TEACHER QUALIFICATIONS AS PREDICTORS OF STUDENT ACHIEVEMENT IN MATHEMATICS

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by

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ABSTRACT

The research for this study focused on differences in achievement among grade eleven mathematics students. The purpose of the study was to identify some of the factors determining levels of student achievement with particular emphasis on the impact of teacher qualifications.

The determinants of student achievement in mathematics were considered under three categories; (a) Teacher Resources; (b) Student Resources; and (c) School Resources.

The data used in this study were taken from the Fagan Merge File that was compiled by Dr. Michael Fagan of I.R.E.D. at Memorial University, consisting of data collected by Dr. L. Parsons on "Career Decisions of Newfoundland Youth"; Dr. P. Warren's collection on "Existing Facilities in Newfoundland Schools"; the Educational Staff Record collected by Statistics Canada; and the Public Examinations Master File. The merge file contained information related to teachers and students for the year 1973-74. The statistical analyses consisted of Pearson product moment correlations and regression analyses.

The study found that the only significant determinants of student achievement in mathematics (algebra and trigonometry) were: students' socioeconomic status, students'

self-concept of ability, school facilities, school enrolment, and student ambition. All these relationships were positive.

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CHAPTER I

INTRODUCTION

Statement of the Problem

There is a surplus of teachers in Newfoundland at the present time. However, during the fifties and early sixties a major problem in this province was that of securing enough teachers to staff the schools. Because there was such a problem of teacher supply, the quality of their preparation sometimes had to be ignored. Many teachers were often handling subject matter without previous acquaintance with it. Many of these teachers are still teaching today despite their deficiencies in their area of teaching, but by now their years of experience are regarded as compensating for their lack of subject specialization.

This problem is even more prevalent in smaller schools where there may be more speciality subjects taught than there are teachers with the requisite training. In these situations, if the specialized school curriculum is to be covered, some teachers will have to teach content field subjects even though in a formal sense they may be deficient in terms of teacher education and university training.

Badcock (1972) stated that misassignment of teachers has become increasingly and widely recognized as a problem faced by school administrators, teachers, and the teaching profession generally. Badcock reported that specific adverse effects have been demonstrated on various facets of education

such as efficiency of instruction, pupil achievement, teacher morale, and the teacher claims to professional status.

Jackson (1976-77) in his study on schools in Nova Scotia has provided some evidence on the possible degree of misassignment. He reported that in mathematics 14% of the teachers had no university mathematics courses and 67% had fewer than five. In English, 28% had no English courses and 64% had fewer than five courses. Similar statistics were reported for chemistry, physics, history and French.

It's interesting to note that in French, 276 out of a total of 497 teachers have five or fewer than five university courses in French (Jackson 1976-77).

Another definition of misassignment put forth is that misassignment is any violation of the following: "... one in which the teacher's education in subject matter and methodology, his experience, his physical and psychological condition are appropriate for maximum effectiveness in his teaching situation" (Rousseau 1970).

Yearger (1954) defines proper assignment as a case "where teachers should be assigned in accordance with their preparation, certification status, and peculiar fitness, with the desires of all reasonably satisfied in the assignment."

The major problem of misassignment that this study concerns itself is misassignment where teachers are teaching subjects outside of their area of university training or

their major. This aspect of misassignment and the problems it presents has been demonstrated by a variety of research studies mainly in the United States and Britain. In a review of the literature, Ackerman (1954) cites several studies where teacher's knowledge of his subject matter is significantly related to teaching efficiency. These studies have demonstrated that the assignment of the teachers outside the major areas of specialization must adversely affect teacher efficiency. Similar findings have been made by a number of other researchers in the United States. Faber (1965) examined the relationship between teacher qualifications and school district quality and found that for twenty schools studied there was a direct relationship between teacher qualifications and school district quality.

However, not all research findings in this area have been consistent. An example of this is a comparative study conducted by Bodnaruck (1962) on examination results in grades IX and XII. He found that even though town teachers had more experience and were more often teaching in specific fields in which they were trained, the difference in academic achievement of the two groups of students was not significant. Barring other factors, his study indicated that years of experience, and specialized training in specific fields have no bearing on the student achievement.

These two studies alone suggest that there is a lack of consistency in the research findings. Using student

grades on standardized examinations as a measure of student achievement, the study examined whether teachers teaching in subject areas for which they were specially trained, were more effective than those teachers who were not. As we go on we will see that the dilemma will be further strengthened by more inconsistent findings discussed in the literature review, with regard to this question.

Badcock (1972) stated that in Newfoundland we have teachers, especially in smaller schools, teaching subjects outside their area of specialization for reasons previously mentioned. Are these teachers, then, as effective as teachers who are teaching the same subjects, but who have had specialized university training in that particular subject? This question is a major question that needs to be answered especially for the sake of administrators and principals who do the hiring of teachers based on their qualifications.

This study will address this particular problem with respect to Newfoundland schools. Student grades on mathematics public examinations will be used to test which group of teachers, i.e., those who are mathematics specialists versus those who are not, appears to be the most effective.

Significance of the Study

The qualifications of the teacher is believed to be an important factor in determining student success. School

administrators need to know whether or not certain teacher characteristics are related to effective teaching. The hiring done by Newfoundland school boards is very much based on the experience and university training of teachers. Today, more teachers are being hired to teach in fields corresponding to their university training.

The present study is similar to that conducted by Klufas (1964) in the Province of Alberta; thus, like Klufas, the author uses selected teacher characteristics as predictors of student achievement. By doing this, it was hoped that additional information on the effects of teacher qualifications on student performance could be used to gain insight into a number of practical questions, such as; who should be hired? The research may also have relevance for such thorny problems as teacher placement, merit ratings, salary differentials; even the recurrent question of subject matter versus methods courses in teacher education institutions. The fact that research elsewhere has been inconclusive need not constrain the present inquiry. Most Newfoundland classrooms are staffed by teachers trained at the same institution -- Memorial University. Further, most of the teacher force (some 60 per cent) is under the age of thirty-one and have been trained in the last decade. There is unusual uniformity in the training given to teachers in Newfoundland which constitutes a set of natural controls not present in any of the other research studies into this question. Such conditions justify a reconsideration and replication of

previous research through application to the Newfoundland case.

Limitations

This study is limited in that not all determinants of student success in mathematics are examined. Only those factors revealed by the literature review as being the strongest determiners were selected. A study at this level could not possibly consider all the factors that would have some effect on student achievement in mathematics.

Another limitation is that the study deals only with students in the area of mathematics, and more specifically those students who wrote the matriculation mathematics (i.e. algebra and trigonometry). Therefore, we are unable to assume that the findings of this study will apply to the other subject areas in the Newfoundland grade eleven program.

A further limitation is that the data used in this study was collected in 1973, therefore involving students and teachers for that time period only. As a result, we are unable to assume that these results would apply for any time period except for 1973.

A final limitation involves the questionnaire method of data collection. Due to methods of data collecting some variables were not measured as specifically as might be desired. However, these problems are very much beyond the control of any researcher.

CHAPTER II

RESEARCH RATIONALE

Theory

The main purpose of this study was to identify some factors which explain the differences in grades achieved by students on the Newfoundland mathematics public examination. More importantly, the study was designed to isolate factors pertaining to the teacher's degree of qualifications and to examine the extent to which they determined the outcome on these examinations.

However, in order to weigh the importance of teacher qualifications other factors had to be considered. All these factors including those relating to teacher qualifications are considered the determinants of grades achieved on the mathematics examination.

The factors considered as determinants of these achieved grades were grouped into three categories as follows:

(i) the teacher resources component,

(ii) the student resources component, and

(iii) the school resources component.

One of the most extensive studies ever carried out that dealt with reasons why individuals differ in their levels of achievement was conducted by James S. Coleman

(1966). The three resource arguments above are also dealt with in some detail in Coleman's study. Since Coleman studied the determinants of student achievement in these three categories, his research will be used as an introduction into the more specific studies, dealing with a more limited number of determining factors of achievement.

The Teacher Resources Argument

As mentioned earlier (Coleman et al., 1966), the quality of teachers is believed to be an important factor in the success of education. The hiring of teachers by Newfoundland school boards is based on both experience and university training. These criteria form the basis for teacher placement and salary.

If school boards in the province hire teachers based on these criteria, it is assumed that these characteristics of teachers have some positive effect on the overall student achievement.

In the literature reviewed, the teacher resource determinant was composed of two main factors: (a) teacher specialization; (b) teaching experience. Since the data used in this study also consisted of teacher certification and teacher salary, which are very closely related to teacher specialization and experience, it was decided to include

these as well.

Coleman (1966) considered three of the above factors as well as others in examining the influence that teachers had on the level of student achievement. In the Coleman study student achievement was based on the scores of ten different tests, one of which included achievement in mathematics. Such teacher characteristics as teaching experience, teachers' degree level, and average salary were included. Coleman reported that all teacher characteristics, including the three above, explained between 1 and 1.5 percent of the variance in achievement for Whites, about 3 percent of the variance for Northern Blacks and about 8.5 percent of the variance for Southern Blacks. Therefore, teacher characteristics seem to have very little influence on how well students achieve in school. Findings such as these are examined further by looking into similar studies, but of a smaller scope.

Teacher Specialization

Lindstedt (1960) in his study of grade IX mathematics achievement found no significant differences in grade IX mathematics results for teachers having from 1 - 4 years of training, but his study revealed that teachers with more than four years of training were more effective. He also found that the number of university

courses taken in mathematics did not reflect any significant difference in the effectiveness of grade IX mathematics teachers when the effectiveness is measured by the results of the final exams in grade IX mathematics.

Garner (1963) pre-tested and post-tested ninth grade algebra students using the Cooperative Algebra Test, Form 1. He found that there was a significant relationship between the college mathematics preparation of the teachers and the pupils' achievement in mathematics.

Schunert (1950) compared the final achievement of algebra and geometry classes whose teachers had less than two years of college training in mathematics and those classes whose teachers had more than two years of college training in mathematics. He found no significant difference, but the results favored those teachers with the lesser amount of college preparation in mathematics.

Golberg (1965) studied 51 seventh grade classes and their 1477 pupils in the talented youth project. He found that the amount of mathematical preparation did bear a significant relationship to pupil success at the end of grade seven.

Eddy (1961) carried out a similar study to examine the relationship between certain characteristics of teachers and achievement in grade IX social studies. He reported a significant positive correlation between student achievement and the number of university-level social studies courses taken.

Finally, using examination results in physics as a

measure of student achievement, Klufas (1961) reported that there was a very significant positive relationship between student scores in 1961 final exams in physics and the number of university physics courses held by that teacher.

The above are just some of the findings reported by researchers who were attempting to isolate those facets of teacher qualifications that determine a student's success in school. The findings clearly indicate that results of such research in this area have been most inconsistent.

This study therefore considered whether a teacher who was specialized in mathematics determined, to any degree, the student achievement in mathematics.

Teacher Experience

The importance of teaching experience in relation to teaching effectiveness has long been a point of discussion among leading educators as well as layman. The following studies provide considerable information on the role experience plays in teacher effectiveness. Ackerman (1954) stated that apparently, the teacher with the greater experience would prove to be more effective. Educators use experience as a very strong deciding factor when selecting and promoting teachers. But in a test given to students in chemistry, Rolfe (1945) found that highest

scores were reported for students of instructors who had one to eleven years of teaching experience and a notable decrease was seen for instructors with twelve or more years of teaching experience.

Schunert (1951) found that algebra classes taught by teachers who had more than eight years teaching experiences exceeded the achievement of classes taught by teachers with less experience. He found no significant difference between the achievement of classes taught by teachers of less than two years experience and the achievement of teachers having from two to eight years of experience.

In a study of pupils' competence in mathematics, Alkire (1954) found that teachers' T-score (which took into consideration both teaching experience and training in higher mathematics) showed a positive correlation with pupils' competence in mathematics.

Wasylyk (1961), in his study of the relationship between teacher experience and mathematics results found that there was no significant difference in student examination results between teachers with nine or less years of teaching experience and teachers with ten to nineteen years of teaching experience. He also found that there was no significant difference in student results between teachers with twenty-five years of experience and teachers

with nine or less of teaching experience. Teachers with 10 - 19 years of experience produced better results than teachers with twenty-five or more years of experience. The results of teachers with 20 - 24 years of experience were better than those of any other group.

Lindstedt (1960), in his study of the competence of grade nine mathematics teachers in Algebra found that a significant relationship existed between student achievement and teaching experience. Teachers with 5 - 9 years of teaching experience were more effective than teachers with 3 - 4 years of experience, but there was no difference in competence between teachers with 5 - 9 years of experience and teachers with less than three years of experience. Students whose teachers had ten or more years of teaching experience obtained higher marks on grade IX mathematics examinations than students whose teachers had less than ten years of teaching experience.

Stoneking (1960) found there was no significant difference in the scores of the examinees who were practicing teachers and those who were not practicing teachers. This would indicate that experience as a teacher does not enhance one's understanding of basic arithmetical principles and generalizations. These results suggest that experience as a teacher does not enable one to be a more effective teacher of mathematics.

Again, as was the case with teacher specialization,

teaching experience appeared to be inconsistently correlated with student achievement. However, this study retained the teaching experience variable in order to test the hypothesis that teaching experience will affect the student achievement in mathematics.

