at Tables 7a and 8a, it should be noted that the proportion of variance contributed by all the MCI scales together is significant. Thus for Indian students' Mathematics achievement, the MCI scales together contribute 26.2% in the first order and 24.5% in the second order to the total variance of 39%, which is a substantial contribution. For Indian students' Composite achievement scores, the MCI scales together contribute a significant 18.3% to the total variance of 60.9%.

In a corollary to Hypothesis 3, it was predicted that the relationship between cohesiveness and achievement would be positive for both Indians and non-Indians. Referring only to significant relationships, this prediction held true for non-Indians but not for Indians, as already mentioned. It was also predicted that the relationship between achievement and competitiveness would be positive for non-Indian students and negative for Indian students. This hypothesis is rejected in that the significant relationships found between achievement and competitiveness for Indians were in a postitive direction.

Another corollary to Hypothesis 3 predicted that the MCI scales scores together would explain a significantly greater proportion of the

variance in achievement scores for Indian than for non-Indian students. An examination of Tables 4-8 reveals that the total R^2 Change values for the MCI are greater for Indians than non-Indians for all achievement tests. When the R^2 Change values for the MCI scores are divided by the total amount of variance due to regression for each group and the proportions compared (using z - test), it is discovered that the hypothesis is accepted only partially. That is, this corollary to Hypothesis 3 is accepted only for the achievement scales of Vocabulary, Mathematics and the Composite score but rejected for Reading and Language Skills. For Language Skills, the comparison of proportions is not significant although it is in the hypothesized direction. For Reading, the relationship is opposite to that expected. That is, the MCI total R^2 Change explained a significantly greater proportion of the total variance in Reading achievement for non-Indians than for Indians.

Hypothesis 4, predicting that type of school, Federal or Provincial, would be a significant predictor of achievement scores for Indian students is partially supported in that school was a significant predictor of achievement in two cases. In the original statement of the hypothesis, it was expected that students would perform better in the federal school than in the provincial schools. A preliminary examination of the data indicated that when the mean scores for the two provincial schools were taken together, they were consistently higher than the mean scores for the federal school which

was opposite to predictions. Subsequent analyses separated the two provincial schools rather than combine them.

Table 4a reveals that school is a significant predictor of Indian students' achievement in Vocabulary; school contributes 8.9% to the total variance (55.5%) accounted for in the second ordering of variables. The mean Vocabulary achievement scores by school for School 1, School 2, and School 3 are 83.15, 90.72, and 83.75 respectively. Using the Scheffé or S method for multiple comparison between means, it is discovered that there is significant difference between the mean scores for School 1 and School 2. D (7.57) is larger than S (6.76), $p < .05$, df = 2, 34. Other differences are not significant. Table 7b reveals that school is a significant predictor of non-Indian students' achievement in Mathematics. The mean Math achievement scores by school for School 2 and School 3 are 107.11 and 98.45 respectively.

A corollary to Hypothesis 4 predicted that Indian students would perceive the provincial schools as more competitive than the federal school. An examination of the mean competitiveness scores by school (see Appendix A) indicates that this hypothesis is rejected. The mean competitiveness scores for Indian students in School 1, School 2 and School 3 are 19.56, 20.37 and 21.38 respectively. Combining the scores for the two integrated schools produces a mean of 20.83 for the integrated schools compared to the mean of 19.56 for the federal school; the difference between the means is not significant. It was also expected that the Indian students in the

integrated schools would perceive the climate as more competitive than the non-Indians in the same school. This hypothesis is also rejected. In School 3, the mean competitiveness scores for Indians and non-Indians are 21.38 and 21.21 respectively; in School 2 the mean scores for Indians and non-Indians are 20.37 and 21.15 respectively. The differences between these means are not significant and for School 2, the direction is opposite to that expected.

Hypothesis 6, predicting that grade would not be a significant predictor of achievement scores is accepted for non-Indian students but is only partially supported for Indian students. Thus for Indian students achievement in Vocabulary and Mathematics, grade is not a significant predictor but it is significant for Reading achievement, Language achievement and the Composite score. The mean Reading achievement scores for Indians for grades 4, 6, and 8 were 89.76, 88.56, and 84.17 respectively. The mean Language achievement scores for grades 4, 6, and 8 were 93.62, 90.47, and 86.81 respectively. Differences between these means were not tested for statistical significance because of a significant grade x school interaction for these achievement scores, which will be discussed later. Grade was also a significant predictor of Composite achievement scores for Indian students. In order, the mean Composite achievement scores for grades 4, 6, and 8 were 86.05, 87.13, and 83.39.

Hypothesis 5, predicting that sex would not be a significant

predictor of achievement scores is accepted for Indian students on all achievement scores and is partially supported for non-Indian students. Table 6b reveals that sex is a significant predictor of non-Indian students' Language Skills achievement scores. Sex contributed 4.0% to the amount of variance accounted for (36.8%) by the total regression. The means for language achievement for females and males in order were 104.85 and 100.04, indicating that non-Indian females' achievement scores in Language Skills were significantly better than males.

Additional significant findings that were not predicted are those of the grade x school interaction. For non-Indians, the grade x school interaction contributed significantly to the total variance accounted for in achievement in Vocabulary, Reading, Language Skills, and the Composite scores. The mean grade scores by school are plotted on graphs in Figures 1, 2, 3, and 4. Looking at figures 1 to 4, it can be seen that for the two schools, the comparisons among means for the three grades are in opposite directions. That is, in School 3, mean scores increase from grade 4 to grade 6, then decrease to grade 8. The opposite is true in School 2 where mean scores decrease from grade 4 to grade 6 and then increase again to grade 8.

For Indian students, the grade x school interaction contributed significantly to their achievement in Reading and Language Skills. Figures 5 and 6 represent these interactions for Reading and Language Skills respectively. Figure 5 shows that for Indian students

Non-Indians

Grade x School Interaction

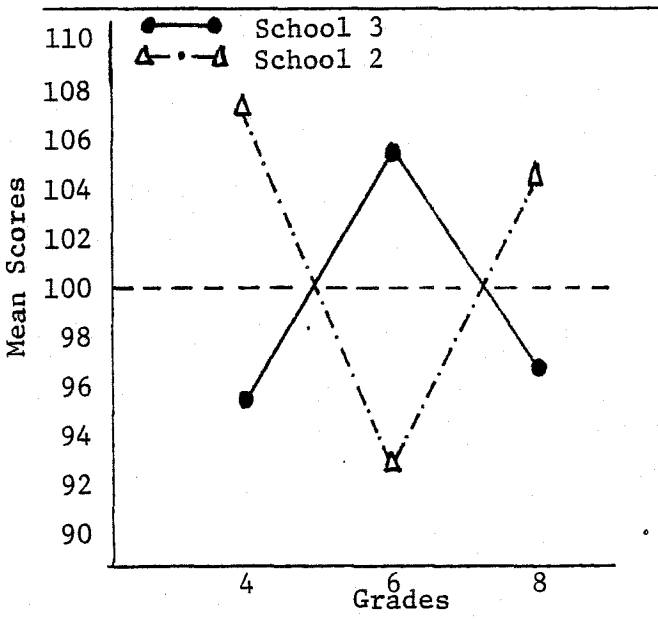

Figure 1. Grade x School Interaction for non-Indians Vocabulary Achievement.

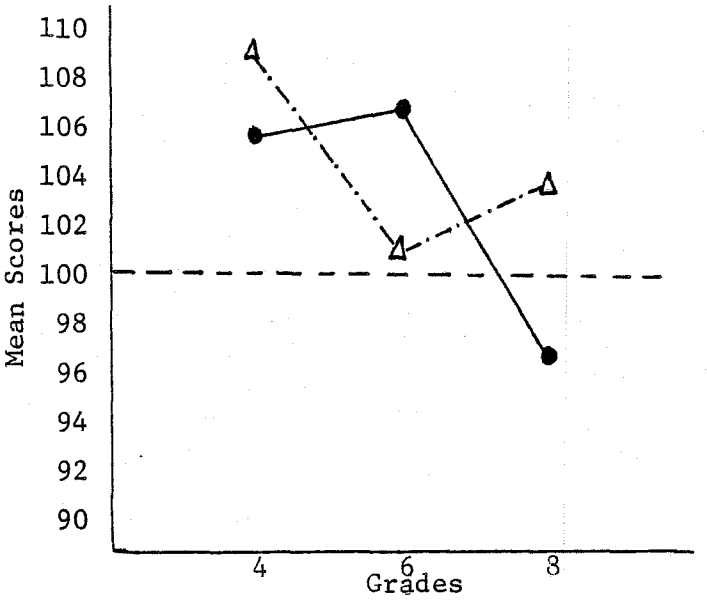

Figure 2. Grade x School Interaction for non-Indians Reading Achievement.

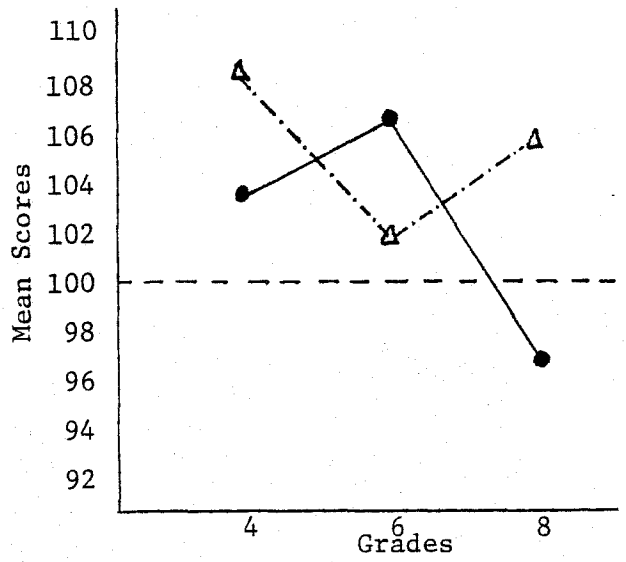

Figure 3. Grade x School Interaction for non-Indians Composite Scores Achievement

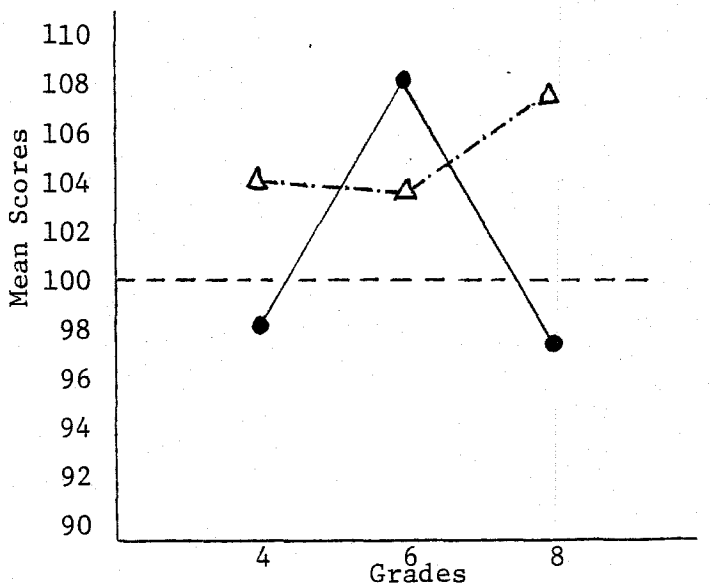

Figure 4. Grade x School Interaction for non-Indians Language Skills Achievement

Note: Dotted line indicates mean of 100 of standardized achievement scores.

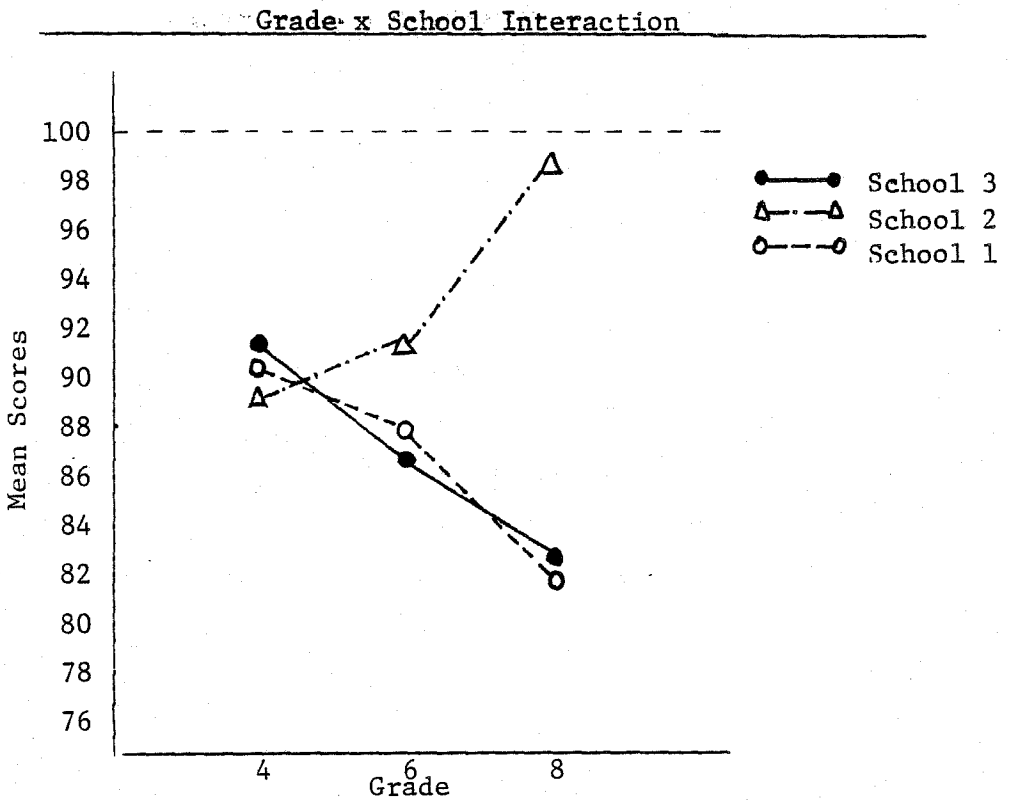

Figure 5. Grade x School Interaction for Indians Reading Achievement

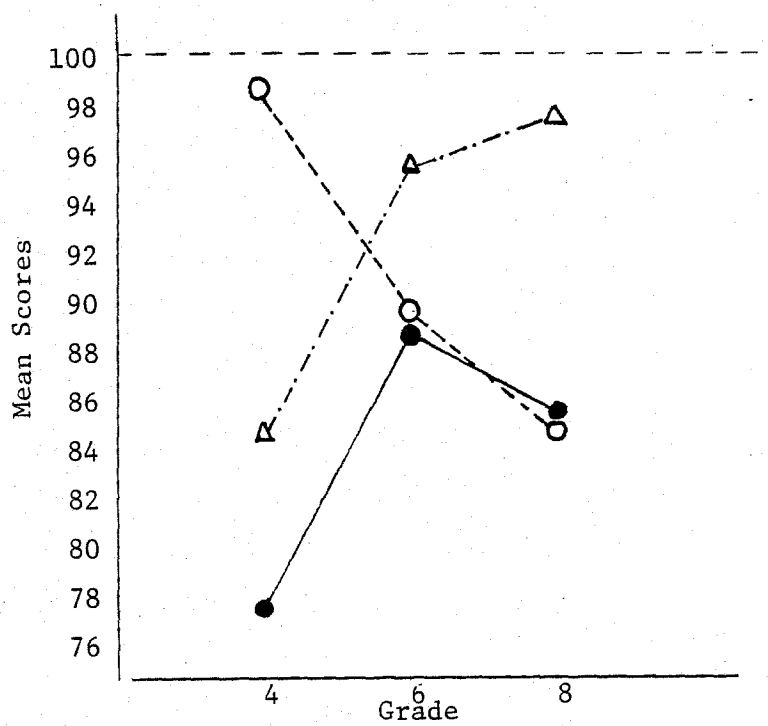

Figure 6. Grade x School Interaction for Indians Language Skills Achievement

Note: Dotted line indicates mean = 100 of standardized achievement scores.