Teacher Certification

Smith (1964) reported on the results of the data collected in 1957-58 concerning the relationship between teacher professional education and student achievement. He used as his student criterion the results of the California Achievement Test in Arithmetic, which he administered to 528 students in the eighth grade. He found a significant relationship between the credits earned in professional education courses (more than 28 courses against less than 28 courses) and student achievement.

Stephens (1968) claimed that there is every reason to expect that an increased understanding of the educational process will help the teacher practice his craft. Knowledge obtained from professional courses should enable the teacher to see his task in its larger perspective. Such knowledge should help immeasurably in understanding the nature of educational development and in dealing with the many responsibilities to be encountered outside the classroom.

In light of this then, one might expect that, as is the case in Newfoundland, the higher the certification of the teacher, the more effective the teacher for reasons just previously mentioned. However, in Newfoundland, higher certification does **not** necessarily mean that the teacher has had more professional training (i.e. has completed more education courses.)

Based on these arguments, it may be hypothesized that in so far as more professional training -- hence, higher teacher certification -- is a proxy for additional teacher education courses, then the higher the teaching certificate, the greater the teacher effectiveness in terms of student achievement.

Teacher Salary

A final factor introduced as a proxy for the teacher resource was teacher salary. Since teacher experience and certification determine the pay differentials the other two variables (certification and experience) would almost certainly take care of the salary factor. However, since the data did include salaries, it was decided to include this factor, under the assumption that it would relate to student achievement in mathematics very much the same as teather certification and experience.

The Student Resources Argument

The family into which a child is born is one of the major influences of how well the child does in school. In her review of the literature on this matter, Boocock (1972) notes that family attributes, such as socioeconomic status, are very strongly related to a child's school career, and that all affect academic success directly or indirectly. Indirect effects are those mediated by such variables as self-concept of ability and reading comprehension.

Coleman et al. (1966) also examined some background factors to determine if in fact they were strong determinants of student achievement in school. Very similarly to this study, Coleman also included such background factors as parental education, number of siblings, and whether or not they were from urban centres. He found that all the background factors explained about 15 percent and 10 percent of the variance in the achievement of Southern and Northern Blacks, respectively. Background factors accounted for about 20 percent of the variance for Northern and Southern Whites.

Similarly, Averch et al. (1972) reported that background factors are always important determinants of educational outcomes. They claimed that the socioeconomic status of a student's family and community are consistently related to his educational income.

that variables such as personality factors and motivational factors become increasingly more important in determining school success with advancing age. In other words, as the authors concluded, school success in the higher grades may depend on "accumulated knowledge."

On the other hand, Levin (1970) and Michelson (1970) both reported age as having a significant negative influence on student achievement. Levin used student verbal scores as a measure of achievement whereas Michelson used mathematics and reading scores.

This study will consider age and examine whether or not the factor plays any significant role in determining achievement in mathematics.

Self-Concept of Ability

Although this study does not have a measure of mental ability or intelligence, it does have a rating of student self-concept of ability. A study carried out by Joiner (1969) found that self-concept of academic ability adds to the predictive efficiency of intelligence when grade point average in academic subjects is used as criterion measure. In fact, Joiner claims that self-concept receives more weight in a prediction formula than does intelligence. That is, students' ideas about their academic ability may have more effect on their school

the home background from which students come quite clearly plays a part in the determination of educational progress. Scores on the Home Index, a measure of this background factor, related significantly to both high school graduation and college attendance.

Bhushan (1970) found that the regression of SES for predicting GPA (grade-point average) was significant at the .01 level. He went on to say that these findings indicate that teachers and counselors of high schools should take into consideration a student's socioeconomic background, along with his intellective factors whenever his academic performance is considered. Bhushan used father's occupation and education as measures of SES.

Harker (1970) conducted a study to determine the effect of SES on the scores of children on a verbal I.Q. test (Otis), together with scores on a reading test (ACER) and an arithmetic test (VG7). These students were divided into four groups depending on their socioeconomic status that was determined by father's occupation. His results found that the relationship between socioeconomic group and achievement is consistent and significant.

Pollard (1970) conducted a study to examine some factors that contributed to reading achievement of grade six students in Newfoundland. Pollard used mother's education, father's occupation, and family size as proxies for socioeconomic status. In this study both the product-

moment correlation analysis and the multiple regression analysis showed father's occupation and mother's education to be more closely related to reading achievement than any other of the socioeconomic and educational variables used as inputs. Father's occupation and family size, however, were the only input variables to retain any statistical significance after intelligence had been partialled out. Furthermore, in the multiple regression analysis father's occupation, mother's education and, sometimes to a lesser extent, size of family accounted for nearly all the variations in reading achievement that was contributed by the socioeconomic and educational input variables.

This study is also using socioeconomic status as a predictor of student achievement in mathematics. Father's and mother's education, father's occupation and family size, were used as measures of socioeconomic status.

Age

Ahammer and Schaie (1970) carried out a study to examine age differences in the relationship between personality questionnaire factors and school achievement. It was found that crystalized intelligence correlates less well with academic success for the older age group as compared to the younger subjects. This finding may indicate

Further studies also report family background factors as having a significant influence on student achievement. These studies will be discussed later along with additional student resources as suggested by the literature review.

However, student achievement can be determined only partly by Family Attributes. The student himself must possess certain attributes if he or she is to have any great success with school. Boocock (1972) also suggests that in addition to family factors as determinants of students' academic performance, there are individual student characteristics that are very powerful direct determinants of their academic success. She grouped these student factors into student attitudes and aspirations and individual abilities. However, Boocock (1972) used I.Q. scores as measures of student abilities whereas this study used self-concept of ability for reasons that will be discussed later.

Socioeconomic Status

Socioeconomic status has always been a powerful determinant of individual achievement. Study after study has pointed to socioeconomic status as being one of the most significant factors in predicting grade-point averages, high school graduation and the desire to attend a university (Rehberg and Rosenthal, 1978).

Gough (1971) claimed that socioeconomic status or

achievement than their intelligence does.

A study conducted by Jones (1970) involved 411 girls and 466 boys at the University of Texas, Austin. The nonintellectual measures employed were the identity rating scale, self-concept of ability, and self-expectations. These, along with a measure of scholastic aptitude, were used to predict scholastic achievement. All variables were positively associated with each other. However, self-perception appeared to be the most powerful predictor of academic achievement.

Bodwin (1957) studied the relationship between immature self-concept and reading ability in third and sixth grades and found a positive correlation of .72 and .62 between the two variables of self-concept and achievement in grades three and six respectively.

Jones (1968) found that among high school seniors in Wisconsin, adolescent identity, student self-concept, and self-expectations appeared to be positively related to scholastic achievement, although they are not equally effective predictors of achievement. Brookover's scale measuring the self-concept of ability as a student was as effective a predictor as the Hemmon-Nelson Test of Mental Ability, while the other measures were less powerful.

The number of personality variables investigated has been numerous and the value of self-concept

for predicting academic achievement seems to be especially important.

Singh (1972) found that partial correlations between self-concept of ability and academic achievement, when perceived evaluations were controlled, were relatively higher between self-concept of academic ability and academic achievement than between perceived evaluations and academic achievement.

More specifically, Singh reported a .49 and .51 correlation for boys and girls respectively between their self-concepts of ability and their academic achievement.

Thus, self-concept of ability does rank very highly as a predictor of academic achievement. Some researchers such as Joiner (1969) and Jones (1968) rank self-concept higher than intelligence as a predictor of academic achievement. Therefore, this factor will be included in the theoretical model as having a considerable influence on student success in mathematics.

In the light of this, it can be predicted with some confidence that self-concept of ability will strongly influence mathematics achievement among students.

Ambitions

For the purpose of this study a variable called

student ambition was introduced to examine whether or not it would be a determining factor in mathematics achievement. This new variable was formed by using combined measures of occupational aspirations and occupational expectations. Reviewed literature often cite these two as separate and, in most cases, with each individual factor having a significant effect on its dependent variable.

Pidgeon (1970) conducted a study on expectations and pupil performance. A careful examination of the results revealed how both the aspirations and expectations of those students who do well in school stay at a very high level irrespective of the type of school they have attended, and irrespective of the level of their fathers' occupation. The study clearly indicated a strong association between success in school and having high expectations. Without doubt, doing well in school will lead students to a higher anticipation of a high status job, but at the same time such high aspirations and expectations spur a student on to do well in school (Pidgeon 1970).

Glignet and Foster (1966) stated that a student's level of aspiration is not "detached" from his actual position in a given stream and cycle of the system. In other words, there is a moderately high relationship between a student's level of aspiration and his academic status.

Banks and Finlayson (1973) in studying some reasons why some students fail and others succeed in school

reported results similar to those mentioned earlier. They found again that pupil aspirations and expectations were significantly related to success in school.

In a study dealing with factors that contribute to educational achievement among Black adolescents, Cramer (1966) noted that occupational expectations have some independent effect (or at least independent predictive power) beyond that contributed by scholastic performance and ability measures. He goes on to say that there is a good chance that occupational plans do influence educational plans for a sizable number of students, although the influence may well often be in conjunction with the influence of other variables.

For the purposes of this study, the two variables of occupational aspirations and occupational expectations have been combined in order to construct another variable called ambition. Since most literature report that expectations and aspirations are a determiner of student achievement, it will be assumed at this point, that ambition (a combination of both) should produce similar results.

Urban Versus Non-Urban Students

Entwisle (1966) conducted a study comparing the word association patterns of Baltimore city children with

those of a matched sample of rural Maryland children and a group of Amish children who lived on very isolated farms where there were few books and magazines and limited interpersonal relations. Entwisle found that scores for the urban children were substantially higher. The Amish children lagged even further behind the other rural children at all levels.

Boocock (1972) stated that the more the child's place of residence isolates him from exposure to the mass media and to other persons -- both kinds of exposure are plentiful in the urban child's environment -- the more likely he is to be retarded in verbal skills. Boocock goes on to say that school experience eventually compensates for this deficiency but to a larger extent with the bright students. In other words then, the slower student may not have overcome this weakness even at grade eleven.

Finally, in a study to determine student success in the grade nine social studies in Alberta schools, Eddy (1961) reported that city students exceeded the non-city students. Again this variable will be examined, to detect whether or not the rationale put forth by Boocock will hold in a Newfoundland setting.

School Resources Argument

Warren and Fisher (1972) conducted a survey of the facilities in our Newfoundland and Labrador schools. In his study he clearly points out that the Province of Newfoundland and Labrador is faced with an educational facility development crisis. Many educational environments which were once acceptable are no longer acceptable due mainly to the rapid changing and increasingly stringent educational requirements being made upon educational systems to meet the needs of the youth of the Province. Warren goes on to say that the impact of the physical environment in which educative processes are housed has been identified as playing a very important role in the development of sound instructional programs for the province. In this case where facilities are lacking to some degree, we can be more specific and make a claim that the facilities of the schools in this province are interfering with adequate instructional programs for our students.

Some of these inadequacies included such things as overcrowding and inappropriate utilization of classroom space. In addition, the schools are often forced to use facilities that are unsafe, unhealthy, and ill-adapted for the introduction and expansion of a modern curriculum (Warren and Fisher, 1972).

However, Coleman (1966) found that, in general, measures of school facilities and curriculum accounted for

an extremely small amount of variation in student achievement. Eleven variables, including enrolment, school location (urban or rural), facilities, etc., were considered in this portion of his study. Coleman reported that the unique contribution of the school facilities and curriculum measures varied among grade levels and race/region subgroups. But the only cases where the additional explanatory power of the variables exceeded about 3 percent were, again, Southern Blacks.

Averch et al. (1972), in reviewing the results of a number of studies of educational effectiveness, in what he referred to as the input-output approach, reported very similar results. His examination of the production-function literature suggested that school resources are seldom important determinants of student outcomes. He found that no school resource is consistently related to student outcomes.

This study will attempt to identify some of these school facilities and to examine whether or not they do interfere with or enhance student achievement. A school resource variable has been constructed in order to determine the impact of this factor. The variable will consider such things as enrolment, type of school (central high, or all-grade), as well as the formation of a composite variable referred to as school plant which will take into accouht some of the actual existing physical facilities of the schools.

Warren and Fisher (1972) found great variability in the physical characteristics of Newfoundland schools. The presence or absence of such facilities as science laboratories, libraries, and gymnasiums are definitely going to have some consequences. A lacking in such facilities might lead to a restriction in the opportunity to learn certain subjects or to provide desirable reinforcement for some subjects (e.g., mathematics through scientific applications). Moreover, it doesn't take much imagination to conclude that children are quite capable of making invidious comparisons between their ill-equipped rural schools and a well-equipped urban school. Such comparisons are the basis of definitions both of self and of learning opportunities. These definitions in turn govern behavior, especially in terms of ambition and motivation (Bandura, 1977).

Just as socioeconomic status is a proxy for variability in the child's home environment, so "school facilities" is a proxy for a student's school environment, especially the school as a structure of opportunities. If the plant is seriously deficient, the learning opportunities will be adversely affected.

In light of the above argument, it is expected that these characteristics of a school building will influence the actual achievement of its students, as measured by success in mathematics.

Enrolment

A survey of reading achievement in grade VIII in Newfoundland, conducted for the Royal Commission on Education and Youth, suggested that there was a tendency for the better readers to come from the larger schools. (Province of Newfoundland and Labrador, 1967).