in School 3 and School 1, the Reading performance scores decrease from grades 4 to 8. In contrast, Indian students' in School 2 improve in Reading achievement scores from grades 4 to 8. In figure 6, the Language achievement by grades for Indian students in School 3 and School 2 looks similar. That is, achievement scores improve from grades 4 to 6 in almost parallel lines for both schools but in School 2 the increase continues to grade 8 whereas in School 3 there is a decrease to grade 8. In School 1 the achievement from grades 4 to 6 is opposite to the other two schools, that is, there is a decrease in scores between grade 4 and 6 and a further decrease to grade 8. The decrease from grade 6 to 8 is similar to that in School 3 but opposite to that in School 2.

Additional Results

In order to discover whether the profiles of the mean classroom or group MCI scale scores differed for high and low achievers, or differed according to cultural group, or grades, or between schools; the profiles for the various groups were drawn and are presented in Appendix D. The average student score for each group was calculated for each subscale and profiles were generated comparing these scores. The median score of 18 is also used as a comparison point for these profiles.

Although no definitive conclusions can be made from a study of these profiles, some interesting comparisons can be seen. Figures 1 to 10 include profiles which compare lower achievers with higher achievers. In four of the figures, the profiles are fairly similar

but in five figures (2, 4, 6, 7, and 8), the higher achievers see their classrooms as higher in friction than the lower achievers see their classrooms. In three figures (2, 4, and 6) the higher achievers perceived their classes as less satisfying than the lower achievers saw their classes although in figure 8, this tendency was reversed. Figure 11 shows that the Indian students in the three different schools perceive those schools fairly similarly, although the federal school students seem to perceive their school as more satisfying and more cohesive. The profiles for the non-Indian students' perceptions of their two schools are fairly similar (figure 12). The profiles for the Indian students in the three grades (figure 13), shows that there are few differences between grades. In figure 14, the profiles seem to indicate that the Indian students perceive the federal school as more satisfying and more cohesive with less friction than the Indian students perceive the integrated schools. These profiles also seem to indicate that the Indian students perceive the integrated schools as having less friction than the non-Indian students see the same schools. As mentioned, these figures are presented for interest and no definite conclusions can be made about differences between groups as these differences were not tested for statistical significance.

CHAPTER V

Discussion

This study used multiple regression analysis to investigate the amount of variance in achievement test scores that could be explained by the independent variables of cultural group, reasoning ability, classroom environment variables of satisfaction, friction, competitiveness, difficulty, cohesiveness, plus school, grade and sex. It was hypothesized that culture, reasoning ability, the five environmental variables, and school would be significant predictors of achievement tests scores and that grade and sex would not be. The hypotheses regarding the contributions of cultural group and reasoning ability were strongly supported. Only two classroom environmental variables predicted achievement when the total group was divided into two so this hypothesis was only partially supported. The hypotheses regarding the predictability of school, grade, and sex were also only partially supported.

Hypothesis 1 stated that cultural group would be a significant predictor of achievement. The finding that culture was a significant predictor of achievement for the total group and that the non-Indian group obtained significantly higher mean scores than the Indian group is in agreement with previous research comparing Indian and non-Indian achievement (Franklyn, 1974; F. S. I., 1973; Renaud, 1958). It should be mentioned, however, that there is considerable overlap between the two groups. The distribution of achievement

scores for the two groups indicates that there is about a 60 percent overlap. In other words, although the mean achievement scores for the non-Indian group are higher than the mean achievement scores for the Indian group, about 60 percent of the scores are common to the two groups..

A comparison of the group mean achievement scores with the 1973 Standardization Sample on the CTBS provides some additional information. For the 1973 Standardization Sample the mean standard score for each achievement subtest could be assumed to be 100. The Indian group in the present study obtained a mean achievement score in each subtest that was significantly lower than the 1973 standardization sample ($p < .05$). The non-Indian group obtained significantly higher mean scores in Reading ($Z = 2.024$, $p < .05$), Mathematics ($Z = 2.08$, $p < .05$), and the Composite Score ($Z = 1.963$, $p < .05$). The non-Indian group's mean scores in Vocabulary and Language Skills were also higher than the 1973 standardization sample but the differences were not significant.

Hypothesis 2 stated that reasoning ability would be a significant predictor of achievement test scores. Reasoning ability, as measured by Raven's Progressive Matrices, was a significant predictor of achievement scores for Indians and non-Indians which was expected from previous research. An interesting and unexpected finding was that the proportional amount of variance in achievement scores explained by the Raven's scores was different for the two cultural

groups, and within the Indian group it was different for different achievement scores. The fact that the Raven's score contributed much less to the total variance in Indian students' Mathematics achievement than to their other achievement scores is difficult to explain. The Mathematics subtest included tests of Mathematics concepts plus problem solving so the difference cannot be due to lack of a verbal component. The Raven's scores also contributed less proportionately to the Indian students' Language Skills achievement. The Language Skills subtest includes tests on spelling, capitalization, punctuation, and grammar. Perhaps the reason for the differential Raven's contributions to the Indian students' achievement scores is due to the component of rote learning in Mathematics and Language Skills. The Raven's Matrices is described as a test of observation and clear thinking (Ravens, 1960) and as such, would not likely be related to subjects requiring rote learning. The same relationships do not hold true for the non-Indian students' achievement in Mathematics and Language in that the Raven's contributes about the same proportion to the total variance in all their achievement tests. If the previous speculations regarding rote learning are pursued, then one might suggest that perhaps the non-Indian students and Indian students use different cognitive strategies in learning Mathematics and Language Skills.

There is evidence in the literature to suggest that Indians and non-Indians do, in fact, use different cognitive strategies.

Several studies have demonstrated that variations in the patterns of cognitive abilities exist among ethnic groups (cited in Krywaniuk & Das, 1976). For purposes of explanation in this study, the two cognitive abilities of simultaneous and successive synthesis provide some insights. Simultaneous information processing "refers to the synthesis of separate elements into groups, these groups often taking on spatial overtones. . . . Successive information processing refers to processing of information in a serial order." (Das, Kirby, & Jarman, 1975, p. 89). According to the Das et al (1975) model for cognitive abilities, rote memory requires sequential or successive processing, "whereas reasoning of the Progressive Matrices types usually needs simultaneous processing" (p. 98). Krywaniuk and Das (1976) state however, that "no task is purely simultaneous or successive, but involves elements of each, and can be approached with some combination of strategies. It is in this combination where individuals, and indeed cultures, vary" (p. 272). From the results of previous research and the present study, it is hypothesized that the Indian and non-Indian students use either different cognitive strategies or different combinations of strategies in their approaches to learning Mathematics and Language Skills.

Hypothesis 3, stating that the five scale scores of the MCI would be significant predictors of achievement scores, presumed that each scale, by itself, would be a significant predictor. The results of this study which indicated that three of the MCI scale scores,

satisfaction, friction, and difficulty, were not significant predictors of achievement are contrary to previous research results. It should be mentioned, however, that research studies which did find that these three scales were significant predictors were done in high schools. Also, these studies used the LEI, and in most studies the unit of analysis was the class rather than the individual as was the case in the present study. Using the MCI in elementary schools, Walberg, Sorenson, and Fischbach (1972) found that the relations identified were not as strong as those found in high schools. They suggest that this may be because older students have more frames of reference in rating the environment. Another possible reason for the different findings between this study and previous studies which used the LEI, is that the individual scale reliabilities for the MCI are considerably lower than those for the LEI. Thus the MCI may not be as reliable a test instrument as the LEI. Another limitation regarding the use of the MCI in this study is that one group of subjects, the Indian students, are from a different culture than the one for whom the test was constructed. Thus there may have been problems associated with both their understanding of instructions or questions and their motivation to answer in terms of their own perceptions.

Another part of hypothesis 3 predicted that the relationships found between the classroom climate variables and achievement would be stronger for Indian students than for non-Indian students. This

hypothesis presumed that the five MCI scales, when acting together, would explain more of the variance in achievement scores for Indian than for non-Indian students. The results from this study support this hypothesis. These results are in agreement with the conclusions drawn by Maynor (1970), that disadvantaged students are more strongly influenced by the student environment than are advantaged students.

The conclusion that Indian students are more strongly influenced by the classroom social climate than non-Indian students may be explained by social-psychological theory. Under Murray's Need-Press Model (cited in Nielsen & Kirk, 1974) the demands, sanctions, and expectations within the classroom give that classroom its particular environment. If we accept the premise that there are cultural and social class differences in child care and rearing, and that attitudes and values are developed initially in the family, then we can expect to find differences in children's values and attitudes. The literature suggests that there is a strong likelihood that the values emphasized in the classroom tend to reflect the white middle class perspective. Thus white middle class pupils will likely be accustomed to the attitudes and values which underlie the demands, santions, and expectations of the classroom. Therefore the classroom environment is consistent with their home environment. On the other hand, Indian students who have had different sociocultural influences may find the classroom alien or incompatible with their home environment because the values and attitudes learned at home may be

inconsistent with the values emphasized in the classroom. Thus we can expect the Indian students to be more strongly influenced by the classroom environment because they are not accustomed to the values which underlie the expectations of the classroom.

Clifton's (1977) hypothesis that interaction with others has an important effect on academic achievement, and that this aspect affects Indians' and non-Indians' achievement differently, receives some support from this study. The MCI subscale of cohesiveness is a measure of the feeling of intimacy that has developed as a result of several individuals interacting over a period of time. For Mathematics achievement, cohesiveness had a significant positive relationship for non-Indians but a significant negative relationship for Indians, thus lending some support to Clifton's hypothesis. It is recognized, of course, that correlation does not infer causation. Therefore, the results of the present study show only that the relationships between Mathematics achievement and cohesiveness are in opposite directions for the two groups.

It was predicted that cohesiveness would be positively related to achievement. The finding that cohesiveness had a significant negative relationship to Indian students' Mathematics achievement is contrary to most previous research findings with non-Indian students. The majority of previous studies found that cohesiveness had a positive influence on achievement. A negative relationship between achievement and cohesiveness means that low cohesiveness is associated

with high achievement and high cohesiveness is associated with low achievement. When the distribution of Mathematics' achievement scores and cohesiveness scores is examined, the scattergram of scores reveals the reason for the reported relationship. Thus the high cohesiveness - low achievement pattern is accounted for by the students in School One, the federal school. And the low cohesiveness - high achievement pattern is found in the two provincial schools.

For present purposes, the discussion will concentrate on differences in the cohesiveness factor between schools; differences in achievement scores will be discussed later in another section. The nature of the MCI is such that the student is prompted to use the total classroom group as a frame of reference. The results indicate that the Indian students in the federal school perceive the total class as a cohesive group. On the other hand, the Indian students in the provincial schools perceive their classes as lower in cohesiveness. It seems reasonable that the Indian students, as a minority group in the provincial schools, would perceive that climate as low in cohesiveness. They may experience in-group cohesiveness with the other students of their own cultural group but see the total group as low in cohesiveness. It should be mentioned, however, that the non-Indian students' scores on cohesiveness were not very different from the Indian students' scores in the provincial schools. Again, this finding may relate to the students' perceptions of the total group which may not seem cohesive, although there may be cohesive

sub-groups or cliques within the larger group. The low cohesiveness - high achievement relationship found for Indian students and the supposition that there may be in-group cohesiveness or cliques receives some support from previous research. House (1975) found a positive relationship between cliquishness and self-concept, with prior evidence that self-concept was positively related to achievement. In summary, this study indicates that Indian students in the federal school perceive their classes as high in cohesiveness and their achievement is lower; Indian students in provincial schools perceive their classes as lower in cohesiveness and their achievement is higher. The relationship between cohesiveness and achievement in the provincial schools may be mediated by peer group influences.