Similarly, the Newfoundland Department of Education conducted a study in 1964 that involved 1300 students. The Dominion Achievement Tests were administered to test whether or not scores would differ significantly between schools that differed in enrolment. It found that the average score in the vocabulary test was 27, ranging from 18 in the one and two room schools, where enrolments were very low, to 36 in the larger elementary schools. In the comprehension test, the average score was 11, varying from 7 in smaller schools to 14 in the larger elementary schools. Similar results were reported with respect to reading levels (Department of Education, 1965).

Enrolment, however, may be a proxy for other variables. For example, greater enrolments ordinarily mean more specialized teachers, more facilities, etc. which are most likely having an impact on student achievement.

School Plant

This is a composite variable consisting of six school characteristics related specifically to the actual facilities of the school and its overall physical conditions. The composite variable originally consisted of eleven characteristics, but after doing a factor analysis, five of these were dropped after they were found to have very little influence as indicated by a factor matrix value of less than 0.400.

Some studies seem to indicate that school facilities and physical characteristics do have a bearing on student achievement. As was mentioned in the introduction of the school resources argument, Warren (1972) indicated that the physical environment in which the educational process takes place is very important in determining the existence of sound instructional programs. If there is a lack of proper facilities, then there are hindrances to a full and complete educational process.

Smith (1972), in a reanalysis of the Coleman report, investigates the same eleven school facilities and curriculum variables as did Coleman et al. He supported Coleman's original finding that the relationship between facilities and curriculum variables and student achievement is extremely slight.

This study will examine these factors to find out whether or not the school plant itself does affect the

quality of instructional programs, hence affecting the achievement of its students.

School Type

This variable was introduced to try and determine if a central high, regional high, or all-grade school were differentially effective in producing achievement in mathematics. These three exhaust the different types of high schools in Newfoundland.

There are very few all-grade schools in Newfoundland today since 1967, 80% of Newfoundland high schools were either regional or central (Davis, 1970).

In Newfoundland, a central high school is defined as a school that has been established within an area and in a building separate from other schools for the express purpose of accommodating all students in designated grades not lower than grade VII. Regional high schools, on the other hand, were schools established within an area and in a building separate from other schools for the express purpose of accommodating all students in designated grades not lower than grade IX from any or all schools within a district or districts (The Education Act, 1960). The all-grade schools, unlike the other two, include students from kindergarten to grade eleven.

Davis (1970) states that central high schools in

the province are usually larger than regional high schools, which was initially a recommendation of the Royal Commission on Education and Youth. The Commission made a recommendation to Government that: ... a five-year high school (central high) should have at least five hundred students, and a three-year high school (regional high) should have at least three hundred (Royal Commission Report, 1967).

Davis (1970) stated that these centralized schools are academic in nature, which would give them a slight advantage over the all-grade schools in terms of student academic performance.

Alcorn, Kinder and Schunert (1965) found in their study of American high schools that the larger schools were providing broader and more varied offerings in curriculum. In light of this then, perhaps the central high schools have a lead on the other high schools since they usually have the greater number of students.

In any event, this study will examine the types of high schools in Newfoundland to see if in fact they do contribute to student academic achievement as measured by their scores in mathematics. They will be referred to as $STYPE_1$ and $STYPE_2$, meaning central high schools and all-grade respectively.

Auxiliary Theory

The extent to which student achievement is determined by teacher qualifications, school resources, or student resources can be seen more clearly by examining the conceptual model in Figure 1.

This model suggests that specialization in mathematics, certification, amount of teaching experience and teacher salary contained under teacher resources determine student achievement in mathematics on grade eleven public examinations in Newfoundland. The conceptual model also outlines a direct relationship between socio-economic status, age, self-concept of ability and ambition under student resources and student achievement in mathematics. Finally, the mathematics achievement is also seen as being influenced by whether schools are urban or rural, the enrolment, type of school, and the school plant under the school resource variable.

The model itself can be subdivided into three sections:

(a) Mathematics achievement (algebra and trigonometry) each as dependent variables and the variables of teacher resources as independent.

(b) Mathematics achievement (algebra and trigonometry) each as dependent variables and the variables of

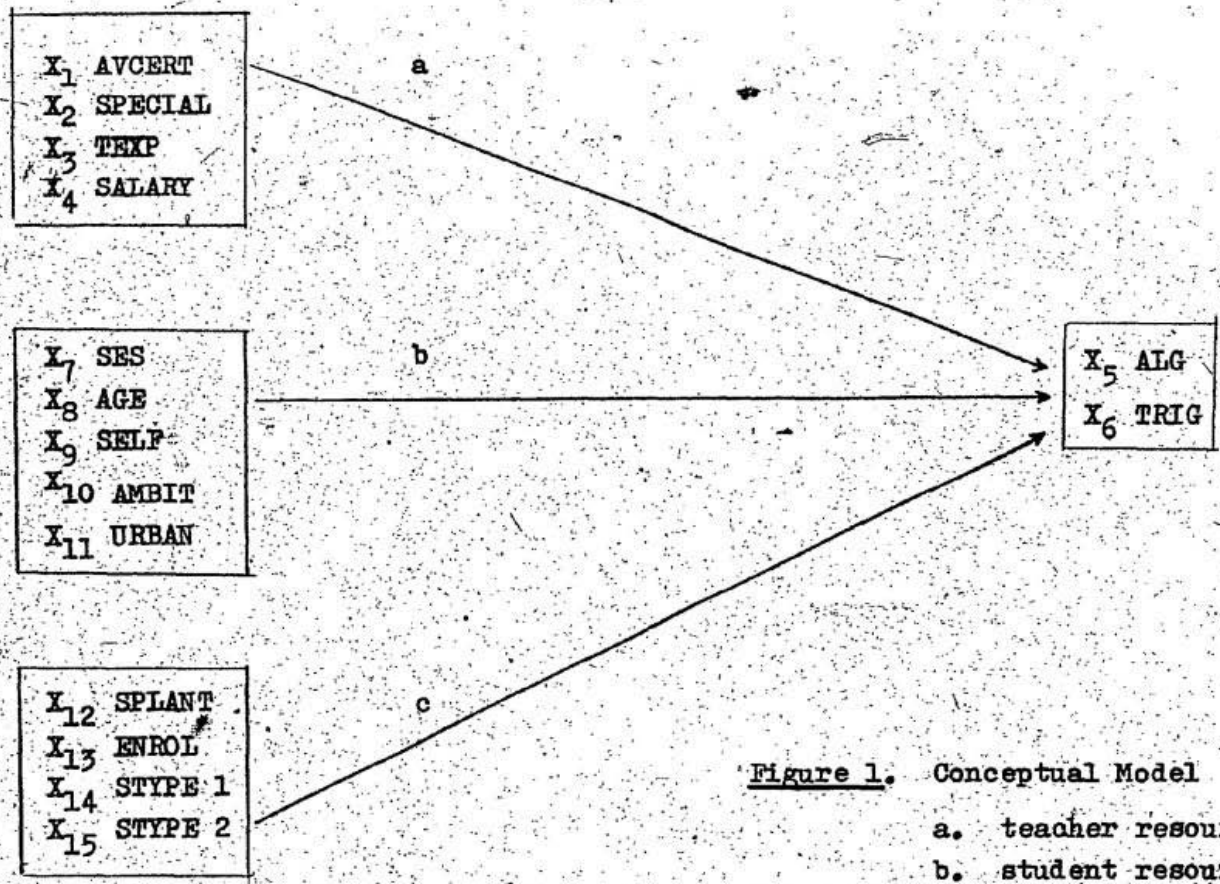


Figure 1. Conceptual Model

a. teacher resources
b. student resources
c. school resources
d. mathematics achievement

student resources as independent.

(c) Algebra and trigonometry achievement each as dependent variables with variables of school resources as the independent variables.

This model is composed of three independent resource variables. The teacher resource factor consists of four variables; whether or not teachers are specialized in the area of mathematics (X_1 SPECIAL); average certification of the teachers in the school (X_2 AVCERT); teaching experience (X_3 TEXP) and the teacher salary (X_4 SALARY). The student resource factors are represented by four variables; socio-economic status (X_7 SES); age of student (X_8 AGE); student self-concept of ability (X_9 SELF) and student ambitions (X_{10} AMBIT). The school resource factor is also represented by four variables; whether the school is urban or not (X_{10} URBAN); physical attributes of the school building (X_{11} SPLANT); the enrolment of the school (X_{13} ENROL) and the type of school (X_{14} STYPE). The dependent variables of achievement in algebra and trigonometry on the Newfoundland public examinations, (X_5 ALG) and (X_6 TRIG) represent the criteria of interest.

Summary

Chapter two, through an extensive review of related literature, attempted to isolate some of the more important factors that appear to influence the academic performance of

students. The factors that were considered to be determinants of a student's level of achievement were grouped into three categories. These three categories consisted of a teacher resources component, a student resources component, and a school resources component.

Each resource component, in turn, was composed of a number of factors. The teacher resources component, for example, consisted of four factors: (a) teacher specialization; (b) teacher experience; (c) teacher level of certification; and (d) teacher salary. Similarly, the student resources component consisted of a number of factors. The factors included in the student resources component were: (a) the socioeconomic status of the student; (b) the age of the student; (c) the student's self-concept of ability; (d) the student's ambitions; and (e) whether the student attended a rural or urban school. Finally, a school resources component was considered. This component was included in order to determine the influence of school characteristics on the academic achievement of students. Such factors as school enrolment, school type (central high, regional high, or all-grade) and school plant (physical attributes of the school) were considered under school resources.

All these factors were considered as factors most likely to have an impact on student achievement, as suggested by the literature review. All the factors were then grouped

in a conceptual model (Figure 1) in order to clearly illustrate the predictions made concerning the influence that each would have on the academic achievement of the students, as measured by their achievement in mathematics.

A complete rationale for the inclusion of these various factors, as well as explanations of each, are presented throughout the chapter.

CHAPTER III

THE RESEARCH METHODOLOGY

The Sample and Data Gathering Procedure

The data used in this study were selected from the Fagan Merge File Code Book. The file consists of a total of 433 items. This file compiled by Fagan is a merged file consisting of a collection of data from four different sources.

The first 125 items of this file were collected by Dr. L. Parsons in 1973-74 in a questionnaire designed to tap the "Career Decisions of Newfoundland Youth." The source for items 126-219 is the "Public Examination Master File for 1973-74. This file gives examination scores in all subjects written by the same students who completed the Parsons' questionnaire on their career decisions.

Warren and Fisher in 1972 conducted a survey of school facilities in Newfoundland and Labrador. This survey takes into account the facilities of these schools attended by these students in the two former data sets.

Finally, the remainder of the items of this complete data file (items 283-433) come directly from the Statistics Canada Educational Staff Record. This set of data then, provides the necessary information about the teachers who

were teaching the students mentioned in the former three surveys.

Instrumentation

Instrument

The data to be analyzed in this study were collected by four separate questionnaires (see Appendix A for details). The four questionnaires were:

a) Dr. L. Parsons' questionnaire on "Career Decisions of Newfoundland Youth. This involved the grade eleven students of 1973-74. The questionnaire itself consisted of 24 questions, including such information as socioeconomic status of students' families, students' plans after graduating from high school, and their knowledge of opportunities available after high school graduation.

b) The Fisher-Warren questionnaire which was a survey of "Existing Facilities in Newfoundland and Labrador Schools." This particular questionnaire was answered mostly by the principals of the school and involved responses to 108 questions. All of these questions were designed to get an overall picture of the adequacy and condition of school buildings and school facilities.

c) The third questionnaire was one constructed by Statistics Canada called the "Educational Staff Record." This is information about individual teachers provided by Newfoundland and Labrador teachers during October of every school year. The questionnaire consists of 98 items concerning teacher qualifications and information about the teachers' individual teaching positions.

d) The final data set is that of the "Newfoundland and Labrador Public Exams Master File." This file includes school and student identity, as well as a record of all student marks in all subjects on the public examinations in 1973-74.

However, only a small portion of the data collected by these questionnaires will be used in this study.

Variables

For the purpose of this study, the specific items on the questionnaires that were used, as well as their operational definitions, are described below.

Teacher Specialization in Mathematics. This variable is based on item 335 of the Fagan File which was originally items 86-95 on the Statistics Canada Educational Staff Record. This item appeared on the questionnaire in the following manner:

> "Using lists 1 and 2 on the back of this document code the major subject areas or fields you have completed 3 or more university courses, and give the number of full courses completed in each area. (1 full course = 2 semester courses = 3 units = 6 semester hours = 9 quarter hours).

Code		No. of courses completed	
86		87	
88		89	
90		91	
92		93	
94		95	

Average Teacher Certification. This variable is based on item 67 of the Statistics Canada Educational Staff Record which read as follows:

"Present Teaching Certificate or Licence."

Certificate	Licence
VII	A
VI	ES
V	
IV	
III	
II	
I	

Teaching Experience. This variable is based on items 64-66 on the same questionnaire mentioned in the previous variable measurement. The particular item read as follows:

"Years of teaching experience to end of last June."
Note: 10 months = 1 year.

The reply was in a three part form:

	Yrs.	Mons.
With this board	___	___
Elsewhere in Newfoundland	___	___
Outside Newfoundland	___	___

Teacher Salary. This variable is based on items 13-16 again on the educational staff record. The item reads as follows:

> "... annual salary (to nearest dollar) at rate applicable in September."

The reply falls into two or more of the following categories:

-- basic annual contract salary

-- administrative bonus

-- other bonuses

-- total annual salary

Socioeconomic Status. This variable was compiled by summing four weighted indicators of socioeconomic status. These four indicators consisted of father's and mother's education, father's occupation and family size. These indicators were based on questions two, four, and six of the Parsons questionnaire concerning career decisions of Newfoundland youth. The question read as follows:

> "What are your parents' occupations? (Please read all classifications before answering. Check the occupational group that best describes his/her job.)"

	Item Score
-- owner/manager of a large business (e.g. employs 3 or more people)	5
-- owner/manager of a small business (e.g. employs less than 3 people)	4

	Item Score
-- professional/technical (e.g. lawyer, doctor, teacher, etc.)	5
-- clerical (e.g. clerk, bookkeeper, office worker, etc.)	3
-- service and recreation (e.g. policeman, cook, barber, etc.)	4
-- transport and communication (e.g. bus driver, radio announcer)	3
-- fishing	2
-- farmers and farm workers (e.g. farmer, farm laborer, etc.)	1
-- logging and mining (e.g. lumberman, miner, etc.)	1
-- craftsman (e.g. carpenter, plumber, electrician, machinist, etc.)	2
-- laborer (e.g. construction labour, etc.)	3
-- unemployed	1

Students were to indicate separately, father's and mother's occupation, using the above spectrum of occupations.

The mother's and father's levels of education were also indicated separately in a response to this question:

"How far did your parents go in school?"

The student reply included one of the following categories:

	Item Score	
	MOCC	FOCC
-- grade six	2	2

	MOCC	FOCC
-- grade seven	2	2
-- grade eight	3	3
-- grade nine	3	3
-- grade ten	4	4
-- grade eleven	4	4
-- some university	5	5
-- graduated from university	5	5
-- other post secondary school (e.g. college of fisheries, etc.)	5	5
-- post secondary technical training (e.g. armed forces training, apprenticeship training, etc.)	5	5
-- nursing school	5	

The final indicator variable used for constructing the socioeconomic status variable was family size. On the questionnaire, it appeared in the following form:

"How many brothers and sisters do you have?"

-- none
-- one
-- two
-- three
-- four
-- five
-- six
-- seven
-- eight or more

To determine item weights, the principal component method of factor analysis was used (see, for example, Nie et al. 1975, pp. 468-513).

The intercorrelations among the variables used for the factor analysis are presented in Table 1.

Table 1

Correlation Matrix, Means and Standard Deviations of SES Variables

	FOCC	FED	MED	SIBSZ	Mean	SD	Cases
FOCC	1.000				2.909	1.349	2635
FED	0.472	1.000			3.016	1.376	3438
MED	0.352	0.507	1.000		3.320	1.217	3533
SIBSZ	-0.162	-0.263	-0.218	1.000	5.569	2.384	3827

Table 2 presents the results from the factor analysis.

Table 2

Principal Component Analysis: SES Variables

	Factor Matrix	Communality (h^2)	Factor Score
FOCC	0.720	0.519	0.355
FED	0.831	0.691	0.410
MED	0.761	0.579	0.375
SIBSZ	-0.489	0.238	-0.241

Eigenvalue = 2.027

Alpha Reliability Coefficient = .662

The alpha reliability coefficient of .662 was computed using the Nunnally formula (Nunnally, 1978, p. 211).

Socioeconomic status (SES) and subsequent factor composites or latent variables were computed as follows (Nie et al., p. 488):

$$FC = fSc_1 Z_1 + fSc_2 Z_2 + \ldots + fSc_n Z_n$$

where the factor composite (FC) is the sum of the fSc_j, factor score coefficients for variable j and Z are the cases standardized value on variable j. In the present case socioeconomic status = 0.355 x (FOCC - 2.909)/1.349 + 0.410 x (FED - 3.016)/1.376 + 0.375 x (MED - 3.320)/1.217 + -0.241 x (SIBSZ - 5.569)/2.384. Thus, Z_n represents the standardized values of variables FOCC to SIBSZ respectively, that is, Z_1 = (FOCC - mean of FOCC)/the standard deviation of FOCC, and so on for FED, MED, and SIBSZ.

Age. This variable was operationalized by question 11 on the Public Exams Master File which merely states the age of the student along with the student's name, student number and address.

Self Concept of Ability. Similar to the SES variable, the self-concept of ability variable was also compiled by summing weighted indicators. However, in this case six indicators were used. The six indicators were derived from six items of question 17, of the Parsons' questionnaire concerning career decisions of Newfoundland youth. The question, as it appears on the questionnaire, reads as follows:

> "... rate yourself along each of the dimensions listed below. (Circle the appropriate number to indicate your response in each case.)"

	low				high
Your ability compared with that of your close friends	1	2	3	4	5
Your ability compared with other members of your school class	1	2	3	4	5
Your ability to complete a university degree	1	2	3	4	5
Your ability to complete a post-graduate university degree like an M.A.	1	2	3	4	5
The quality of your work at present	1	2	3	4	5
The kind of grades (marks) you are capable of getting	1	2	3	4	5

Again the principal component method of factor analysis was used to determine the item weights (Nie et al. 1975, pp. 468-513). The intercorrelations among the indicator variables are presented in Table 3.

Table 3

Correlation Matrix, Means and Standard Deviations of Self-Concept Variables

	SC_1	SC_2	SC_3	SC_4	SC_5	SC_6	Mean	SD	Cases
SC_1	1.000						3.564	0.826	3813
SC_2	0.532	1.000					3.380	0.828	3810
SC_3	0.430	0.497	1.000				2.965	1.122	3778
SC_4	0.400	0.482	0.780	1.000			2.716	1.119	3682
SC_5	0.390	0.430	0.386	0.385	1.000		3.453	0.842	3759
SC_6	0.372	0.408	0.475	0.445	0.416	1.000	4.113	0.791	3778

Table 4

Principal Component Analysis: Self-Concept Variables

	Factor Matrix	Communality (h^2)	Factor score
SC_1	0.695	0.482	0.211
SC_2	0.756	0.571	0.229
SC_3	0.822	0.676	0.250
SC_4	0.805	0.648	0.244
SC_5	0.659	0.435	0.200
SC_6	0.693	0.481	0.211

Eigenvalue = 3.293

Alpha Reliability Coefficient = .848

The alpha reliability coefficient of .848 was computed using the Nunnally formula (Nunnally, 1978, p. 211).

Self-Concept of ability (SELF) was computed by the following equation (Nie et al., p. 488):

$$\text{Self-concept of ability} = .211 \times (SC_1 - 3.564)/0.826 + 0.229 \times (SC_2 - 3.380)/0.828 + 0.250 \times (SC_3 - 2.965)/1.122 + 0.244 \times (SC_4 - 2.716)/1.119 + 0.200 \times (SC_5 - 3.453)/0.842 + 0.211 \times (SC_6 - 4.113)/0.791.$$

Ambition. This variable was formed by combining both variables of occupational aspirations and occupational expectations.

The question, as it appears on the Parsons' questionnaires, is a two part question where students respond by answering what occupation they would like to have and which one they expect to have, when they finish their schooling. There is also a space provided opposite each category where students were asked to specify their occupational aspiration and expectation.

The question is number nineteen on the questionnaire and is stated as follows:

> "Please indicate the category of occupation you would like to have -- and the category you expect to have -- when you finish your schooling. Also, in the space provided beside each occupational category, please write in the specific occupation you would like to have, and the one you expect to have."

The student response included a choice of the following categories:

	Item Score
-- owner/manager of a large business	7
-- owner/manager of a small business	7
-- professional/technical	6
-- clerical	5
-- sales	5
-- service and recreation	3
-- transport and communication	3

-- fishing	2
-- farmers and farm workers	2
-- logging and mining	2
-- craftsman	4
-- laborer	2
-- other	1
-- home duties	1

Urban-Rural. This variable was used to detect any influence of environmental settings on student achievement in algebra and trigonometry. Whether or not the students were from urban areas was identified by information contained in "Public Exams Master File" for 1973-74. Not only does this file include all the grades of individual students in all subject areas, but also such information as school name, student name and addresses of the students. From this latter information we can determine whether or not the students were from urban centres. The urban centres included Labrador-Wabush, Stephenville, Corner Brook, Grand Falls-Windsor, Gander, Clarenville, St. John's and St. John's Metropolitan area.

Enrolment. This was taken directly from question 10 of the Warren-Fisher questionnaire on Existing Facilities in Newfoundland and Labrador Schools, read as follows:

"How many students are enrolled in your school by grades?"

	K	1	2	3	4	5	6
Grades Enrol:	—	—	—	—	—	—	—

	7	8	9	10	11	12	oppt. classes
Grades Enrol:	—	—	—	—	—	—	____

Total Enrollment ____

School Plant. The school plant variable is also a composite variable consisting of six weighted indicators. The composite originally consisted of eleven indicators but five of these were dropped when a factor matrix value of less than 0.400 indicated they were carrying very little weight in their influence.

The six indicators that were eventually used were based on questions 16,18,26,30,42 and 106 of the Warren-Fisher questionnaire (1972) of existing facilities of Newfoundland and Labrador. These questions were answered by the principal of the school or teacher-in-charge. The six indicator variables were concerned with such things as school auxiliary power supplies, artificial lighting, heat rating, presence of hot water, physical condition of washroom facilities, and then a final rating of the school's overall

physical condition.

In the order mentioned above, these items appeared on the questionnaire in the following manner:

(a) "Is auxiliary power available for the building in the event of power failure?"
Yes ___ No ___

(b) "In your opinion, is there sufficient artificial lighting in all classrooms?"
Yes ___ No ___

The principal was also asked to explain, in the event that the response was "no".

(c) "In your opinion, how adequate, from a comfort standpoint, is the heating system?"

This question did not have a rating scale, but the reply was merely a comment by the principal.

(d) "Is hot water piped to the sinks?"

The reply consisted of one of the following:

all ___
some ___
none ___

In the case where the response was "some", again the principal was asked for an explanation.

(e) "In your opinion, what is the present physical condition of the toilets, including both rooms and facilities?"

The reply was again in a three part form:

good ___
fair ___
poor ___

Again the principal was asked for an explanation in the case of a "fair" or "poor" response.

The final question was a general overall rating of the physical condition of the school, in one of seven categories.

> "In your opinion, which statement below best describes the building from the standpoint of <u>owerall physical condition</u>?"
>
> -- it is in excellent condition
>
> -- it is in good condition
>
> -- it is in fairly good condition
>
> -- it is in fair or average condition
>
> -- it is in bad condition, but would be usable if minor expenditures were made
>
> -- it is in bad condition, but would be usable if major expenditures were made
>
> -- it is in bad condition and should be replaced

For this school-plant variable the principal component method of factor analysis, was once again used, to determine the item weights (Nie et al. 1975, pp. 468-513). The intercorrelations among the indicator variables are presented in table 5.

Table 5

Correlation Matrix, Means and Standard Deviations of School Plant Variables

	SP_2	SP_3	SP_5	SP_7	SP_9	SP_{11}	Mean	SD	Cases
SP_2	1.000						1.292	0.583	3758
SP_3	0.541	1.000					1.165	0.371	3758
SP_5	0.276	0.374	1.000				1.604	0.799	3514
SP_7	0.295	0.313	0.478	1.000			1.254	0.626	3774
SP_9	0.341	0.224	0.176	0.246	1.000		1.360	0.619	3774
SP_{11}	0.550	0.353	0.304	0.348	0.481	1.000	1.609	1.070	3763

Table 6

Principal Component Analysis: School-Plant Variables

	Factor Matrix	Communality (h^2)	Factor score
SP_2	0.760	0.577	0.273
SP_3	0.697	0.485	0.250
SP_5	0.622	0.387	0.223
SP_7	0.643	0.414	0.231
SP_9	0.588	0.345	0.211
SP_{11}	0.761	0.578	0.273

Eigenvalue = 2.787

Alpha Reliability Coefficient = .767

The alpha reliability coefficient of .767 was computed using the Nunnally formula (Nunnally, 1978, p. 211).

The School Plant Variable (SPLANT) was computed by the following equation (Nie et. al., p. 488):

School Plant = $0.273 \times (SP_2 - 1.292)/0.583 + 0.250 \times (SP_3 - 1.645)/0.371 + 0.223 \times (SP_5 - 1.604)/0.799 + 0.231 \times (SP_7 - 1.254)/0.626 + 0.211 \times (SP_9 - 1.360)/0.619 + 0.273 \times (SP_{11} - 1.609)/1.070$.

School Type. Question 111 of Warren-Fisher questionnaire (1972) refers to this variable as school classification. The question is stated as follows:

"How is your school classified?"

The response consisted of seven categories.

____ primary	____ regional high
____ elementary	____ all-grade
____ junior high	____ other
____ central high	

Since this particular study is concerned with grade eleven matriculation students, the first three responses and the last one will not be required for purpose of the analysis.

However, since this variable was a nominal variable it could not be included in the regression equation in its present form. Therefore, dummy variables were created by treating each category of a nominal variable as a separate variable and assigning arbitrary scores of 1 and 0 depending upon their presence or absence in each of the categories. After the dummy variables are given metric value of 0 and 1, they may be treated as interval variables and then placed in the regression equation.