The positive relationship found between cohesiveness and non-Indian students' achievement in Language Skills and Mathematics is consistent with the findings of previous research (Anderson, 1970; Walberg, 1970; Walberg & Anderson, 1972). This means that low cohesiveness is associated with low achievement and high cohesiveness is associated with high achievement plus a variety of scores in the middle range. An examination of the distribution of achievement and cohesiveness scores reveals that the low cohesiveness - low achievement pattern is accounted for by the grade eight class in School Three for both Language Skills and Mathematics. The grade six class in School Three also has a low cohesive - low achievement relation

in Mathematics. For Mathematics achievement, there is also a distinct high cohesive - high achievement pattern for the grade four students in both schools. Other scores are fairly well scattered throughout the middle range. It should be mentioned that when the terms "low cohesive" and "high cohesive" are used, this does not mean low or high in any absolute sense but only in a relative way. For example, the range of cohesiveness scores for non-Indians (by class) is only 2.67 with a low score of 18.33 and a high score of 21.

The hypothesis predicting a negative relationship between competitiveness and achievement for Indian students was not supported. The positive relationship found between competitiveness and Indian students' achievement in Vocabulary, Language Skills, Mathematics, and the Composite Score is similar to results of studies involving non-Indian subjects. No causal implications can be drawn from this data; in fact, the classroom climate dimension of competitiveness and achievement scores are probably mutually interrelated in a complex manner. Thus a more competitive classroom may produce higher achievement or higher achievers may perceive the classroom as competitive. A cause and effect relationship could only be determined by an experimental study. The data do seem to indicate that competitiveness does not have a negative influence on Indian students' achievement as Frideres (1974) suggested. The finding that competitiveness was not significantly related to non-Indian students' achievement suggests that the relationship found for Indian students may be mediated by student background characteristics such as cultural

values and attitudes. The commonly accepted premise that Indian children are more cooperative than non-Indian children may account for the findings of the present study. It could be that Indian children are cooperative within their own group but not necessarily within the school system.

Hypothesis 4, which predicted that school would be a significant predictor of achievement scores for Indian students, was based on the expected effect of the competitiveness factor. As has already been mentioned, the findings regarding the relationship between competitiveness and achievement were contrary to those expected. Although Hypothesis 4 did receive partial support, it is obvious that the differences in achievement between schools were not due to differences in the competitiveness factor. Thus there must be another explanation for differential achievement between schools. In the F.S.I. report (1973), the authors report that "Indian students in joint schools performed better than Indian students in federal schools although this difference was not always a significant one" (p. 251). The present study had similar results for achievement in Vocabulary. Assuming that instructional quality was equivalent in the three schools, an explanation may lie in the influence that the middle-class students in the joint schools have on the lower socioeconomic class Indian children. Wilson (1959) found that lower socioeconomic class children attending schools where the majority of students are from middle class families have higher educational aspirations than lower class pupils attending schools attended

predominantly by lower class pupils. Another possible explanation for differences between schools may lie in the school-selection procedure. Perhaps the parents of higher-achieving Indian students choose to send those children to the joint schools.

Hypothesis 5, predicting that sex would not significantly predict achievement scores, was only partially supported. For non-Indian students' achievement in Language Skills, the girls obtained a significantly higher mean score than the boys. The Language Skills test includes subtests on punctuation, capitalization, grammar and spelling. Maccoby and Jacklin (1974) conducted a major review of the research on sex differences. They report that females aged 1-3 are more proficient in linguistic skills than males but from preschool to adolescence, the sexes are very similar in their verbal abilities. Maccoby and Jacklin state further that throughout the school years, girls do better than boys on tests of grammar, spelling, and word fluency. The present study supports Maccoby and Jacklin's conclusion in that the girls scored better in Language Skills which included grammar and spelling. In other tests involving verbal abilities, Reading and Vocabulary, the sexes had similar scores.

Hypothesis 6 predicted that grade would not significantly predict achievement scores. The conclusion that grade is a significant predictor of Indian students' achievement scores in Reading, Language Skills and the Composite Score may be indicative of what Jenson (1966) has described as "cumulative deficit." This means that as

a child advances in school, the school work tends to become progressively difficult and frustrating as the child increasingly fails to match the competence demands of advancing school progression. Other research studies involving Indian students' achievement have found evidence of what may be called cumulative deficit. Renaud (1958) tested 1,562 Indian students in Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia. He found that in grade 5, the average Indian student was approximately one year behind, in reading, while in grade 8 he was approximately two years behind. In a study commissioned by the Federation of Saskatchewan Indians (1973), the authors reported that "Indian students, on the average, are probably achieving two to three years below grade level in reading by the time they reach grade 7" (p. 251). The results of the present study found similar decreases in levels of academic achievement as the Indian students progress from grade 4 to grade 8. Rosenthal and Jacobson (cited in Fowler, 1972) suggest that this process which is predominant in socioeconomically disadvantaged groups and which has been described as a cumulative deficit is "also partially shaped by socioeconomic barriers of discrimination and a kind of negative identity, self-fulfilling prophecy" (p. 100).

Recommendations

It is not the intention of the author of this study to make extensive recommendations regarding the broad field of education for Indian children as this has been done many times before by many

very competent researchers and authors (Bowd, 1977; Fisher, 1969; Franklyn, 1974; Frideres, 1974; MacArthur, 1968; Ryan, 1972). The book edited by Ryan is an especially good book on Canadian Intervention Research and Programs and includes suggestions for programs for native people.

In view of the speculation that Indian and non-Indian students may use different cognitive strategies or different combinations of strategies in learning Mathematics and Language Skills, it is recommended that further research be conducted to investigate this possibility. In a study of forty low-achieving Canadian Indian children in grades 3 and 4, Krywaniuk and Das (1976) found that the children had well-developed simultaneous strategies but these were often used in place of the more efficient sequential processes. The authors suggest that most academic tasks demand specific sequential operations. The authors report that this study demonstrated that when appropriate remedial programs were used, cognitive strategies could be taught. In view of this, it seems important that the low-achieving Indian students from the present population be tested in order to determine whether they are using inefficient sequential learning processes and, if so, then proper remediation programs should be carried out. Methods for assessing cognitive strategies and remediation programs are discussed in Krywaniuk and Das (1976).

Because Indian students are strongly influenced by their school environment, it is important that educators of Indian children try

to foster an environment that is conducive to improved learning. From the present findings of a positive relationship between competitiveness and achievement for Indian students, it is recommended that experimental studies be undertaken to discover whether there is a causal relationship between these two factors. In view of the findings on cohesiveness, it is recommended that further research be conducted to discover whether peer group influences or cultural in-group influences may be affecting the relationships between cohesiveness and achievement.

It was suggested previously in this study that the values and attitudes which underlie the expectations of the school may be in conflict with the values and attitudes of Indian children. It seems advisable that schools examine the values and attitudes of school personnel to discover if their values and attitudes are concordant with those of Indian as well as non-Indian children. "The school should become familiar with the values of parents and children so that teachers and curriculum can work more effectively with them" (Friesen, 1974, p. 154). The school system has often stressed the importance of teacher's being cognizant of and reacting to individual differences between students and this has been done to a great extent in relation to differential abilities and levels of achievement. Now steps should be taken to also recognize and react appropriately to sociocultural differences. One way to do this would be to develop programs and materials which are culturally meaningful

to the Indian child.

Again, in view of the importance of the classroom environment in influencing Indian students' achievement, it is recommended that future research be carried out to discover additional environmental factors that have a positive influence on Indian and non-Indian students' achievement. From such research, teachers would receive more information regarding the environmental aspects that will foster learning for both Indian and non-Indian students and thus will have some basis on which to work. Further to this recommendation, it is also recommended that either the MCI be changed and/or improved in order to make it a more reliable instrument, or else a new instrument should be developed to measure elementary classroom environments. In using the MCI in the present study, the investigator concluded that the instrument had too few items altogether, had too few items per subscale, and had too few subscales to adequately measure the total classroom learning environment.

References

Anderson, G. J. Effects of classroom social climate on individual learning. American Educational Research Journal, 1970, 7, 135-152.

Anderson, G. J. Effects of course content and teacher sex on the social climate of learning. American Educational Research Journal, 1977, 8, 649-663.

Anderson, G. J., & Walberg, H. J. The assessment of learning environments: A manual for the Learning Environment Inventory and the My Class Inventory (2nd ed.). Chicago, Illinois: University of Illinois at Chicago Circle, 1973.

Anderson, G. J., & Walberg, H. J. Learning environments. In H. J. Walberg (Ed.), Evaluating educational performance. Berkeley: McCuthan Publishing, 1974.

Anderson, G. J., Walberg, H. J., & Welch, W. W. Curriculum effects on the social climate of learning: A new representation of discriminant functions. American Educational Research Journal, 1969, 6, 315-328.

Beady, C. H. Systematic interpretation of an analysis of the relationship between academic climate variables and achievement in predominantly black elementary schools. Unpublished doctoral dissertation, Michigan State University, 1975.

Bental, G. Differences in mental ability and academic achievement of two groups of high school graduates. Journal of Educational Research, 1966, 60, 127-134.

Bowd, A. D. Some determinants of school achievement in several Indian groups. Alberta Journal of Educational Research, 1972, 18, 69-76.

Bowd, A. D. Ten years after the Hawthorn Report: Changing psychological implications for the education of Canadian Native peoples. Canadian Psychological Review, 1977, 18, 332-345.

Brookover, W. B., & Schneider, J. M. Academic environments and elementary school achievement. Journal of Research and Development in Education, 1975, 9, 82-91.

Cayne, R. E. Relationships of teacher personality to classroom social climate. AERA Abstracts, 1970, 2, 40.

Chadwick, B. A., Bahr, H. M., & Stauss, J. Indian education in the city: Correlates of academic performance. Journal of Educational Research, 1977, 90, 135-141.

Clifton, R. A. Factors which affect the education of Canadian Indian students. In R. A. Carlton, L. A. Colley and R. J. MacKinnon (Eds.), Education, change and society: A sociology of Canadian education. Toronto: Gage Educational Publishing, 1977.

Coleman, J. S. Equality of educational opportunity. Washington: U.S. Government Printing Office, 1966.

Dankworth, R. T. Educational achievement of Indian students in public secondary schools as related to eight variables, including residential environment. Logan, Utah: Utah State University, May, 1970. (ED 042 526)

Das, J. P., Kirby, J., & Jarman, R. F. Simultaneous and successive syntheses: An alternative model for cognitive abilities. Psychological Bulletin, 1975, 82, 87-103.

Davis, E. J., & Ryan, T. J. Proposals for the future: Action and study. In I. J. Ryan (Ed.), Poverty and the child. Toronto: McGraw-Hill Ryerson, 1972.

DiMarco, N. Life style, learning structure, congruence and student attitudes. American Educational Research Journal, 1974, 11, 203-209.

Elliott, J. G. Educational and occupational aspirations and expectations: A comparative study of Indians and non-Indian youth. March, 1970. (ED 045 257)

Ellison, R. L., Callner, A., Fox, D. G., & Taylor, C. W. Measurement of academic climate in elementary schools. Proceedings of the 81st Annual Convention of the American Psychological Association, 1973, 8, 653-654.

Federation of Saskatchewan Indians. Indian education in Saskatchewan, Vol. III. Saskatoon, Saskatchewan: Saskatchewan Indian Cultural College, 1973.

Fisher, A. D. White rites versus Indian rights. Trans-action, 1969, 7 (1), 29-33.

Fowler, W. The development of competence and deficit and some Canadian perspectives. In I. J. Ryan (Ed.), Poverty and the child. Toronto: McGraw-Hill Ryerson, 1972.

Franklyn, G. J. Alienation and achievement among Indian-Metis and non-Indians in the Mackenzie District of the Northwest Territories. Alberta Journal of Educational Research, 1974, 20, 157-169.

Frideres, J. S. Canada's Indians, contemporary conflicts. Scarborough: Prentice-Hall, 1974.

Hall, D. T., & Hall, F. S. The relationship between goals, performance, success, self-image and involvement under different organization climates. Journal of Vocational Behavior, 1976, 9, 267-278.

Hawthorn, H. B. A survey of the contemporary Indians of Canada (Vol. II). Ottawa: Indian Affairs Branch, 1967.

Hearn, J. C., & Moos, R. H. Subject matter and classroom climate: A test of Holland's environmental propositions. American Educational Research Journal, 1978, 15 (1), 111-124.

Heath, R. W. The ability of white teachers to relate to black students and to white students. American Educational Research Journal, 1971, 8, 1-10.

Hoople, J., & Newbery, J. W. E. And what about Canada's Native peoples? Ottawa: Richelieu Graphics Ltd., 1976.

House, P. A. Learning environments, academic self-concepts and achievement in Mathematics. Journal for Research in Mathematics Education, 1975, 6, 244-252.

Jensen, A. R. Cumulative deficit in compensatory education. Journal of School Psychology, 1966, 4, 37-47.

Keller, D. E., & Rowley, V. N. The relations among anxiety, intelligence and scholastic achievement in junior high school children. Journal of Educational Research, 1964, 54, 4.

Kerlinger, J. N., & Pedhazur, E. J. Multiple regression in behavioral research. New York: Holt, Rinehart & Winston, 1973.

Kleinfeld, J. S. Classroom climate and the verbal participation of Indian and Eskimo students in integrated classrooms. Journal of Educational Research, 1973, 67, 51-52.

Koenigs, S. S., Fiedler, M. L., & deCharms, R. Teacher beliefs, classroom interaction and personal causation. Journal of Applied Social Psychology, 1977, 7, 95-114.

Krywaniuk, L. W., & Das, J. P. Cognitive strategies in Native children: Analysis and intervention. Alberta Journal of Educational Research, 1976, 23, 271-280.

Lane, R. B. Canadian Indians. The Canadian Psycholigist, 1972 13, 350-359.

Lucker, G. W., Rosenfield, D., Sikes, J., & Aronson, E. Performance in the interdependent classroom: A field study. American Educational Research Journal, 1976, 13, 115-123.

MacArthur, R. S. Educational potential of Northern Canadian Native Pupils. Paper presented at Alaskan Science Conference, American Association for the Advancement of Science, 1968. (ED 028 889)

Maccoby, E. E., & Jacklin, C. N. The psychology of sex differences. Stanford, California: Stanford University Press, 1974.

Marjoribanks, K. Ethnic and environmental influences on mental abilities. American Journal of Sociology, 1972, 78, 323-337.