All dummy variables, however, cannot be included in the equation because it would produce an unsolvable equation. This is due to the fact that the Kth dummy variable is

completely determined by the first K-1 dummies entered into the regression equation. It is therefore necessary to exclude one of the dummies from the equation, in this case the "regional high" category. This excluded category then becomes a reference point by which the effects of the other dummies are judged and interpreted (Nie, et al., 1975).

Student Achievement in Mathematics. This dependent variable will be measured by student scores on the algebra and trigonometry public examination in 1974. The scores for these two subjects were acquired from the 1973-74 "Public Exam Master File."

Hypotheses

Teacher Resources Hypotheses

1. Teacher specialization in mathematics will have a significant positive influence on student achievement in algebra and trigonometry.
2. Algebra teacher certification in the school will have a positive significant influence on student achievement in algebra and trigonometry.
3. Teaching experience will have a positive significant influence on how well students achieve in algebra and trigonometry.
4. Teacher salary will be a positive significant determinant of student achievement in algebra and trigonometry.

Student Resources Hypotheses

1. The socioeconomic status of the students will be a significant positive determinant of how well the students do in algebra and trigonometry.
2. Age of the students will be positively related to how well they do in algebra and trigonometry.

3. Student self-concept of ability will be a significant positive determinant of student achievement in algebra and trigonometry.

4. Student ambition will be positively correlated with grades in algebra and trigonometry.

5. Students from urban centres will perform significantly better than students from rural areas.

School Resources Hypotheses

1. The school plant variable will be a positive influence on student achievement in algebra and trigonometry.

2. School enrolment will be positively correlated with student grades in algebra and trigonometry.

3. School type will not be a significant determinant of how well students will do in algebra and trigonometry.

Statistical Analyses

Pearson product moment correlations were used first to measure associations between the different variables. The coefficient in each relationship indicated how the variation of one variable was related to the variation of

another variable. All of these correlations are presented in matrix form.

These correlations are adequate in a situation where one is only concerned with the direct relationship between an independent and dependent variable. However, correlation coefficients are quite inadequate when there is the possibility that the independent variables may be interacting with each other and then correlating with the dependent variable, which is quite often the case in studies such as the present one.

Therefore, a second method of analysis, called multiple regression, was used to examine such relationships. Multiple regression analysis is a more rigorous statistical technique through which one can analyze the relationship between a dependent or criterion variable and a set of independent or predictor variables.

The regression analysis was conducted in a number of steps. First, an analysis was done with variables of each of the three resource variables as independent and two variables of student scores in algebra and trigonometry as dependent, i.e. the four variables of the teacher resource argument with scores in algebra as dependent and then the same four variables with scores in trigonometry as dependent; the four variables of the student resource argument with the two dependent variables, etc.

CHAPTER IV

FINDINGS

Introduction

The purpose of this chapter is to present and examine the results of the statistical analyses. The findings will be reported in table and/or diagram form.

First, a matrix of the Pearson product moment correlation coefficients among the variables will be examined.

Secondly, the results of the regression analyses will be reported in a table form and then in a diagram form. This method of presentation will be followed for the student resources and then the school/teacher resources.

The Pearson product moment correlations are used in order to examine the relationship between each of the independent variables. The regression analyses that follow will be used to identify the effects of the independent variables on student achievement in mathematics in both the algebra and trigonometry public examinations.

Student Resources Model

The results for the student resource variables are

presented in Tables 7 and 8 and Figures 2 and 3. The Pearson correlation coefficients presented in Table 7 point out the degree to which variation in one variable is related to variation in another.

All of the student resource variables are positively correlated with ALG, however, the URBAN/ALG is very weak and not statistically significant. The SES/ALG, AGE/ALG, SELF/ALG and AMBIT/ALG relationships are o.164, 0.034, 0.352 and 0.114 respectively. With the exception of the AGE/ALG, which is statistically significant at the .05 level, the other three relationships are significant at the .001 level. Since the computer calculated the significance levels only to three places, it's quite likely that some of these relationships are beyond the .001 level. The SELF/ALG correlation is just one example with a moderately high positive correlation of 0.352.

Self-concept of ability, however, was even more strongly associated with TRIG than it was with ALG. This time the correlation coefficient was 0.393 for the SELF/TRIG relationship which was highly significant at the .001 level. However, this time there was no significant relationship between AGE and TRIG, whereas on the other hand, unlike the URBAN/ALG association, there was a 0.039 correlation between URBAN and TRIG. This association, however, was weak and significant only at the .05 level. As was the case with algebra, the remaining relationships of SES/TRIG

and AMBIT/TRIG were significantly correlated with correlation coefficients of 0.139 and 0.155 respectively. These relationships were significant at the .001 level of significance.

However, this sort of bivariate analysis is a very crude measure of association for reasons mentioned in the section on statistical analyses in the previous chapter. A single correlation coefficient merely indicates a direct relationship between independent and dependent variables. Therefore, it does not account for the influence of other outside variables. Therefore, it was decided that a more rigorous statistical analysis, regression analysis, be used.

Table 8 indicates the relative effects of the predictor variables -- i.e. relative to the other predictors in the model. This relationship can be noted by referring to the standardized beta coefficients in column 1, for both ALG and TRIG.

The T-value in column 4 of the table is used to determine whether or not each relationship is significant. The T-value is the quotient of the unstandardized regression coefficient and the standard error. A relationship is considered significant if it produces a t-value of 2.000 or greater.

With this in mind then, one can see from Table 8, after regression analysis was done, that only two variables have any significant influence on student achievement in

Table 7

Correlations, Means, Standard Deviations, and Case Base of Variables in Student Resource Model [a]

	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	$\bar{X}$	SD	Case Base
X_7 (SES)							0.041	0.989	2307
X_8 (URBAN)	0.364*						1.439	0.496	3866
X_9 (AGE)	0.012	0.019					4638.673	2961.671	3866
X_{10} (SELF)	0.195*	0.052**	0.012				0.002	1.002	3565
X_{11} (AMBIT)	0.189*	0.049**	0.020	0.205*			9.153	3.491	2510
X_5 (ALG)	0.164*	0.019	0.034	0.352*	0.114*		76.5460	103.057	2479
X_6 (TRIG)	0.139*	0.039	0.017	0.393*	0.155*	0.760*	68.3685	166.941	3866

a X_7 = socioeconomic status, X_8 = urban students, X_9 = age, X_{10} = self-concept of ability, X_{11} = ambition, X_5 = algebra achievement, X_6 = trigonometry achievement.

* Significant at .001 level. ** Significant at .05 level.

Table 8

Regression Analysis of Student Resources Model [a]

Dependent Variables

Independent Variables	X_5 (ALG)				X_6 (TRIG)			
	1 Standard-ized beta	2 Unstand-ardized regression coefficient	3 Standard error	4 T-value (4=2/3)	1 Standard-ized beta	2 Unstand-ardized regression coefficient	3 Standard error	4 T-value (4=2/3)
X_7 (SES)	0.110*	11.446	2.769	4.134	0.055*	9.317	4.392	2.121
X_8 (URBAN)	0.040	-8.339	5.357	-1.557	0.114	-1.217	8.499	-0.144
X_9 (AGE)	0.029	0.001	0.001	1.000	0.011	0.001	0.001	1.000
X_{10} (SELF)	0.326*	33.554	2.558	13.117	0.368*	61.306	4.058	15.107
X_{11} (AMBIT)	0.028	0.819	0.733	1.117	0.070*	3.334	1.164	2.864
Constant	76.4740				65.1547			
Multiple R	0.369				0.404			
R Square	0.136				0.163			
Residual	0.929				0.915			

[a] X_7 = socioeconomic status, X_8 = urban students, X_9 = age, X_{10} = self-concept of ability, X_{11} = ambition, X_5 = algebra achievement, X_6 trignometry achievement.

* Statistically Significant, T ≥ 2.000

algebra. The SES/ALG and SELF/ALG relationships both produced positive standardized beta values of 0.110 and 0.326 respectively. T-values of 4.134 and 13.117 suggest these relationships to be highly significant. The URBAN/ALG, AGE/ALG and AMBIT/ALG relationships failed to produce a significant association with the more rigorous regression analysis.

Similarly, socioeconomic status and self-concept of ability also produced a significant positive influence on trigonometry scores as indicated by the SES/TRIG and SELF/TRIG standardized beta values of 0.055 and 0.368 respectively. Furthermore, the AMBIT/TRIG relationship also came through as being significant which was not the case in the AMBIT/ALG association.

Table 8 also points out that the five student resource variables of SES, URBAN, AGE, SELF and AMBIT, combine to explain only 13.6% (multiple R square) of the variance in algebra scores and only 16.7% of the variance in trigonometry.

The information contained in Table 8 is presented in diagram form in Figures 2 and 3.

Teacher/School Resources Model

The findings for the teacher/school resources model are presented in Tables 9 and 10 and Figures 4,5,6, and 7. Originally these variables were grouped into two separate

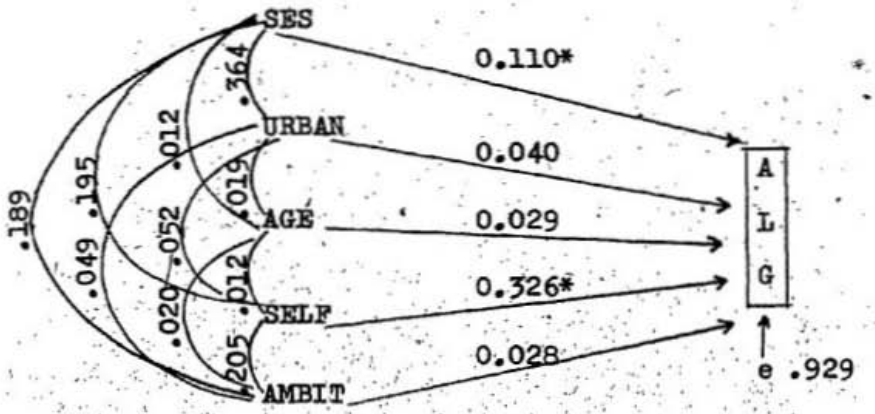


Fig. 2 Path model of student achievement in algebra.
SES = socioeconomic status, URBAN = urban students,
AGE = age of students, SELF = self-concept of ability,
AMBIT = student occupational aspirations and expectations.

* Statistically significant

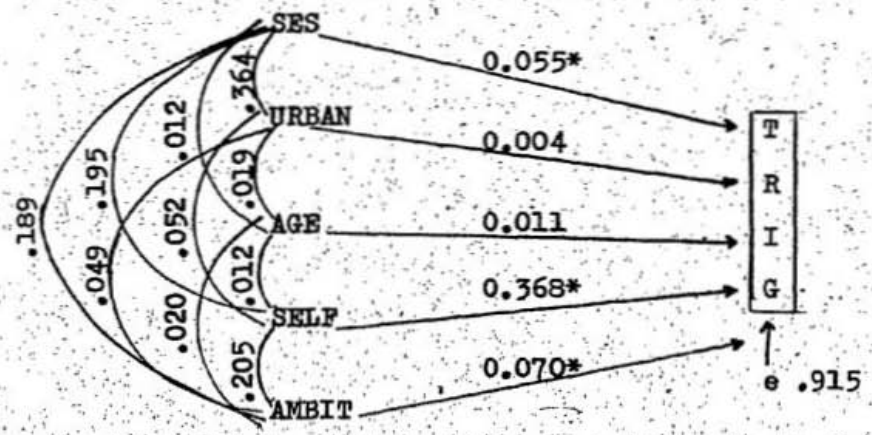


Fig. 3 Path model of student achievement in trigonometry.
SES = socioeconomic status, URBAN = urban students,
AGE = age of student, SELF = self concept of ability,
AMBIT = student occupational aspirations and expectations.

* Statistically significant

resources: teacher resources and school resources. However, it was decided to group both resources when an earlier analysis determined that separately they were having very little impact on the dependent variables. The correlation coefficients presented in Table 9 indicate the relationships between the independent variables in the teacher/school resource model -- i.e. PLANT, ENROL, SCH_1, SCH_2, SALARY, TEXP, SPECIAL, and AVCERT; and each of the dependent variables ALG and TRIG.

The Pearson correlation coefficients presented in Table 9 indicate that four variables had significant correlations with algebra scores. All four relationships were significant at the .05 level. The four correlations of PLANT/ALG, ENROL/ALG, TEXP/ALG, and AVCERT/ALG produced correlation coefficients of 0.044, 0.068, 0.048, and 0.063 respectively.

Where trigonometry was the dependent variable the same four relationships were again statistically significant. However, the PLANT/TRIG and AVCERT/TRIG relationships had a higher level of significance (.001), with coefficients of 0.087 and 0.089 respectively. The relationship between enrolment and trigonometry scores produced a correlation coefficient of 0.101; the relationship between teaching experience and trigonometry was 0.065 and the SPECIAL/TRIG relationship registered a correlation coefficient of 0.033. All of these relationships were positive and significant at

the .05 level.

However, when regression analyses were performed on these variables, none of the relationships appeared to have a significant effect on algebra scores. The regression analysis findings are presented in Table 10. All of the independent variables were positively related to achievement in algebra but none of these relationships were significant. The most powerful relationships were those of ENROL/ALG and SPECIAL/ALG with standardized beta values of 0.036 and 0.035 respectively.

With trigonometry as the dependent variable, two relationships proved to be significant; the PLANT/TRIG with a standardized beta of 0.053 and the ENROL/TRIG with a beta value of 0.167. T-values of 2.633 and 2.500 verify the two relationships as being statistically significant. With the exception of these two relationships, no other variables had any significant influence or trigonometry scores. Three of the other relationships were negative: SCH_2/TRIG (-0.016); SALARY/TRIG (-0.033) and AVCERT/TRIG (-0.079). The remaining three relationships were positive with SCH_1/TRIG having a beta value of 0.019, TEXP/TRIG with a value of 0.020, and SPECIAL/TRIG with a value of 0.025. However, none of these relationships were statistically significant.

At this point, it is interesting to note that teacher specialization in mathematics (SPECIAL) was not a significant

determinant of student scores in algebra and trigonometry. The SPECIAL/ALG relationship with a standardized beta value of 0.035 and SPECIAL/TRIG relationship with an even smaller value of 0.025.

Finally, all of these variables combine to explain a mere .6% (multiple R square) of the variance in algebra and only 1.7% of the variance in trigonometry.

The information contained in Table 10 is presented in diagram form in Figures 4,5,6,7. Because the teacher/school variables were analyzed together, their residuals are the same. The teacher/school resources were diagrammed separately in Figures 4,5,6,7 in order to point out the relationship between the independent variables more clearly.

Integrated Model

The variables from each of the explanatory models which were found to have a statistically significant effect on ALG or TRIG were grouped together in a final integrated model. Even though the SPECIAL variable was found to have a significant influence at only the .05 level, it was still a fairly good determinant and one of much interest for this study. Therefore, it was decided to include this variable as well. The same procedure was followed in reporting the findings for this integrated model.

Table 11 presents the correlation coefficients and

Table 9

Correlations, Means, Standard Deviations, and Case Base of Variables in the Teacher/School Resources Model [a]

		X_{12}	X_{13}	X_{14}	X_{15}	X_4	X_3	X_2	X_1	$X_{5(Alg)}$	$\bar{X}$	SD	Case Base
School Resources	X_{12} (PLANT)										-0.316	1.014	3487
	X_{13} (ENROL)	* -0.399									497.387	347.548	3736
	X_{14} (SCH_1)	* 0.244	* -0.412								0.387	0.487	3716
	X_{15} (SCH_2)	* -0.266	* 0.441	* -0.952							0.590	0.492	3716
Teacher Resources	X_4 (SALARY)	* -0.139	* 0.089	** -0.104	** 0.098						13615.630	4668.500	3860
	X_3 (TEXP)	* -0.453	* 0.421	* -0.221	* 0.263	* 0.196					8.811	3.041	3860
	X_2 (SPECIAL)	** 0.073	* -0.077	* 0.250	* -0.265	* -0.213	* -0.131				0.852	0.196	3681
	X_1 (AVCERT)	* -0.349	* 0.959	* -0.383	* 0.421	** 0.040	* 0.398	* -0.145			3.415	2.268	3866
	X_5 (ALG)	** 0.044	** 0.068	-0.026	0.029	0.013	** 0.048	0.023	** 0.063		76.5460	103.057	2479
	X_6 (TRIG)	* 0.087	** 0.101	-0.013	0.017	-0.018	** 0.065	** 0.033	* 0.089	* 0.760	68.3685	166.941	3866

[a] X_{12} = school plant, X_{13} = enrolment, X_{14} = school type 1, X_{15} = school type 2, X_4 = salary, X_3 = teaching experience, X_2 = specialization in mathematics, X_1 = average certification, X_5 = algebra achievement, X_6 = trigonometry achievement.

* Significant at .001 level. ** Significant at .05 level.

Table 10

Regression Analysis of Teacher/School Resources Model [a]

Dependent Variables

Independent Variables	X_5 (ALG)				X_6 (TRIG)			
	1 Standardized beta	2 Unstandardized regression coefficient	3 Standard error	4 T-value (4=2/3	1 Standardized beta	2 Unstandardized regression coefficient	3 Standard error	4 T-value (4=2/3)
School Resources								
X_{12} (PLANT)	0.014	1.409	2.539	0.555	0.053	8.769	3.330	2.633
X_{13} (ENROL)	0.036	0.011	0.025	0.440	0.167*	0.080	0.032	2.500
X_{14} (SCH_1)	0.007	1.539	14.952	0.103	0.019	6.355	19.614	0.324
X_{15} (SCH_2)	0.012	2.457	15.082	0.163	-0.016	-5.311	19.784	-0.268
Teacher Resources								
X_4 (SALARY)	0.010	0.0002	0.0005	0.400	-0.033	-0.001	0.001	-1.000
X_3 (TEXP)	0.021	0.700	0.861	0.813	0.020	1.122	1.130	0.993
X_2 (SPECIAL)	0.035	18.481	12.439	1.486	0.025	21.162	16.317	1.297
X_1 (AVCERT)	0.018	0.821	3.670	0.224	-0.079	-5.847	4.814	1.215
Constant	72.9963				64.9655			
Multiple R	0.079				0.129			
R Square	0.006				0.017			
Residual	0.997				0.991			

[a] X_{12} = school plant, X_{13} = enrolment, X_{14} = school type 1, X_{15} = school type 2, X_4 = salary X_3 = teaching experience, X_2 = specialization in mathematics, X_1 = average certification, X_5 = algebra achievement, X_6 = trigonometry achievement.

* Statistically Significant, $T \geq 2.000$

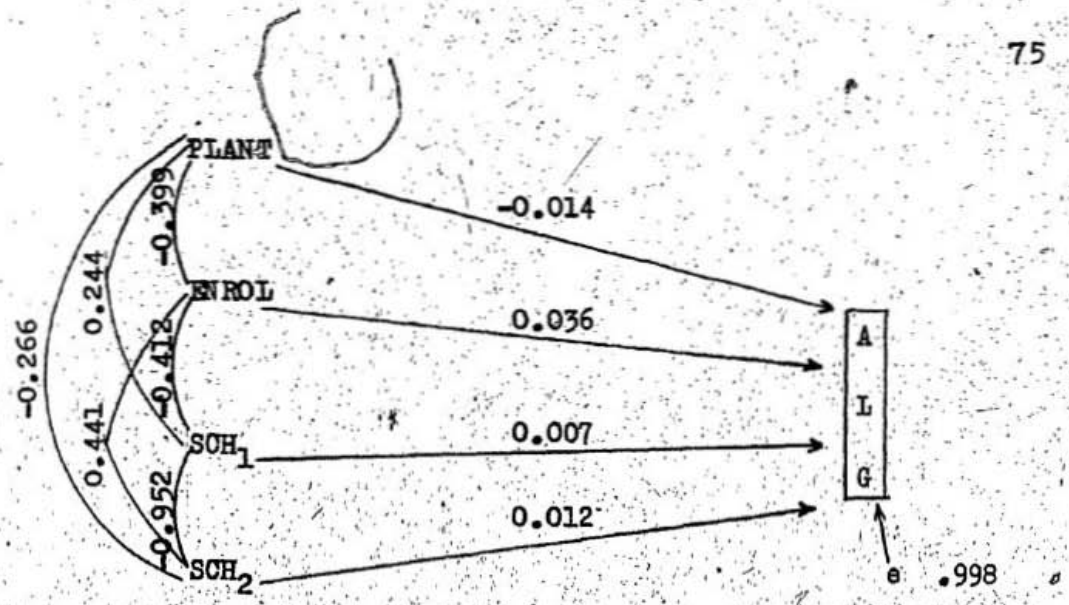


Fig. 4 Path model of student achievement in algebra.
PLANT = school plant, ENROL = school enrolment,
SCH_1 = school type 1, SCH_2 = School type 2.

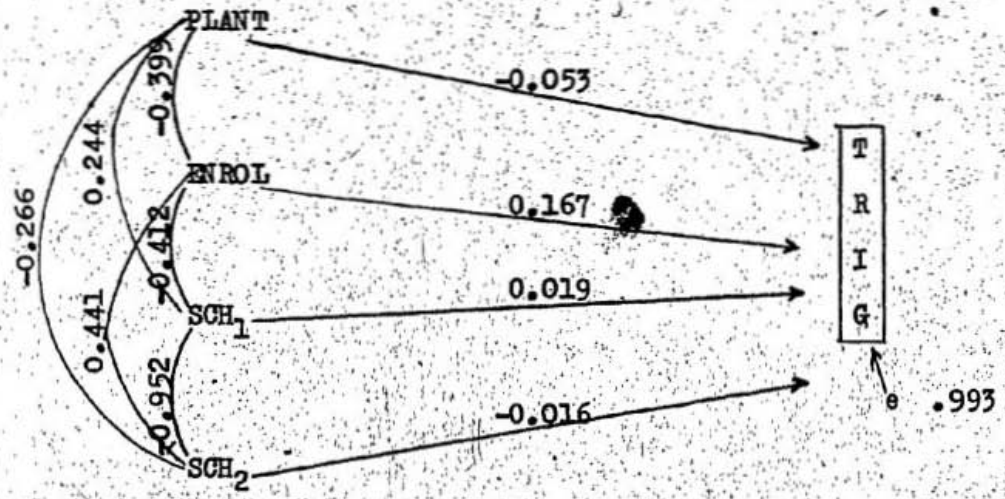


Fig. 5 Path model of student achievement in trigonometry
PLANT = school plant, ENROL = school enrolment,
SCH_1 = school type 1, SCH_2 = school type 2.

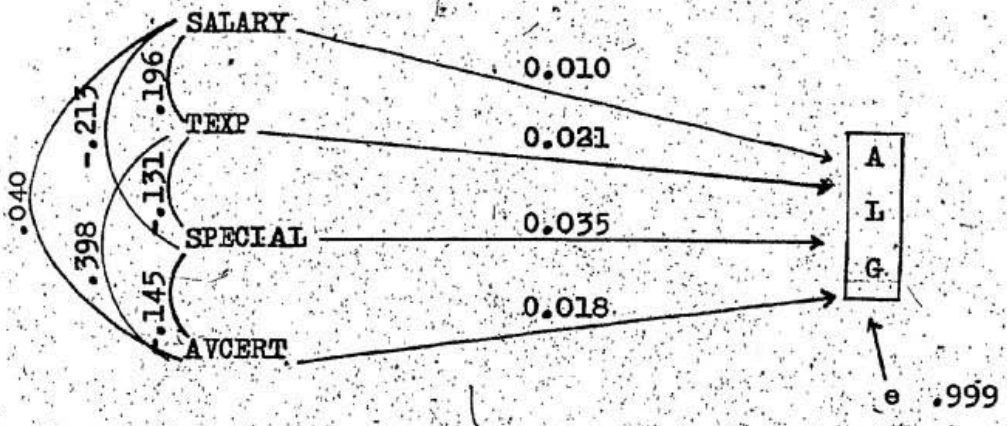


Fig. 6 Path model of student achievement in algebra. SALARY = teacher salary, TEXP = teaching experience SPECIAL = mathematics specialization, AVCERT = average teacher certification.

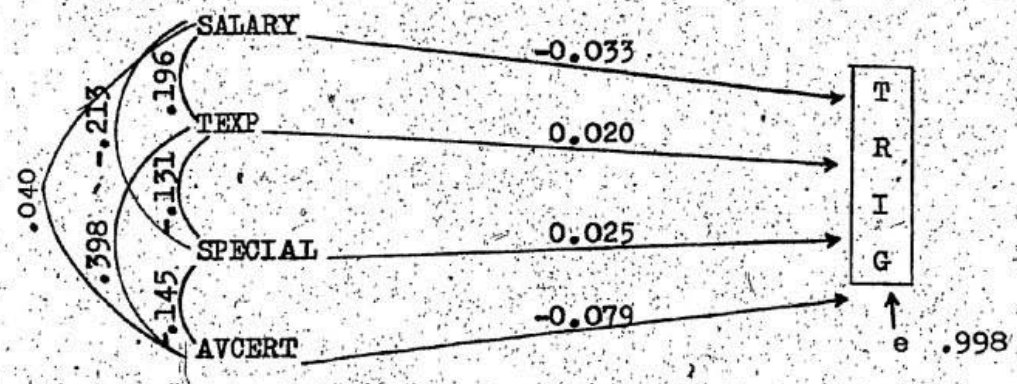


Fig. 7 Path model of student achievement in trigonometry. SALARY = teacher salary, TEXP = teaching experience, SPECIAL = mathematics specialization, AVCERT = average teacher certification.

Table 12 presents the results of the regression analysis. Unlike the coefficients in Table 11, the standardized beta scores in the regression table show the effect of each of the variables while at the same time, taking into account the effect of the other independent variables that were originally found to be significant.

The correlation coefficients in Table 11 indicate significant relationships with regards to the SES/ALG, SELF/ALG and AMBIT/ALG relationships. These three associations have correlations of 0.164, 0.352 and 0.114 respectively, all of which are significant at the .001 level.

With trigonometry scores as the dependent variable, five relationships were significant with respect to correlation coefficients. These relationships were SES/TRIG, SELF/TRIG, AMBIT/TRIG, ENROL/TRIG, and PLANT/TRIG with correlation coefficients of 0.139, 0.393, 0.155, 0.101 and 0.087 respectively.