Maynor, W. Academic performance and school integration: A multiethnic analysis. Durham, North Carolina: Duke University, 1970. (ED 052 863)

McBee, G., & Duke, R. L. Relationship between intelligence, scholastic motivation and academic achievement. Psychological Reports, 1960, 6, 3-8.

Miller, A. G., & Thomas, R. Cooperation and competition among Blackfood Indian and Urban Canadian children. Child Development 1972, 43, 1104-1110.

Moos, R. H. A typology of junior high and high school classrooms. American Educational Research Journal, 1978, 15(1), 53-66.

Moos, R. H., & Moos, B. S. Classroom social climate and student absences and grades. Journal of Educational Psychology, 1978, 70, 263-269.

Moos, R., & Trickett, E. Classroom environment scale manual. Palo Alto, California: Consulting Psychologists Press, 1974.

Nie, N. H., Hull, C. H., Jenkins, J. G., Steinbrenner, K., & Bent, D. H. Statistical package for the social sciences. New York: McGraw-Hill, 1975.

Nielsen, H. D., & Kirk, D. H. Classroom climates. In H. J. Walberg (Ed.), Evaluating educational performance. Berkeley: McCutchon Publishing, 1974.

O'Reilly, R. Classroom climate and achievement in secondary school mathematics classes. Alberta Journal of Educational Research, 1975, 21, 241-248.

Payne, D. A., Ellett, C. D., Perkins, M. L., & Shellenberger, S. The validity of student assessments of principals' competencies Journal of Educational Research, 1977, 70, 156-159.

Randhawa, B. S., & Fu, L. L. W. Assessment and effect of some classroom environment variables. Review of Educational Research, 1973, 43, 303-323.

Randhawa, B. S., & Michayluk, J. O. Learning environment in rural and urban classrooms. American Educational Research Journal, 1975, 12, 265-285.

Raven, J. C. The comparative assessment of intellectual ability. British Journal of Psychology, 1948, 39, 12-19.

Raven, J. C. Guide to the Standard Progressive Matrices. London: H. K. Lewis & Co., 1960.

Renaud, A. Indian education today. Anthropologica, 1958, 6, 1-49.

Ryan, T. J. Poverty and the child. Toronto: McGraw-Hill Ryerson, 1972.

Sindell, P. S., & Wintrob, R. M. Cross-cultural education in the north and its implications for personal identity: The Canadian case. Background paper for Conference on Cross-Cultural Education in the North, 1969. (ED 040 776)

Trickett, E. J., & Moos, R. H. Social environment of junior high and high school classrooms. Journal of Educational Psychology, 1973, 65, 93-102.

Trickett, E., & Moos, R. Personal correlates of contrasting environments: Student satisfaction in high school classrooms. American Journal of Community Psychology, 1974, 2, 1-12.

Vineyard, E. E., & Bailey, R. B. Interrelationships of reading ability, listening skill, intelligence and scholastic achievement. Journal of Developmental Reading, 1960, 3, 174-178.

Walberg, H. J. Class size and the social environment of learning. Human Relations, 1969, 22, 465-475.

Walberg, H. J. Social environment as a mediator of classroom learning. Journal of Educational Psychology, 1969, 60, 443-448.

Walberg, H. J. Predicting class learning, an approach to the class as a social system. American Educational Research Journal, 1969, 6, 529-542.

Walberg, H. J. A model for research on instruction. School Review, 1970, 78, 185-200.

Walberg, H. J. An evaluation of an Urban-Suburban School busing program: Student achievement and perception of class learning environments. Paper presented at the annual meeting of the American Educational Research Association, New York, N.Y., February, 1971.

Walberg, H. J., & Ahlgren, A. Predictors of the social environment of learning. American Educational Research Journal, 1970, 7, 153-167.

Walberg, H. J., & Anderson, G. J. Classroom climate and individual learning. Journal of Educational Psychology, 1968, 59, 414-419.

Walberg, H. J., & Anderson, G. J. Properties of the achieving urban classes. Journal of Educational Psychology, 1972, 63, 381-385.

Walberg, H. J., Rasher, S. P., & Singh, R. An operational test of a three-factor theory of classroom social perception. Psychology in the Schools, 1977, 14, 508-513.

Walberg, H. J., Sorenson, J., & Fischbach, T. Ecological correlates of ambience in the learning environment. American Educational Research Journal, 1972, 9, 139-148.

West, L. W., & MacArthur, R. S. An evaluation of selected intelligence tests for two samples of Metis and Indian children. Alberta Journal of Educational Research, 1964, 10, 17-27.

Wilson, A. B. Residential segregation of social classes and aspirations of high school boys. American Sociological Review, 1959, 24, 836-845.

Wilson, L. Canadian Indian children who had never attended school. Alberta Journal of Educational Research, 1973, 19, 309-313.

Wrightsman, L. S. Social psychology in the seventies. Monterey, California: Brooks/Cole Publishing, 1972.

Appendix A

Mean MCI Scale Scores of Students by School and Grade

Appendix A

Mean MCI Scale Scores of Students by School and Grade

School	MCI Scales				
	Satisfaction	Friction	Competitiveness	Difficulty	Cohesiveness
School 1					
Grade 4	21.14	18.14	19.86	17.14	24.14
Grade 6	18.36	19.54	18.45	13.91	22.27
Grade 8	19.86	18.71	20.71	16.14	23
School Mean	19.91	18.75	19.56	14.63	23.25
School 3					
Grade 4	17 (19)[b]	27 (19.75)	21 (22)	15 (14.75)	19 (21)
Grade 6	15 (10.56)	20.33 (24.11)	22 (22.33)	15.67 (17.67)	21.33 (18.33)
Grade 8	14.17 (13.91)	18.83 (23.64)	20.83 (20.45)	13.50 (15.27)	17.83 (18.82)
School Mean	14.77 (14.18)	20.15 (22.95)	21.38 (21.21)	14.61 (15.72)	19.54 (19.15)
School 2					
Grade 4	14.60 (20.41)	17.40 (20.53)	20.60 (22.06)	17 (12.59)	20.20 (20.29)
Grade 6	19.44 (18.57)	20.56 (21.57)	19.89 (21.57)	13.22 (13.86)	21.44 (20.14)
Grade 8	12.5 (12.76)	23 (23.38)	22 (20.14)	17.5 (15.19)	19 (19)
School Mean	17.06 (16.83)	19.87 (21.96)	20.37 (21.15)	14.94 (13.98)	20.75 (19.73)
Integrated[a] Schools	16.03 (15.69)	20.00 (22.38)	20.83 (21.18)	14.79 (14.73)	20.21 (19.48)

[a]Integrated schools include School 2 and School 3.

[b]Numbers in parentheses indicate mean MCI scale scores for non-Indian students.

Appendix B

Means & Standard Deviations of

Continuous Independent Variables

Appendix B

Means & Standard Deviations of Continuous Independent Variables

	Indians		Non-Indians	
	$\bar{X}$	SD	$\bar{X}$	SD
Ravens	99.58	14.33	109.81	11.19
Satisfaction	18.15	5.41	15.90	5.09
Friction	19.62	4.82	22.39	3.73
Competitiveness	20.72	3.63	21.18	3.86
Difficulty	15.25	3.70	14.89	3.20
Cohesiveness	21.92	3.79	19.48	2.91

Appendix C

Mean Achievement Scores of Students by Grade and School

Appendix C

Mean Achievement Scores of Students by Grade and School

School	Achievement Tests				
	Vocabulary	Reading	Language Skills	Mathematics	Composite
School 1					
Grade 4	81.47	89.87	97.93	80.67	87.00
Grade 6	86.63	87.69	88.88	83.63	86.13
Grade 8	80.20	81.10	84.38	89.56	81.10
School Mean	83.15	86.88	91.44	88.26	85.22
School 3					
Grade 4	75 (95.35)[a]	91 (105.56)	77 (97.67)	71 (104.67)	73 (103.56)
Grade 6	85 (105.44)	86.33 (106.78)	88 (107.56)	89.33 (100.63)	84.83 (106.56)
Grade 8	84 (96.39)	81.8 (96.26)	84.8 (96)	91 (95.26)	83.4 (96)
School Mean	83.75 (100.24)	84.83 (100.61)	85.75 (98.90)	88.50 (98.45)	83.25 (99.98)
School 2					
Grade 4	90.60 (107.56)	89.20 (108.67)	84 (103.89)	88.40 (110.33)	85.80 (108.17)
Grade 6	90.10 (92.40)	91.30 (100.93)	94.50 (102.20)	91.00 (104.27)	90.10 (101.40)
Grade 8	93 (104.43)	98.33 (103.86)	96.67 (106.95)	80 (106.38)	91 (105.19)
School Mean	90.72 (102.13)	91.89 (104.65)	91.94 (104.61)	88.44 (107.11)	89.06 (105.13)
Grade Means					
Grade 4	83.33	89.76	93.62	86.15	86.05
Grade 6	87.41	88.56	90.47	89.81	87.13
Grade 8	83.39	84.17	86.81	88.29	83.39

[a]Numbers in parentheses indicate the mean achievement scores of non-Indian students.

Appendix D

Graphs of MCI Scale Scores

Appendix D

Graphs of MCI Scale Scores

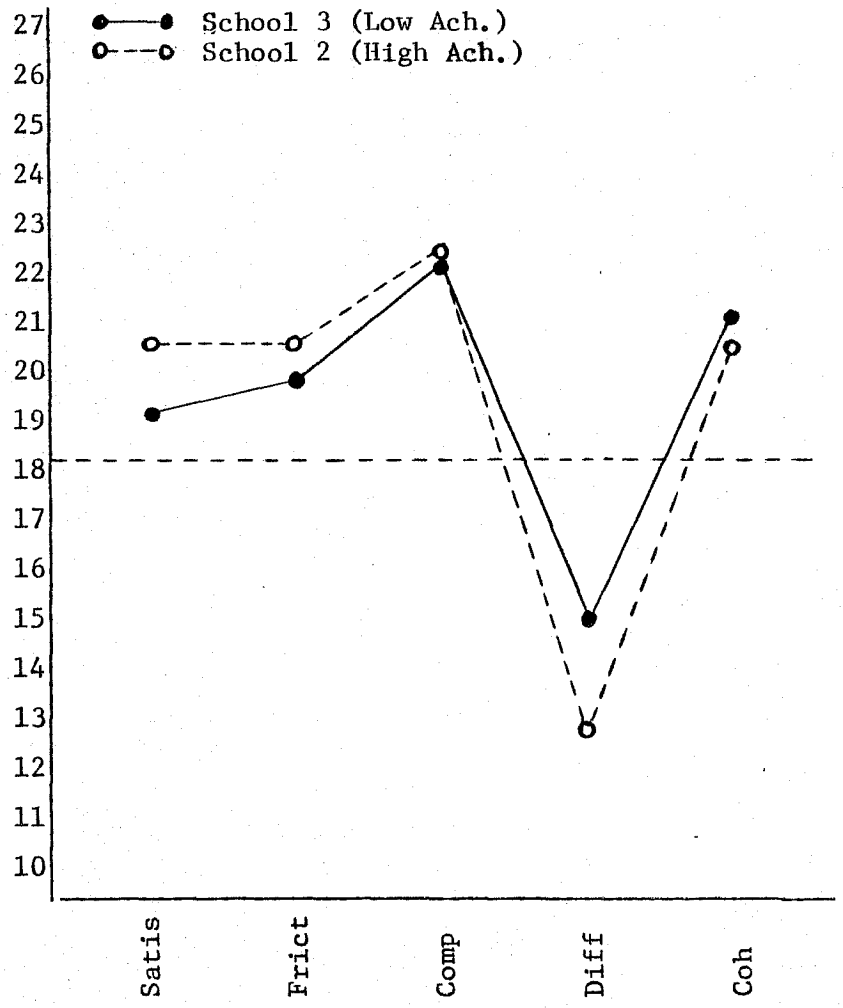

Figure 1. My Class Inventory Profiles for Grade 4 non-Indian students in School 2 and School 3.

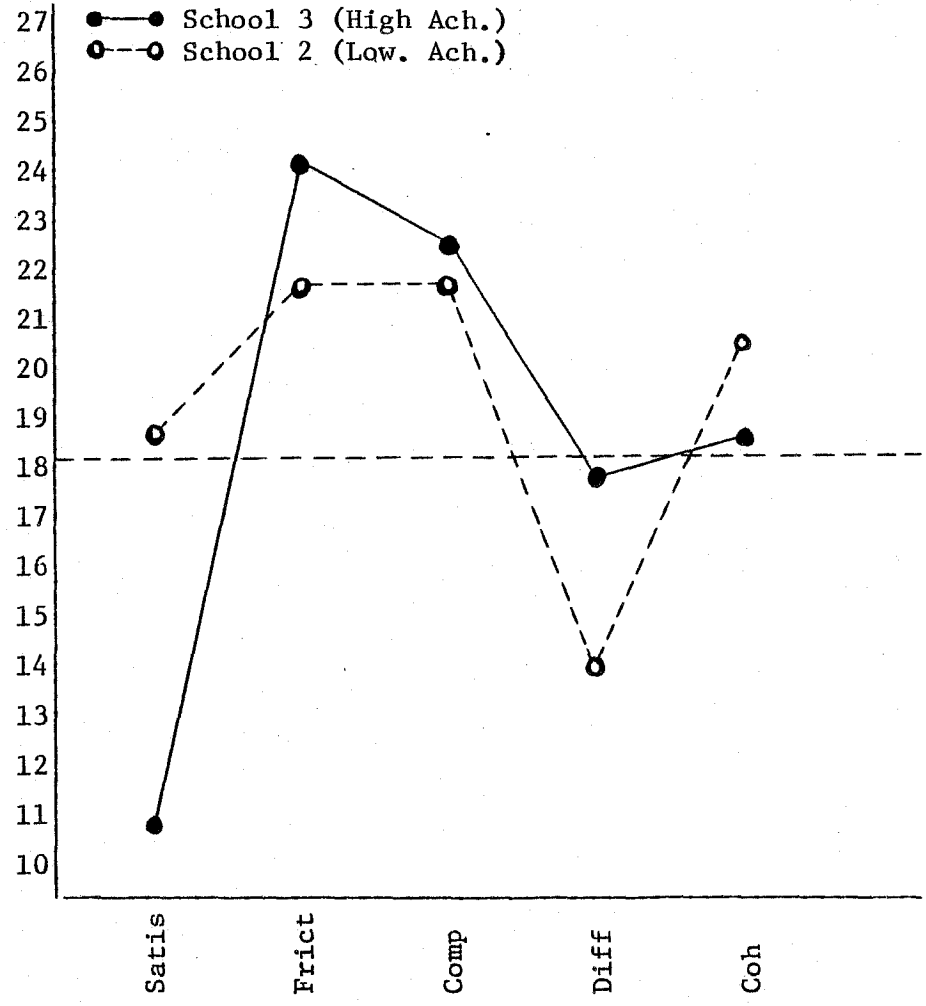

Figure 2. MCI Profiles for Grade 6 non-Indian students in School 2 and School 3.

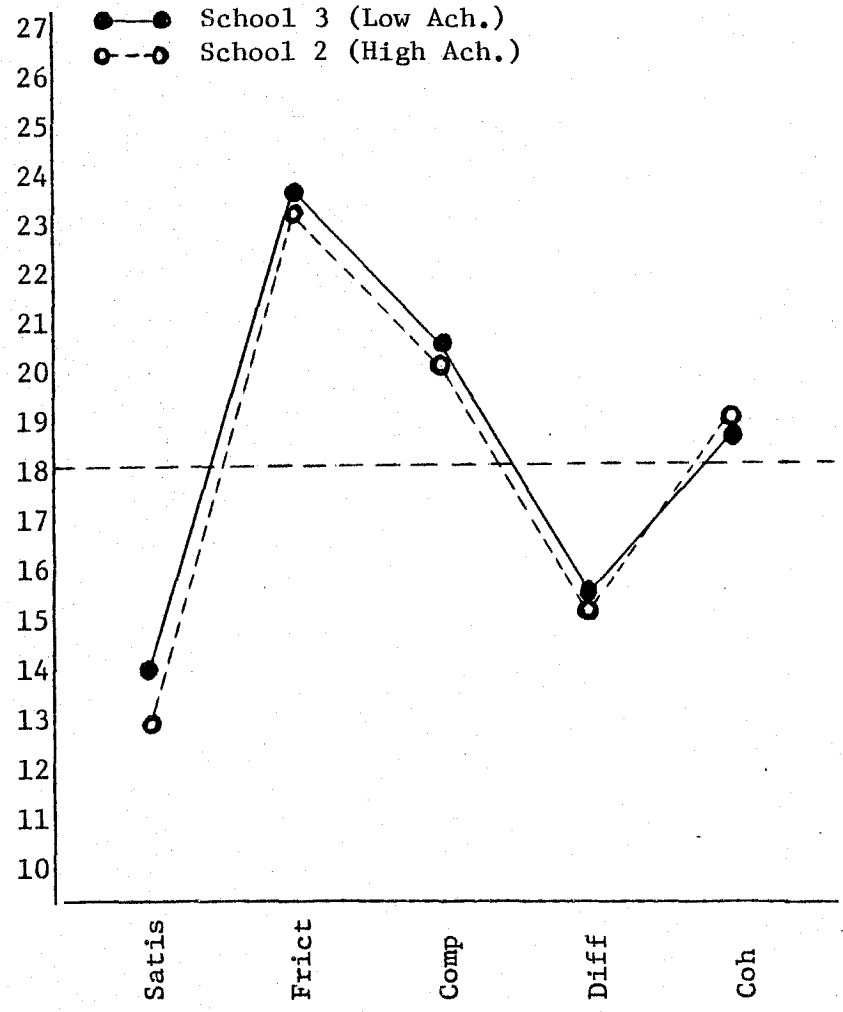

Figure 3. MCI Profiles for Grade 8 non-Indian students in School 2 and School 3.

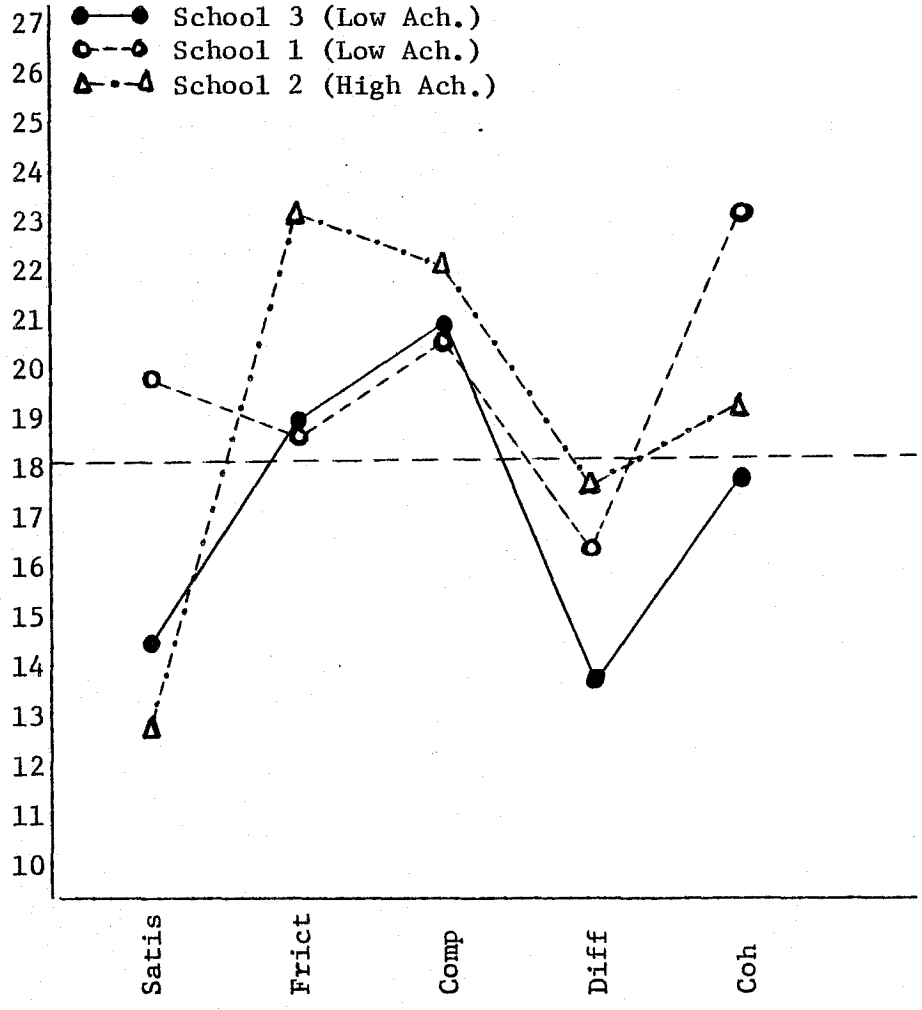

Figure 4. MCI Profiles for Grade 8 Indian students in three schools.

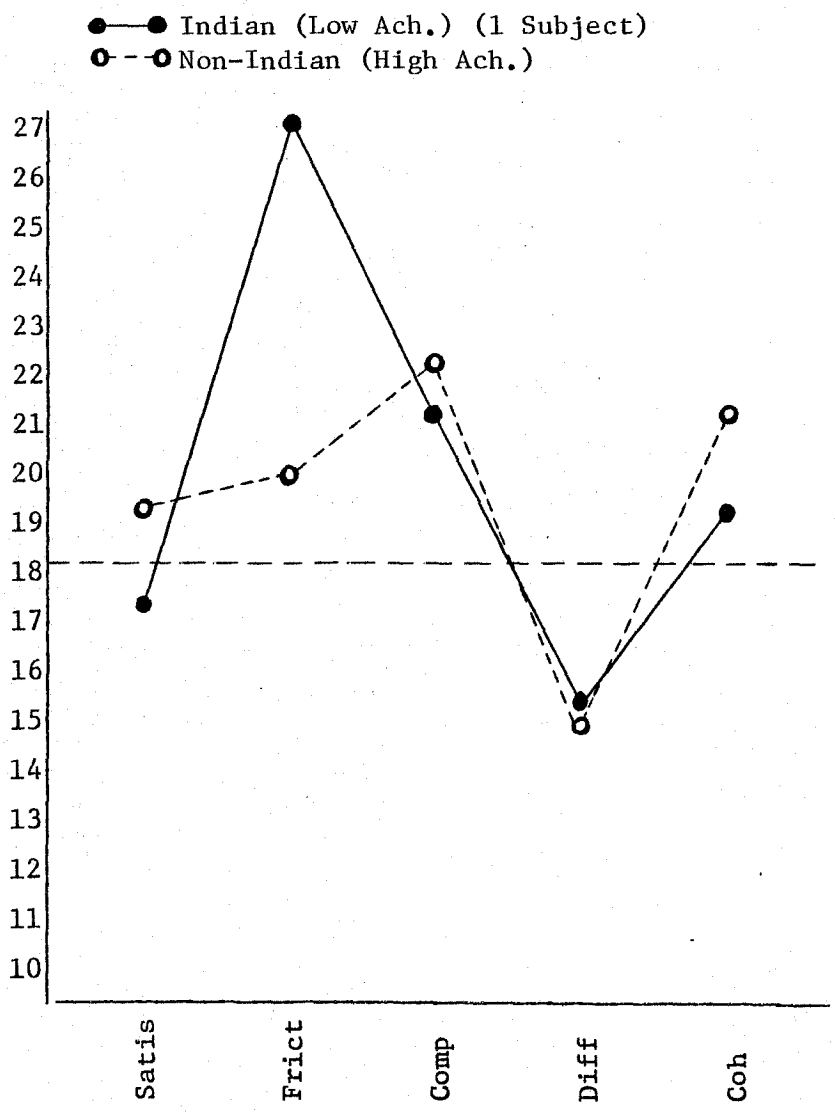

Figure 5. MCI Profiles for Grade 4 students in School 3.

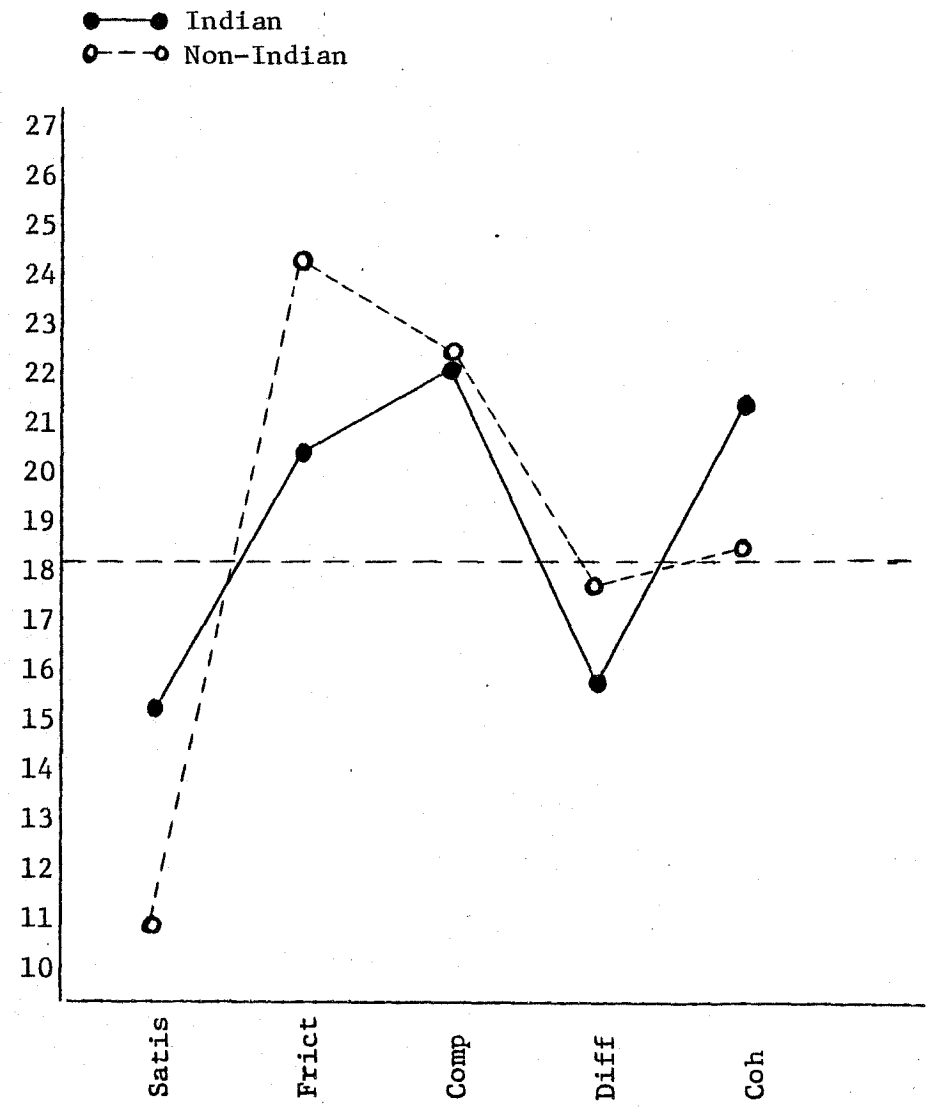

Figure 6. MCI Profiles for Grade 6 students in School 3.