However, when the regression analysis was performed for these independent and dependent variables, two of the relationships did not prove to be significant. The results of the regression analyses are presented in Table 12.

According to the correlation coefficients in Table 11, the AMBIT/ALG relationship was significant. However, a standardized beta value of 0.028 in Table 12, did not prove to be significant. Similarly,

Table 11

Correlations, Means, Standard Deviations, and Case Base of Variables in the ALG and TRIG Integrated Model -- after the deletion of non-significant variables.[a]

	X_7	X_9	X_{10}	X_{13}	X_{12}	X_2	X_5	$\bar{Y}$	SD	Case Base
X_7 (SES)								0.041	0.989	2307
X_9 (SELF)	0.195*							0.002	1.002	3565
X_{10} (AMBIT)	0.189*	0.205*						9.153	3.491	2510
X_{13} (ENROL)	0.304*	0.003	0.031					479.387	347.548	3736
X_{12} (PLANT)	0.126*	0.015	0.057	0.399*				0.316	1.014	3487
X_2 (SPECIAL)	0.051	-0.006	0.011	-0.077	0.073			0.852	0.196	3681
X_5 (ALG)	0.164*	0.352*	0.114*	0.068	0.044	0.023		76.5460	103.057	2479
X_6 (TRIG)	0.139*	0.393*	0.155*	0.101*	0.087**	0.033	0.760*	68.3685	166.941	3866

[a] X_7 = socioeconomic status, X_9 = self-concept of ability, X_{10} = ambition, X_{13} = enrolment, X_{12} = school plant, X_2 = specialization in mathematics, X_5 = Algebra achievement, X_6 = trigonometry achievement.
* significant at .001 level. ** significant at .05 level.

a correlation matrix indicated a significant relationship with the SES/TRIG variables, whereas the regression analysis produced an insignificant relationship of 0.020.

With the exception of these two relationships, the integrated model really reconfirmed the findings earlier reported. The SELF/TRIG and SELF/ALG relationships proved to be the most powerful. The standardized beta values for these two relationships were 0.376 and 0.331 respectively. The AMBIT/TRIG, ENROL/TRIG, and PLANT/TRIG relationships all proved to be significant as presented in Table 12. However, these three independent variables had no significant influence on the dependent variable of algebra achievement.

It should be noted that the SPECIAL/TRIG relationship, even though not statistically significant, produced a beta value of 0.043 and a t-value of 1.834. A t-value of 2.000 would have indicated a significant relationship. In the light of such findings, the SPECIAL variable can be considered as having a somewhat moderate influence on trigonometry achievement. It is felt that this relationship would be a significant determinant of mathematics achievement had the SPECIAL variable not been such a weak measure of specialization. Further explanations of the findings are given in the following chapter.

Table 12 also points out that these independent variables combine to explain only 13.7% of the variance in algebra scores and 17.5% of the variance in the trigonometry scores.

Table 12

Regression Analysis for Variables in ALG and TRIG
Integrated Model -- After Deletion of non-Significant Variables [a]

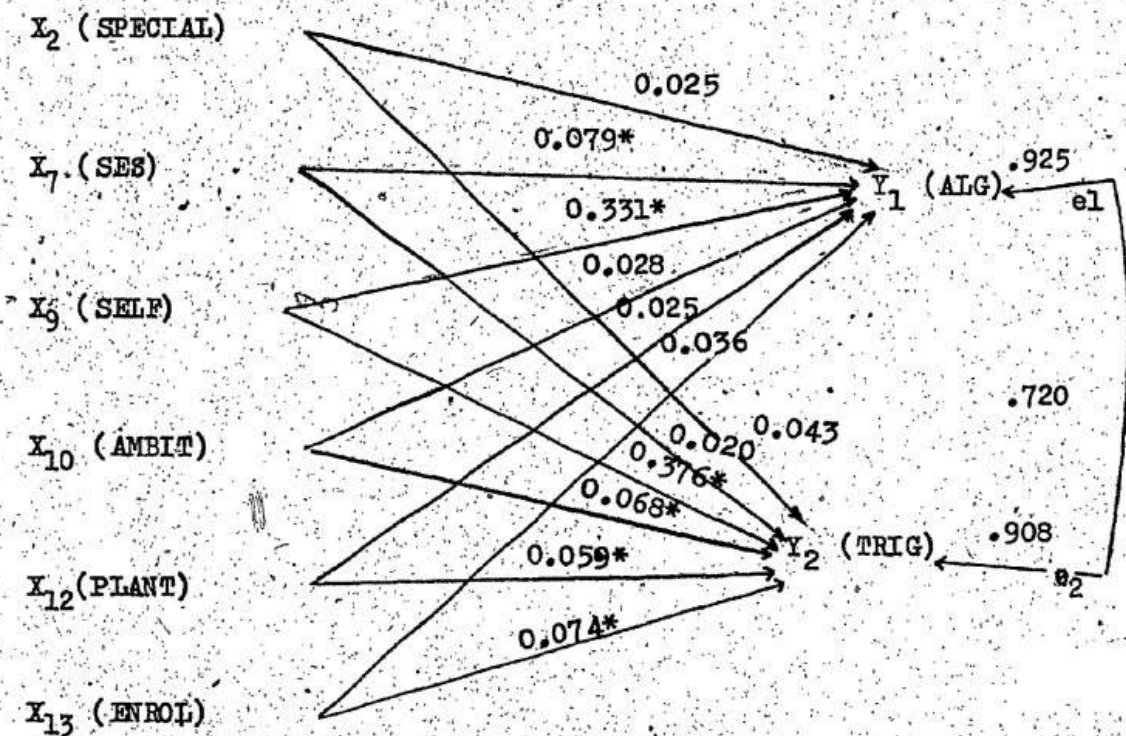
Dependent Variables

Independent Variables	X_5 (ALG)				X_6 (TRIG)			
	1 Standard-ized beta	2 Unstand-ardized Regression Coefficient	3 Standard error	4 T-value (4=2/3)	1 Standard-ized beta	2 Unstand-ardized Regression Coefficient	3 Standard error	4 T-value (4=2/3)
X_7 (SES)	0.079*	8.258	2.725	3.030	0.020	3.456	4.293	0.805
X_9 (SELF)	0.331*	34.040	2.564	13.276	0.376*	62.693	4.040	15.518
X_{10} (AMBIT)	0.028	0.837	0.734	1.140	0.068*	3.271	1.157	2.827
X_{13} (ENROL)	0.036	0.011	0.008	1.375	0.074*	0.036	0.013	2.769
X_{12} (PLANT)	0.025	2.532	2.669	0.949	0.059*	9.762	4.204	2.322
X_2 (SPECIAL)	0.025	13.032	12.710	1.025	0.043	36.727	20.023	1.834
Constant		74.0215				60.1439		
Multiple R		0.370				0.419		
R Square		0.137				0.175		
Residual		0.929				0.908		

[a] X_7 = socioeconomic status, X_9 = self-concept of ability, X_{10} = ambition, X_{13} = enrolment, X_{12} = school plant, X_2 = specialization in mathematics, X_5 = algebra achievement, X_6 = trigonometry achievement.
* Statistically significant, $T \geq 2.000$.

Figure 8 consists of the final model of the relationships between the independent and dependent variables that were statistically significant in the previous analyses. This model is an integrated model combining all the independent variables and the strengths of their different relationships with the two dependent variables. The integrated model is merely a diagrammed representation of those findings presented in Table 12.

Integrated Model



* Statistically significant

Figure 8 Integrated path model of student achievement in algebra (ALG) and trigonometry (TRIG). SPECIAL = mathematics specialization, SES = socio-economic status, SELF = self-concept of ability, AMBIT = student ambition, PLANT = school plant, ENROL = enrollment

CHAPTER V

INTERPRETATION

The purpose of this chapter is to interpret the findings presented in Chapter IV. The results will be discussed under the teacher resources, student resources, and the school resources arguments. Each of the hypotheses will be discussed to see whether or not they should be accepted or rejected based on the results of the analyses. At the same time, attempts will be made to explain the outcome of the results pertaining to each hypothesis. In addition, some practical implications will be discussed in terms of the findings in general.

Teacher Resources Hypotheses

Hypothesis 1. Mathematics teachers with a specialization in the area of mathematics will have a significant positive influence on student achievement in algebra and trigonometry.

Table 9 shows that the correlation coefficients between teacher specialization in mathematics (SPECIAL) and student achievement in algebra (ALG) and trigonometry (TRIG) are 0.023 and 0.033 respectively. The regression analysis in Table 10 produced beta values (i.e. path

coefficients) of 0.035 for the SPECIAL/ALG relationship and a beta value of 0.025 for the SPECIAL/TRIG relationship. Neither of these relationships was considered statistically significant due to t-values of less than 2.000 in both cases.

Certainly, such a finding is counter to the conventional wisdom as well as to educational practice. Ex-post-facto assessment is called for because the finding may be spurious for a number of reasons. For example, specialization in mathematics may not have been measured accurately by the data used.

First of all, the teacher specialization data were aggregated at the school level. Class level variables were not available where this specialization variable would have the greatest impact. Secondly, the specialization measure was considered weak because of the criteria mathematics teachers used in order to classify themselves as specialized. Most grade XI mathematics teachers, for the purpose of the "educational staff record" required by Statistics Canada, classify themselves as specialists regardless of the number of mathematics courses they have or their GPA (grade-point average). Finally, the data provided no information on the number of years that the student has had specialized mathematics teacher instruction. A grade eleven student who has been exposed to a specialized mathematics teacher for one year, as

opposed to another who has had specialized instruction for several years, might have been disadvantaged. This points to the need for longitudinal research designs in which the true effects of entry behavior at time one, on the learning outcomes at time two, can be estimated. Educational research designs frequently lack this type of specification.

For these reasons, the effect of the SPECIAL variable need not be regarded as definitive. There is need for greater precision in measuring the variable; for disaggregating the analysis to the level of the classroom; and for controlling the effects of prior teacher influences through longitudinal research designs, before one can conclude confidently that in Newfoundland schools the effects of speciality training on student performance is negligible.

However, in this particular instance, hypothesis 1 was rejected.

Hypothesis 2. The average teacher certification level in a school will have a positive significant influence on student mathematics algebra and trigonometry.

The correlation coefficients in Table 9 indicate a 0.063 correlation between teacher certification (AVCERT)

and algebra achievement (ALG) and a 0.089 correlation for the AVCERT/TRIG relationship. Neither of these relationships is significant. The regression analysis in Table 10 reveals associations that are even weaker with beta values of 0.018 and -0.079 for the AVCERT/ALG and AVCERT/TRIG relationships respectively.

Unfortunately this does not tell us much with regard to certification of mathematics teacher. This variable was also aggregated at the school level, much the same as the SPECIAL variable. The variable is a measure of average teacher certification, so we have no way of isolating mathematics teachers as to their level of teaching certification.

However, this finding is consistent with the findings of Pollard (1970) who reported that teacher qualifications (based entirely on their certification) had no significant impact on grade six reading achievement in rural Newfoundland.

Based on the findings of this present study, hypothesis 2 was therefore rejected.

Hypothesis 3. Teaching experience will have a positive significant influence on how well students achieve in algebra and trigonometry.

Table 9 indicates a correlation coefficient of 0.048 for the TEXP/ALG relationship and a correlation coefficient of 0.065 for the TEXP/TRIG relationship.

When all the independent variables were considered, the regression analysis, in Table 10, revealed associations of 0.021 and 0.020 respectively. Neither of these relationships was statistically significant.

Due to the nature of the data, this variable is also a measure of average teaching experience at the school level. As a result, the teaching experience of the individual mathematics teachers could not be gathered.

Despite the inability to isolate mathematics teachers according to teaching experience, the findings of this study are not inconsistent with the findings of similar studies. The review of literature revealed a study by Wasylyk (1961) who reported an insignificant relationship between teaching experience and mathematics achievement. Similar results were found in a study conducted by Stoneking (1960) between teaching experience and student understanding of basic arithmatical principles and generalizations. Coleman et al. (1966) also reported no significant relationship between teaching experience and student achievement. Hypothesis 3 was therefore rejected.

Hypothesis 4. Teacher salary will be a positive significant determinant of student achievement in algebra and trigonometry.

Table 9 shows that teacher salary (SALARY) has a very weak relationship with ALG and TRIG with coefficients of 0.013 and -0.018 respectively. This indicates that the higher the salaries of teachers do not necessarily determine whether the students will do better in the area of mathematics.

The unstandardized beta values for teacher salary indicates an even weaker relationship between the TEXP/ALG and TEXP/TRIG variables, (see Table 10). The beta values were 0.0005 and 0.001 respectively.

This finding is not surprising considering the fact that teaching experience and certification determine teacher salary, and these two variables had no significant impact on mathematics achievement.

Student Resources Hypotheses

Hypothesis 1. The socioeconomic status of the student will be a significant positive determinant of how well the students do in algebra and trigonometry.

The correlation coefficients in Table 7 indicate positive correlations between socioeconomic status of the student and the students' achievement in algebra and

trigonometry. The SES/ALG relationship had a coefficient of 0.164 and the SES/TRIG relationship registered a 0.139 correlation coefficient. Both of these relationships were statistically significant at the .001 level.