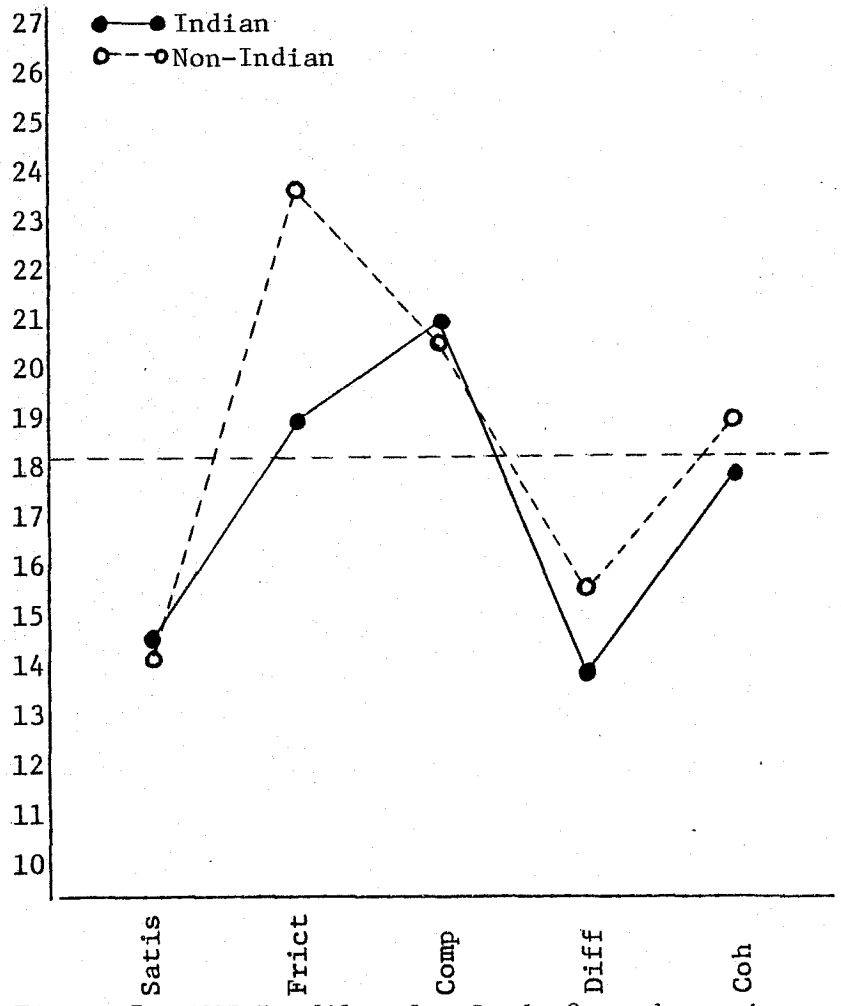

Figure 7. MCI Profiles for Grade 8 students in School 3.

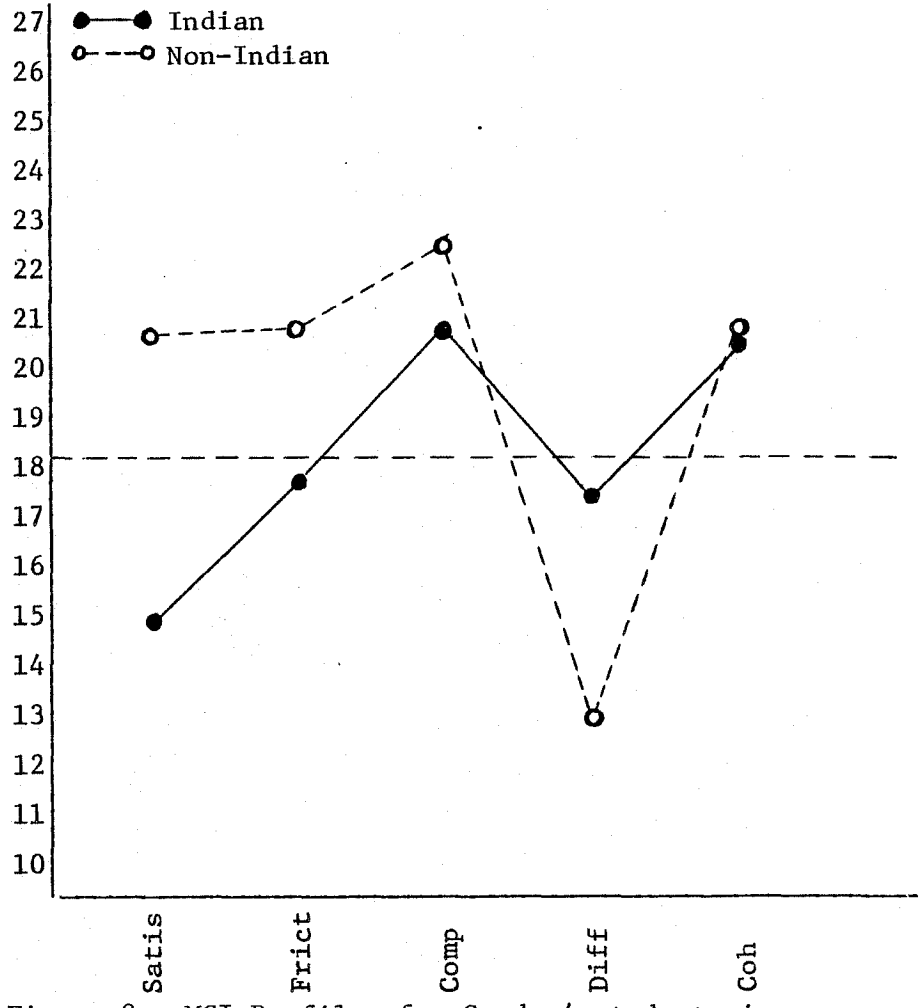

Figure 8. MCI Profiles for Grade 4 students in School 2.

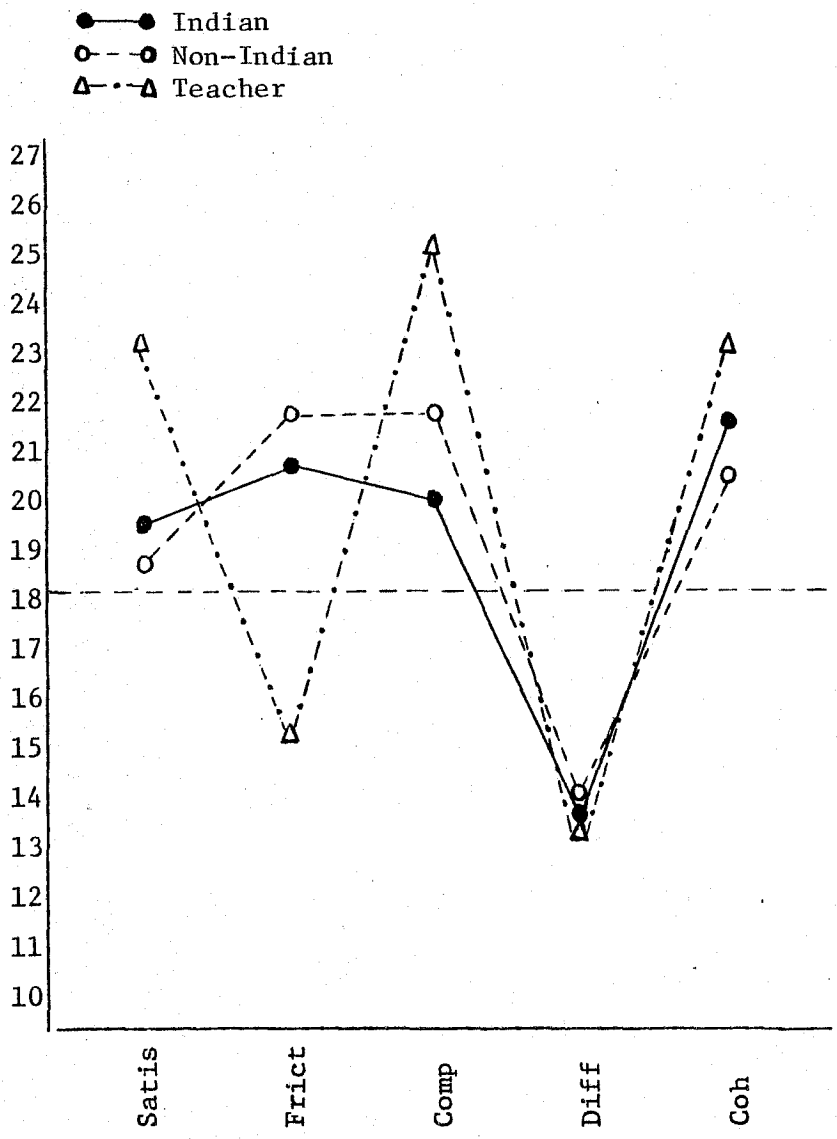

Figure 9. MCI Profiles for Grade 6 students and Teacher in School 2.

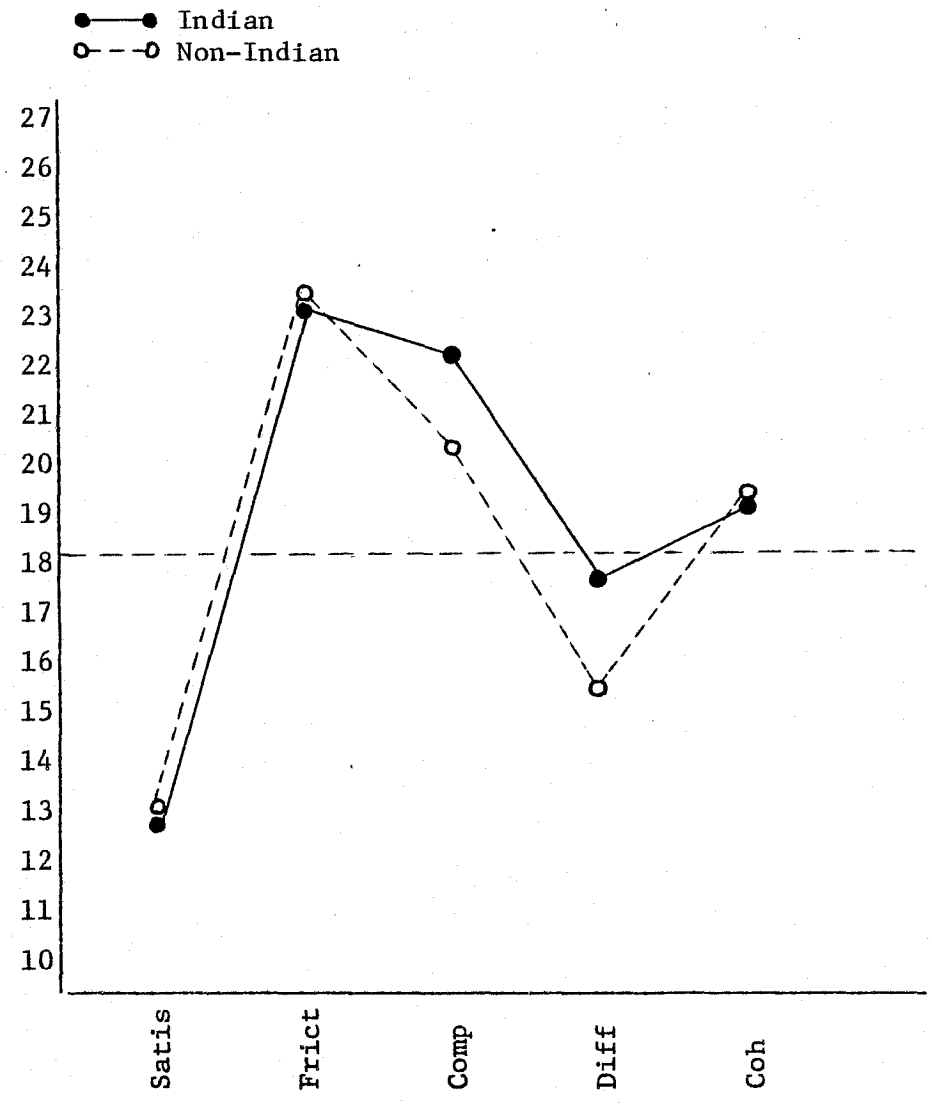

Figure 10. MCI Profiles for Grade 8 students in School 2.

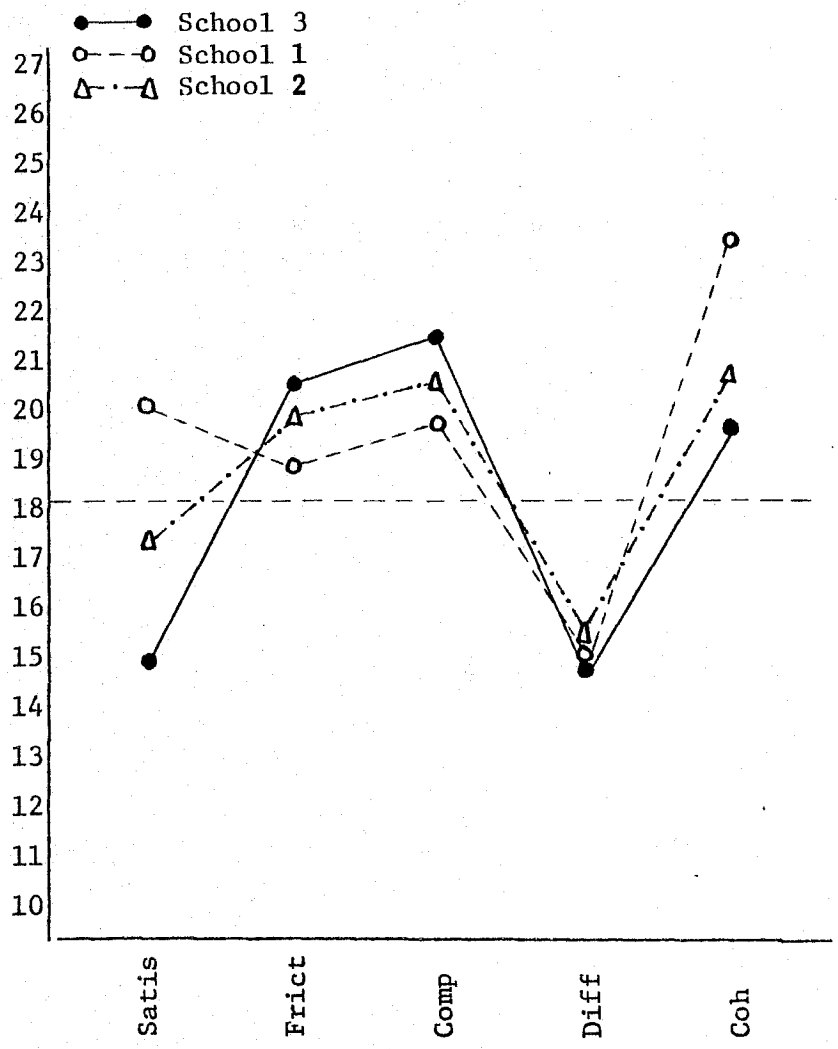

Figure 11. MCI Profiles for Indian students in three schools.

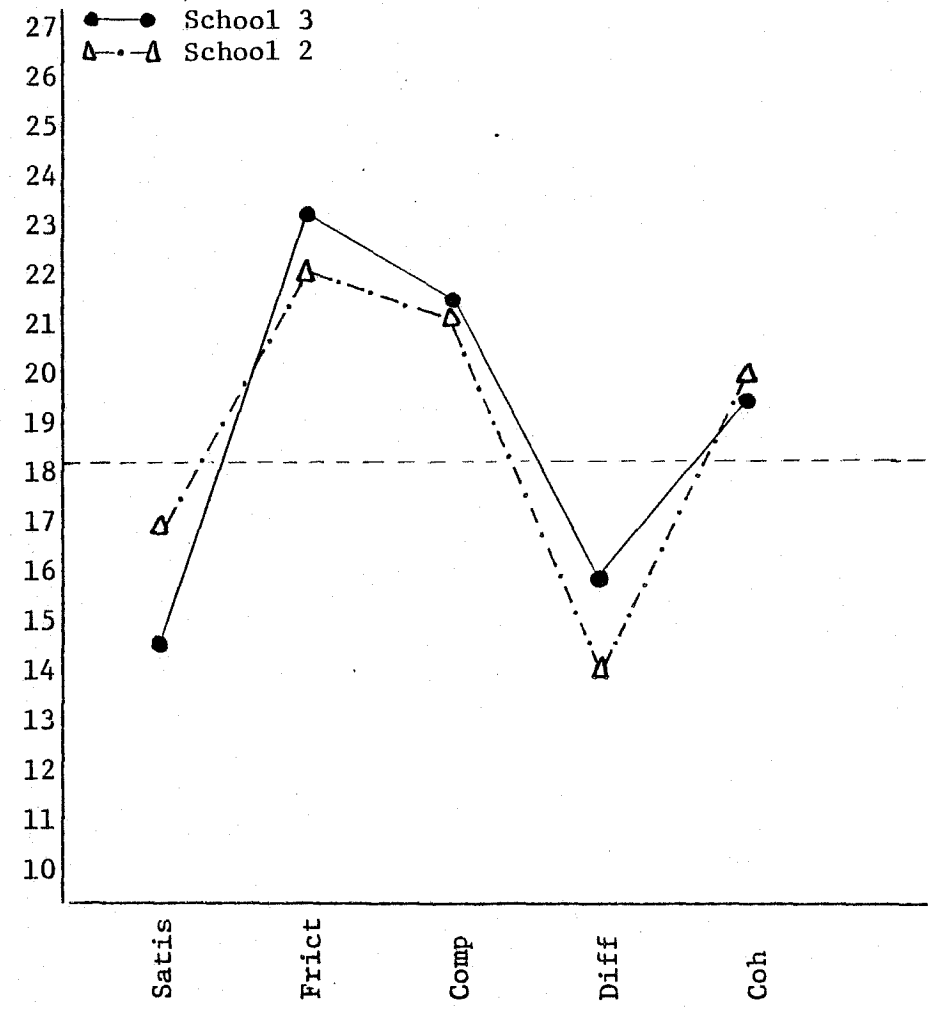

Figure 12. MCI Profiles for non-Indian students in two schools.

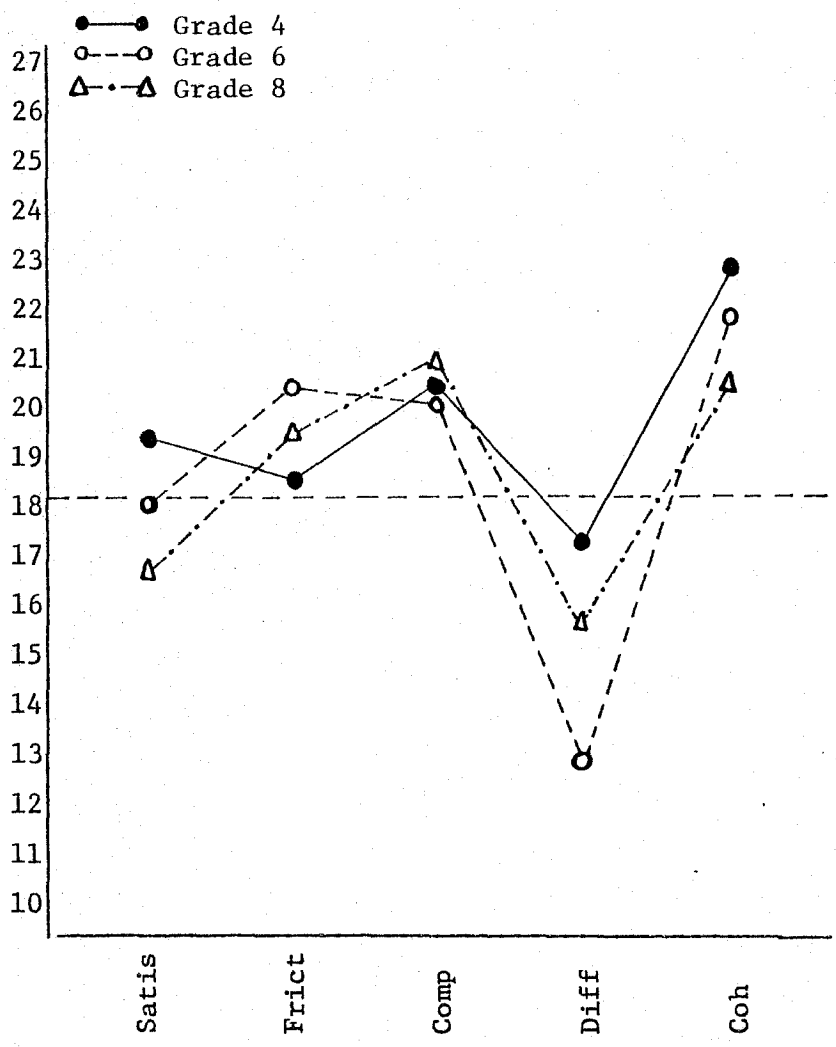

Figure 13. MCI Profiles for Indian students in three grades.

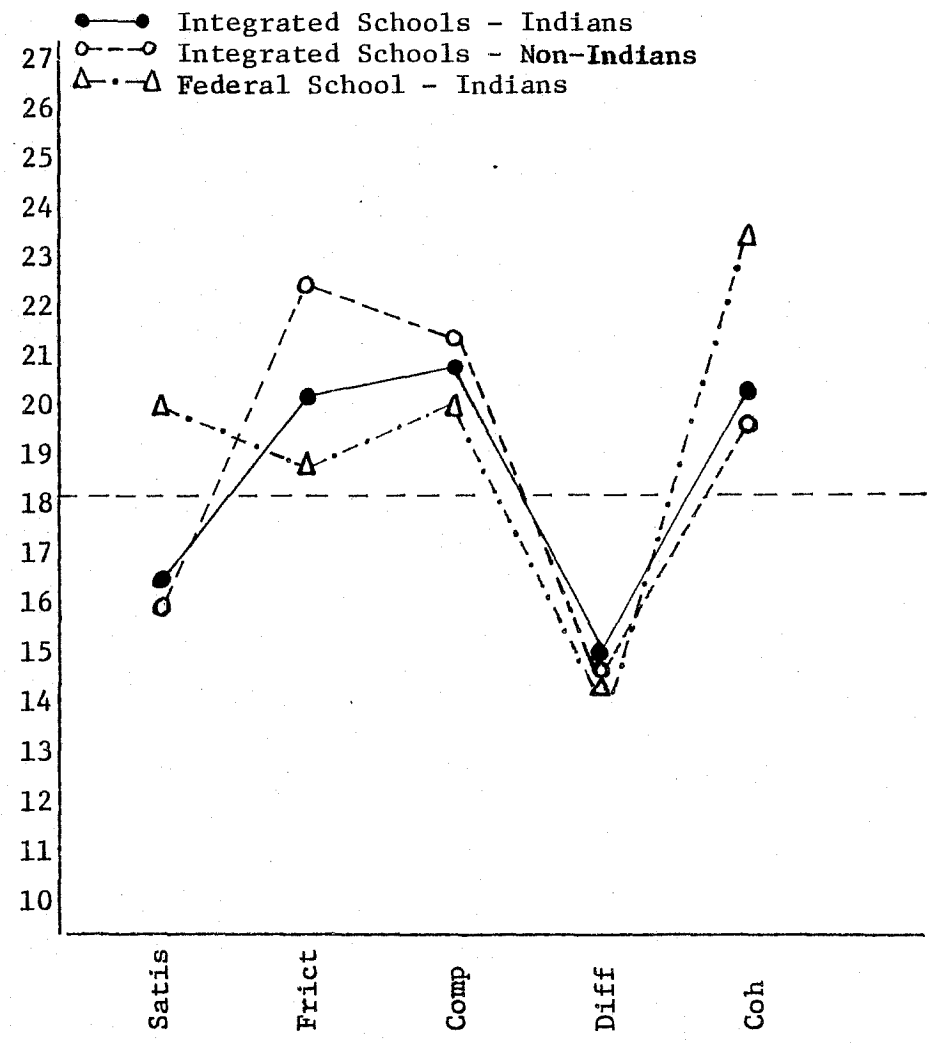

Figure 14. MCI Profiles for Indian and non-Indian students by school--integrated schools combined.

Appendix E

Sample of My Class Inventory, Reliabilities and Scoring Key

Appendix E

Sample of My Class Inventory, Reliabilities and Scoring Key

NAME _____

AGE _____

GRADE _____

DIRECTIONS

This is not a test. The questions inside are to find out what your class is like. Please answer all the questions.

EXAMPLE

Each sentence is meant to describe your class. If you agree with the sentence circle yes. If you don't agree with the sentence, circle no.

1. Most children in the class are good friends. Yes No

If you think that most children in the class are good friends, circle the yes like this:

1. Most children in the class are good friends. (Yes) No

If you do not think that most children in the class are good friends, circle the no like this:

1. Most children in the class are good friends. Yes (No)

Now turn the page and answer all the questions about your class.

	I	Circle Your Answer
1.	The pupils enjoy their schoolwork in my class.	Yes No
2.	Children are always fighting with each other.	Yes No
3.	The same people always do the best work in our class.	Yes No
4.	In our class the work is hard to do.	Yes No
5.	My best friends are in my class.	Yes No
6.	Some of the children in our class are mean.	Yes No
7.	Most pupils are pleased with the class.	Yes No
8.	Children often race to see who can finish first.	Yes No
9.	Many children in the class play together after school.	Yes No
10.	Most children can do their schoolwork without help.	Yes No
11.	Some pupils don't like the class.	Yes No
12.	Most children want their work to be better than their friend's work.	Yes No
13.	Many children in our class like to fight.	Yes No
14.	Only the smart people can do the work in our class.	Yes No
15.	In my class everybody is my friend.	Yes No

	II	Circle Your Answer
16.	Most of the children in my class enjoy school.	Yes No
17.	Some pupils don't like other pupils.	Yes No
18.	Some pupils feel bad when they do not do as well as the others.	Yes No
19.	In my class I like to work with others.	Yes No
20.	In our class all the pupils know how to do their schoolwork.	Yes No
21.	Most children say the class is fun.	Yes No
22.	Some people in my class are not my friends.	Yes No
23.	Children have secrets with other children in the class.	Yes No
24.	Children often find their work hard.	Yes No
25.	Most children don't care who finishes first.	Yes No
26.	Some children don't like other children.	Yes No
27.	Some pupils are not happy in class.	Yes No
28.	All of the children know each other well.	Yes No
29.	Only the smart pupils can do their work.	Yes No
30.	Some pupils always try to do their work better than the others.	Yes No

III

		Circle Your Answer
31.	Children seem to like the class.	Yes No
32.	Certain pupils always want to have their own way.	Yes No
33.	All pupils in my class are close friends.	Yes No
34.	Many pupils in our class say that school is easy.	Yes No
35.	In our class some pupils always want to do best.	Yes No
36.	Some of the pupils don't like the class.	Yes No
37.	Children in our class fight a lot.	Yes No
38.	All of the pupils in my class like one another.	Yes No
39.	Some pupils always do better than the rest of the class.	Yes No
40.	Schoolwork is hard to do.	Yes No
41.	Certain pupils don't like what other pupils do.	Yes No
42.	A few children in my class want to be first all of the time.	Yes No
43.	The class is fun.	Yes No
44.	Most of the pupils in my class know how to do their work.	Yes No
45.	Children in our class like each other as friends.	Yes No

Scales and Reliabilities of the My Class Inventory

Scale	Items	Individual Reliability[a]
Satisfaction	1, 7, 11*, 16, 21, 27*, 31, 36*, 43	.77
Friction	2, 6, 13, 17, 22, 26, 32, 37, 41	.70
Competitiveness	3, 8, 12, 18, 25*, 30, 35, 39, 42	.56
Difficulty	4, 10*, 14, 20*, 24, 29, 34*, 40, 44*	.56
Cohesiveness	5, 9, 15, 19, 23, 28, 33, 38, 45	.54

Note: Score: (yes --3; no --1). Items with an asterisk must have their polarities reversed, ie. yes = 1, no = 3.

[a]Based on data from 655 subjects, 1969.

Appendix F

Raw Data

School 1

	Name	Sex	Age	Raven's S.S	MCI S	MCI F	MCI Comp	MCI D	MCI Coh	V S.S	R S.S	L S.S	M S.S	C S.S
Grade 4	1*	F	10	103	21	21	21	13	23	96	88	113	99	99
	2*	F	10½	93	25	17	21	15	27	102	87	108	112	103
	3*	F	10½	74	21	25	21	17	23	75	90	79	79	76
	4*	F	11½	84	11	23	25	13	23	87	77	98	93	89
	5*	F	11	100	-	-	-	-	-	60	74	89	-	65
	6*	F	11	95	25	17	15	17	25	78	92	97	68	82
	7*	F	10	89	25	23	21	17	27	62	76	86	77	68
	8*	F	9½	79	23	15	19	15	23	75	80	108	86	87
	9*	M	11½	91	27	9	15	13	27	-	-	-	-	-
	10*	F	9	101	23	15	19	21	27	84	87	104	77	89
	11*	F	10	115	-	-	-	-	-	81	90	92	81	84
	12*	M	11½	100	-	-	-	-	-	78	92	97	79	84
	13*	M	10½	117	27	11	17	15	27	87	108	94	81	94
	14*	F	10	79	-	-	-	-	-	84	106	94	91	92
	15*	M	10½	111	19	15	21	21	21	-	-	-	-	-
	16*	F	9½	112	15	25	25	19	19	97	108	109	98	104
	17*	M	11	111	17	27	19	23	25	75	93	101	89	89
Grade 6	18*	F	11½	-	17	17	17	11	15	90	92	94	94	93
	19*	F	11½	111	15	23	23	9	27	94	96	100	107	100
	20*	F	13	-	-	-	-	-	-	69	87	102	92	86
	21*	F	12½	-	-	-	-	-	-	77	76	83	-	74
	22*	M	12½	99	25	13	19	9	27	85	104	95	91	94

S = Satisfaction
F = Friction
Comp = Competition
D = Difficulty
Coh = Cohesiveness
V = Vocabulary
R = Reading
L = Language
M = Mathematics
C = Composite
S.S = Standard Score
* = Indian Student

School 1

	Name	Sex	Age	Raven's S.S	MCI S	MCI F	MCI Comp	MCI D	MCI Coh	V S.S	R S.S	L S.S	M S.S	C S.S
Grade 6	23*	M	12	109	17	25	25	13	19	115	119	100	127	116
	24*	M	12	105	21	21	25	17	25	104	103	100	92	100
	25*	F	12	111	–	–	–	–	–	94	88	103	105	98
	26*	F	12	103	11	15	15	15	25	80	82	77	60	70
	27*	F	13	108	19	19	27	17	25	96	98	105	87	97
	28*	F	13	–	–	–	–	–	–	90	65	83	79	76
	29*	F	14½	58	14	23	22	11	15	75	58	70	90	67
	30*	M	13½	102	23	17	19	19	23	80	61	79	66	65
	31*	M	12	111	19	17	21	21	21	100	98	102	93	98
	32*	F	15	–	21	25	15	11	23	67	87	64	89	74
	33*	F	12	–	–	–	–	–	–	70	89	65	66	70
Grade 8	34*	M	16	100	25	17	17	15	27	85	75	74	105	74
	35*	M	14	86	–	–	–	–	–	77	80	–	97	84
	36*	M	15½	93	27	15	25	13	25	83	76	70	83	75
	37*	M	15	91	27	19	25	19	23	79	70	74	83	72
	38*	M	15	115	19	23	21	11	23	85	87	98	89	89
	39*	F	16	112	11	23	19	17	23	70	83	91	90	81
	40*	F	16½	127	15	9	13	23	23	97	106	100	98	101
	41*	F	18	104	15	25	25	15	17	91	86	–	–	87
	42*	F	14½	97	–	–	–	–	–	58	58	72	58	58
	43*	F	15	–	–	–	–	–	–	77	90	96	103	90

S = Satisfaction
F = Friction
Comp = Competition
D = Difficulty
Coh = Cohesiveness
V = Vocabulary
R = Reading
L = Language
M = Mathematics
C = Composite
S.S = Standard Score
* = Indian Student

School 2

	Name	Sex	Age	Raven's S.S	MCI S	MCI F	MCI Comp	MCI D	MCI Coh	V S.S	R S.S	L S.S	M S.S	C S.S
Grade 4	44	M	9½	123	19	25	27	11	21	113	130	106	130	122
	45	M	10	123	23	21	23	15	17	121	113	91	97	105
	46	F	9½	126	21	21	19	13	19	96	106	90	92	96
	47	M	10	134	23	19	25	15	17	117	121	111	123	120
	48	F	9½	128	11	25	21	15	17	121	111	124	124	122
	49	M	9½	121	11	23	27	13	19	119	123	108	130	122
	50	F	9½	91	27	15	15	15	21	95	98	99	79	93
	51	F	10	112	23	17	19	13	27	117	130	118	123	125
	52	M	9½	113	21	21	25	9	25	102	97	104	112	104
	53	M	9	-	27	25	23	17	23	109	107	100	99	105
	54	F	10	109	19	25	27	15	21	105	91	111	113	105
	55	F	10½	116	23	19	11	9	21	108	128	107	105	113
	56	M	9½	102	17	19	19	13	17	102	87	104	100	99
	57	M	10	-	25	17	25	11	19	133	128	113	130	128
	58	M	10	109	-	-	-	-	-	102	117	113	115	113
	59	F	9½	103	17	25	25	15	17	96	93	103	105	99
	60	M	9½	132	15	23	27	15	19	105	107	97	110	105
	61	F	9½	107	25	9	17	15	25	75	69	71	99	71
	62*	M	9½	111	23	17	13	23	17	87	88	79	99	88
	63*	M	10	-	13	11	23	11	23	65	62	81	62	63
	64*	M	11	106	11	23	23	15	23	106	110	99	92	102
	65*	F	11	-	9	21	21	21	15	117	106	94	108	107
	66*	M	12	91	17	15	23	15	23	78	80	67	81	69

S = Satisfaction
F = Friction
Comp = Competition
D = Difficulty
Coh = Cohesiveness
V = Vocabulary
R = Reading
L = Language
M = Mathematics
C = Composite
S.S = Standard Score
* = Indian Student

School 2

	Name	Sex	Age	Raven's S.S	MCI S	MCI F	MCI Comp	MCI D	MCI Coh	V S.S	R S.S	L S.S	M S.S	C S.S
Grade 6	67	M	11½	103	-	-	-	-	-	99	95	97	84	94
	68	F	11½	116	17	19	23	15	21	92	102	106	108	102
	69	F	11½	109	9	21	23	19	21	96	103	103	121	106
	70	M	12	109	21	23	21	13	19	102	113	128	130	121
	71	M	11½	116	23	17	15	9	23	104	111	112	125	114
	72	F	11½	111	21	23	27	13	17	92	90	87	104	94
	73	F	12	124	17	25	23	15	21	104	104	105	107	106
	74	M	12	109	17	21	19	15	19	92	97	86	91	91
	75	M	11½	87	23	23	25	11	19	89	112	92	90	94
	76	F	14½	89	21	17	25	15	27	77	69	77	65	67
	77	M	11½	105	19	23	23	17	23	107	93	112	101	104
	78	M	11½	121	15	23	19	13	19	108	109	103	117	110
	79	F	12	128	19	21	21	11	19	116	119	123	123	122
	80	F	12	102	19	23	19	15	13	77	84	90	91	83
	81	M	11½	106	19	23	19	13	21	114	113	112	107	113
	82*	F	12	131	15	25	15	13	19	106	116	103	88	103
	83*	M	12	86	19	13	25	11	25	94	100	98	104	99
	84*	M	14	78	15	23	23	13	23	77	74	87	84	76
	85*	F	12	103	19	21	19	15	19	96	96	107	111	103
	86*	F	12½	100	-	-	-	-	-	90	94	102	84	93
	87*	M	14½	95	27	19	19	11	21	99	96	95	97	97
	88*	F	13½	88	17	27	25	19	23	74	70	84	73	70

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School 2

	Name	Sex	Age	Raven's S.S	MCI S	MCI F	MCI Comp	MCI D	MCI Coh	V S.S	R S.S	L S.S	M S.S	C S.S
Grade 6	89*	M	12	93	13	27	23	15	15	106	103	103	98	102
	90*	M	13	100	25	19	15	13	23	77	77	79	99	79
	91*	F	15	105	25	11	15	9	25	82	87	87	72	79
Grade 8	92	M	13½	111	13	19	11	9	19	116	122	118	112	119
	93	M	14	121	11	23	21	13	23	118	107	128	125	123
	94	M	13	116	13	25	25	15	19	124	117	130	117	126
	95	M	13½	126	11	27	19	19	17	116	106	126	127	123
	96	M	14½	111	9	21	13	25	15	118	100	87	96	99
	97	F	14	117	17	23	21	17	21	124	119	140	127	131
	98	M	14	121	9	27	15	17	19	107	106	121	124	116
	99	F	14	111	13	25	21	13	17	96	101	107	121	107
	100	M	13½	117	15	15	21	15	21	105	103	103	107	106
	101	M	15½	93	13	23	23	15	21	73	86	91	77	80
	102	M	14	98	15	27	21	15	17	83	80	79	87	80
	103	F	13½	116	17	19	25	13	19	130	121	119	125	129
	104	F	14	113	17	21	19	17	23	118	117	131	107	89
	105	M	14	108	11	25	23	13	21	103	101	108	102	104
	106	M	14	117	19	27	17	13	21	126	122	118	122	125
	107	F	14	113	9	25	25	11	13	69	85	94	83	80
	108	M	14½	86	17	25	25	21	17	100	109	104	91	102
	109	F	13½	102	19	21	21	17	19	93	107	103	106	106
	110	M	16	98	11	23	11	15	19	77	86	71	86	77

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Grade 8	111	M	13½	98	15	25	21	13	19	100	89	88	89	92
	112	M	13½	114	13	25	25	13	19	97	97	80	103	95
	113*	M	14	98	9	27	23	19	19	106	106	92	86	97
	114*	F	13½	100	–	–	–	–	–	96	105	106	93	100
	115*	F	14½	–	16	19	21	16	19	77	84	92	61	76

School 3

	Name	Sex	Age	Raven's S.S	MCI S	MCI F	MCI Comp	MCI D	MCI Coh	V S.S	R S.S	L S.S	M S.S	C S.S
Grade 4	116	F	9½	113	19	17	21	17	21	96	104	111	100	104
	117	M	10½	103	11	27	25	19	19	108	117	100	87	104
	118	F	9½	115	17	15	23	15	23	112	113	111	116	114
	119	M	10	98	25	15	225	11	23	106	93	93	115	102
	120	M	10	98	25	21	23	13	25	113	117	97	121	111
	121	F	10	112	15	27	23	13	17	112	110	104	100	108
	122	M	11	86	15	23	21	13	19	106	106	83	108	101
	123	M	9½	–	–	–	–	–	–	105	100	90	116	102
	124	M	10½	112	25	13	15	17	21	86	90	90	79	86
	125*	M	10½	66	17	27	21	15	19	75	91	77	71	73
Grade 6	126	M	12	103	9	21	21	15	19	106	99	102	94	101
	127	F	13	99	11	27	25	13	17	107	106	103	–	106
	128	M	13	–	9	25	25	21	19	108	118	103	103	109

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	Name	Sex	Age	Raven's S.S	MCI S	MCI F	MCI Comp	MCI D	MCI Coh	V S.S	R S.S	L S.S	M S.S	C S.S
Grade 6	129	F	11½	114	17	21	25	15	19	123	124	117	124	124
	130	M	11½	89	11	23	21	23	25	87	96	94	94	93
	131	M	13	93	9	25	17	23	15	87	71	99	76	83
	132	F	15	91	9	25	25	17	15	94	93	99	86	94
	133	M	11½	129	9	25	17	15	19	141	141	133	134	143
	134	F	11	106	11	25	25	17	17	96	113	118	94	106
	135*	M	13	98	15	21	19	11	27	90	82	95	76	86
	136*	M	12½	97	19	15	23	17	25	82	84	74	78	76
	137*	M	14	97	11	25	23	23	23	77	74	81	87	75
	138*	M	13	96	15	17	25	15	21	74	82	83	90	77
	139*	M	11½	127	9	21	23	15	11	102	96	101	111	102
	140*	M	11½	113	21	23	19	13	21	85	100	94	94	93
Grade 8	141	F	14	105	17	27	23	11	19	111	109	101	108	108
	142	M	14	115	9	27	21	11	19	89	99	88	96	94
	143	M	15	97	19	27	23	17	21	101	99	78	81	89
	144	F	13½	113	9	19	19	15	19	84	101	103	90	94
	145	F	14	98	9	27	15	15	19	111	90	98	117	104
	146	F	14	103	17	23	19	15	19	103	99	105	99	103
	147	M	15	111	13	25	19	17	17	75	89	87	101	87
	148	F	14	121	17	23	21	13	25	87	93	121	110	104
	149	M	13½	129	19	27	17	13	17	93	81	70	67	76
	150	F	13½	111	13	17	27	13	23	97	91	97	101	97

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Grade 8	151	F	13½	102	15	25	17	19	17	101	90	82	88	89
	152	F	15	125	17	23	19	19	17	102	109	109	93	104
	153	M	14	103	9	27	23	17	19	93	93	84	89	89
	154	F	13½	117	19	21	17	13	19	105	109	127	113	115
	155	M	13½	102	9	27	23	19	15	83	96	111	88	95
	156	M	14	117	13	21	17	19	17	103	111	103	114	109
	157	M	14	95	–	–	–	–	–	96	82	74	84	83
	158	F	15	114	17	27	23	13	21	114	99	99	98	103
	159	F	13½	105	11	23	17	15	19	85	93	92	77	86
	160	F	15	102	19	19	27	9	23	84	94	94	91	90
	161	M	14	113	9	23	21	13	13	108	93	86	91	94
	162	M	14	127	9	23	21	21	15	89	89	99	106	96
	163	F	13½	116	17	19	21	19	21	103	105	100	89	99
	164*	M	15	111	19	17	17	17	17	93	74	86	82	81
	165*	M	15	91	–	–	–	–	–	85	76	80	84	78
	166*	M	14½	108	13	19	23	13	17	79	87	79	106	88
	167*	M	15½	95	12	24	21	15	18	79	83	82	84	78
	168*	M	14½	100	23	23	27	13	21	84	89	97	99	92
	169*	F	14	127	13	19	19	11	17	–	–	–	–	–
	170*	M	15	66	9	19	25	13	23	–	–	–	–	–

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