The standardized beta values for the regression analysis in Table 8 confirmed this relationship. The SES/ALG and SES/TRIG relationships recorded standardized beta scores of 0.110 and 0.055 and T-value scores of 4.134 and 2.121 respectively. T-values greater than 2.000 indicate a statistically sound relationship.

In other words, the higher the socioeconomic status of the student, as measured by father's occupation, father's and mother's level of education, and family size, the greater the chance of that student doing well in mathematics. Students who come from families of high socioeconomic status are exposed to richer, more varied and probably more grammatically correct verbal communication, which gives them a head start in school. Furthermore, parents of higher socioeconomic status have a tendency to apply steady pressure on their children to do well in school (Boocock, 1972). Based on the findings of this study then, Hypothesis 1 was accepted.

Hypothesis 2. Age of students will be positively related to how well they do in algebra and trigonometry.

The correlation coefficients in Table 7 indicate

positive correlations between age and achievement in algebra as well as trigonometry. The AGE/ALG relationship produced a correlation of 0.034 which was not statistically significant. Nor was the 0.017 correlation coefficient between age and trigonometry scores considered significant.

Regression analysis similarly found both relationships to be very weak, with beta values of 0.029 and 0.011 respectively. A t-value of 1.000 for each relationship indicated that these relationships, although positive, were not statistically significant.

However, such a weak correlation is not alarming when one realizes that the study was confined only to grade eleven students. When a study is restricted to one grade level, this, in turn, places a restriction on the variation in the age of the students. Since the ages of the students vary very little, one would not expect the variable to account for any significant variance in mathematics achievement, when all other variables are controlled.

Hypothesis 3. Student self-concept of ability will be a significant positive determinant of student achievement in algebra and trigonometry.

Table 7 reveals correlation coefficients of 0.393 and 0.352 respectively for the SELF/ALG and SELF/TRIG

relationships. Both these relationships were statistically significant at the .001 level.

The beta coefficients of the regression analysis in Table 8, again indicate a highly significant positive relationship between self-concept of ability and the two dependent variables of algebra and trigonometry achievement. The SELF/ALG relationship registered a beta coefficient of 0.326 and the SELF/TRIG relationship a coefficient of 0.368. Both relationships had t-values of 13.117 and 15.107 indicating a high degree of statistical significance. Thus, the higher a student's self-concept of ability -- their confidence in their own ability to achieve -- the higher their level of achievement in mathematics. Therefore, hypothesis 3 was accepted.

A person's confidence in his or her abilities is always a very important determinant in how well they succeed in any endeavour, and academic achievement is no exception. Study after study, some of which are dealt with in the literature review, reveal a very high positive correlation between student's perception or rating of his or her abilities and their academic achievement. The phrase "I can't do it" has perhaps been the greatest obstacle to better academic achievement by scores of students. The fact of the matter is that many of these students possess the abilities to do well, and it may be their negative perception of their own abilities that prevent these abilities from being transformed into higher academic achievement. Joiner

(1969) claimed that students' ideas about their academic achievement have more effect on their school achievement than does their measured intelligence.

Hypothesis 4. Student ambition will be positively correlated with grades in algebra and trigonometry.

Table 7 presents the correlation coefficients between ambition and student achievements in algebra and trigonometry; the coefficients are 0.114 and 0.155 respectively. Both of these relationships are statistically significant at the .001 level.

However, the regression analysis, after all the other independent variables are controlled for, produced beta coefficients of 0.028 and 0.070 respectively for the AMBIT/ALG and AMBIT/TRIG relationships. Only the AMBIT/TRIG relationship proved to be significant with the t-value of 2.864. The t-value for the AMBIT/ALG relationship was 1.117 indicating that the relationship was not significant. Therefore, hypothesis 4 cannot be accepted in its entirety. Only the part predicting a positive correlation between ambition and trigonometry can be accepted since it yielded a t-value greater than 2.000.

A possible explanation for the difference in the strength of these two relationships could be due to the size of the case base. Table 7 shows a case base of 2479 for the algebra students and 3866 for trigonometry students.

In any event, a positive correlation between student

ambition and algebra grades, as well as student ambition and trigonometry grades, indicates that the higher the students' level of ambition, the better their chances to do well in mathematics. Student ambition, in this study, was based on their occupational and educational expectations.

Students who do not see meaningful connections between what they do in school and what they expect or would like to do in their own future lives are not likely to perform well academically (Boocock, 1972).

Hypothesis 5. Urban students will do significantly better than non-urban students in algebra and trigonometry.

The correlation coefficients in Table 7 show that there is a very weak correlation between urban students and their achievement in algebra, with a coefficient of 0.019. Also, the correlation between urban students and achievement in trigonometry is 0.039, which again was very weak and not significant.

The regression analysis in Table 8 also indicate very weak associations between the urban variable and student scores in algebra and trigonometry, with beta values of 0.040 and 0.004 respectively. Neither of these relationships were statistically significant. This implies that urban students do not achieve higher scores in algebra and trigonometry than students in rural areas of the province. Therefore, hypothesis 5 was rejected.

The review of literature suggested that students who come from rural areas, where there is a lack of exposure to

the different kinds of mass media (newspapers, magazines, etc.) and to so many different kinds of people, are deficient in their verbal skills. In addition to this, rural schools were less attractive to these students, especially in the early 1970's, when there was a lack of school facilities, especially in the area of physical education. Therefore, students who came to school with a weakness, and then entered a school that offered very few attractions, often became frustrated and left usually before reaching grade eleven. Boocock (1972) mentioned that students in rural areas who come to school with weaknesses in verbal skills are compensated eventually by the school. However, she noted that this compensation was usually confined to the brighter students.

All too often low aptitude students fail to benefit from the opportunities open to them in small rural schools. This factor is one of many which account for why withdrawal rates in small non-urban schools are unacceptably high to school authorities. Consequently, those students who finally made it to grade eleven were usually the best students in terms of their academic performance. This could well eliminate any differences between mathematics achievement of urban and non-urban students. A study conducted by Stack (1973) reported that the dropout rate is much higher in schools that are further away from an urban centre. These drop-outs are usually the weaker students.

School Resources Hypotheses

Hypothesis 1. The school plant variable will be a positive influence on student achievement in algebra and trigonometry.

Table 9 indicates correlation coefficients of 0.044 and 0.087 between school plant and the dependent variables of algebra and trigonometry respectively. Both relationships were statistically significant.

The results differed somewhat in the case of the regression analysis. A standardized beta of 0.014 indicate the relationship between school plant and student achievement in algebra. The PLANT/TRIG relationship produced a beta coefficient of 0.053. Only the latter relationship produced a t-value greater than 2.000 (2.633) indicating statistical significance. Therefore, the above hypothesis cannot be accepted entirely. Since only the PLANT/TRIG relationship produced a t-value greater than 2.000, then only the part of the hypothesis making that prediction can be accepted.

The school plant, however, does have a positive influence on student achievement, in this case mathematics. In other words, the better the school plant, in terms of adequacy of school facilities, the better the chances of higher student achievement.

This finding is consistent with the statement made by Warren (1972) that the impact of the physical environment in which educative processes are housed plays a very important

role in the development of sound instructional programs for this province. Warren goes on to say that limited resources have fostered the use of outdated facilities that have only interfered with the expansion of a modern curriculum.

Hypothesis 2. School enrolment will be positively correlated with student grades in algebra and trigonometry.

The correlation coefficients in Table 9 show positive correlations between school enrolment and each of the dependent variables of algebra and trigonometry scores. The coefficients for the ENROL/ALG and ENROL/TRIG relationships were 0.068 and 0.101 respectively. Both of these relationships are statistically significant at the .05 level.

The regression analysis in Table 10 reveal again two positive relationships between enrolment and scores in algebra and trigonometry. The relationship between enrolment and algebra achievement had a standardized beta coefficient of 0.036 and a t-value of 0.440. The ENROL/TRIG relationship, on the other hand, had a beta coefficient of 0.167 and a t-value of 2.500, indicating a statistically significant relationship. Again, as was the case with the previous hypothesis, only part of the hypothesis can be accepted. The predicted correlation between enrolment and algebra achievement, which yielded a t-value of 0.440 (less than 2.000) had to be rejected. A larger case base in the ENROL/TRIG relationships may have contributed to its being statistically significant.

These results are consistent with that of the Department of Education studies on the relationship between school enrolment and scores on vocabulary tests with 1300 Newfoundland students. The explanation often suggested is that larger schools can offer better programs for their students, quite often resulting in higher academic achievement among its students.

Hypothesis 3. School type will not be a significant determinant of how well students will do in algebra and trigonometry.

Table 9 indicates a very low correlation between the type of school, whether it is an all-grade school (SCH_1) or a central high school (SCH_2), and mathematics achievement. The SCH_1/ALG and SCH_1/TRIG relationships registered coefficients of -0.026 and -0.013 respectively. The SCH_2/ALG and SCH_2/TRIG relationships had correlation coefficients of 0.029 and 0.017. Neither of these relationships was found to be statistically significant.

The beta coefficients of the regression analysis found the relationships to be much the same, with neither being statistically significant. The beta coefficients for all four relationships of SCH_1/ALG, SCH_1/TRIG, SCH_2/ALG, and SCH_2/TRIG were 0.007, 0.019, 0.012, and -0.016 respectively.

Basically, what this means is that the type of school has no significant bearing on how well students will achieve in mathematics. In other words, when all other variables are controlled for, whether the school is an all-grade or central high school will have no significant influence on student algebra and trigonometry grades. Therefore, hypothesis 3 was accepted.

However, a final correlation between the two dependent variables in the integrated model warrants some mentioning at this point. Figure 8 points out a high correlation of .720 between the residuals of the two dependent variables of algebra and trigonometry achievements. The fact is that the predictors in the integrated model account for a very small (negligible) amount of the covariation between algebra and trigonometry achievement.

This obviously suggests that important variables were omitted from the equation, that might be more powerful determinants of student achievement.

Mathematics achievement in grade eleven is a function of a student's prior achievements, which, in turn, are a function of the student's mastery of basic skills in literacy and numeracy. Mathematics achievement, especially in problem solving, is also a function of the student's stage of thinking -- students at the formal stage are likely to be higher performers than students at the concrete operations stage. But these variables were not measured. Neither was the data longitudinal -- thus entry behavior

variables (prior performances and attitudes) were not available. With these variables lacking, this might well explain why there is so little covariation between algebra and trigonometry scores.

Some Practical Implications

The findings reported in this study have some practical implications with regard to the education of the youth of Newfoundland. However, one cannot make sweeping generalizations on the basis of one study, but the research could be used as a basis for similar research to examine further some of the factors that actually contribute to student success in high school.

The study revealed that the most important determinants of student success in mathematics were characteristics possessed by the students themselves. The two most powerful determinants of mathematics achievement were the students' socioeconomic status as measured by father's occupation, father's and mother's education, and family size, and students' self-concept of ability. Father's occupation, father's and mother's education were moderately correlated with student achievement.

Principals and teachers must recognize that these socioeconomic factors account for a considerable proportion

of variance in student achievement in mathematics. Information on these factors need to be obtained as soon as a child enters school so that the proper planning and evaluation measures can be taken to produce the best learning environment for these children.

Likewise, if the education of parents is continually showing up as having such an impact on student achievement, and numerous studies including this one have confirmed it, then some steps should be taken to develop a much needed program of adult education. Parents have to be made aware of their influences on student academic performance to give them the incentive to register at some adult education centre in the hope that they can help their children.

Another student resource that keeps emerging as being very powerful in determining student achievement, not just in mathematics but any area of educational achievement, is student self-concept of ability. Most studies concerning student academic achievement will point to this variable as being probably the most significant in predicting how students will do in school, and this study was no exception. Self-concept of ability exceeded every other variable in its influence on student achievement in mathematics. Other studies referred to in the literature review report a similar relationship. This, then, points to the fact that academic achievement can be enhanced by self-concept enhancement.

The extent to which self-concept of ability is enhanced will depend a great deal upon the school, and more specifically the teachers. Teachers will have to realize that grouping and labelling children at very young ages could interefere with the enhancement of their self-concept of ability if they are placed in a low-achievers group. Teachers and school officials have to be very cautious that a student's self-concept is not retarded through a lack of attention and encouragement.

Mood (1970) claims that one of the greatest responsibilities of teachers is to increase every student's sense of personal worth. He states that, on the purely negative side, this means that students must never be given the impression that they are dumb or delinquent. However, on the positive side, it is essential that a teacher find, for every student, some knowledge or skill or aptitude that the student can be proud of and go out of his way now and then to compliment the student on that aptitude. Mood further claims that it is impossible to teach a child anything if his confidence or his ability to learn has been destroyed. The teacher can only praise progress and must be careful to take every opportunity to do so especially with slow learners.

The parents can also make a contribution in this area. Children will need their continual support and encouragement if they are to increase the ranks of their self-concept. This implies a closer relationship between teachers, parents and students if there is to be an improvement in a child's self-concept of ability, hence an improvement in his academic standing.

When examining the school resources model, it was found that the school plant was also an important factor in predicting student achievement in mathematics, especially in trigonometry. In other words, schools with the better physical facilities had a positive effect on student achievement in mathematics. If schools with adequate facilities are producing better students than schools lacking in facilities, then school boards have to take positive action to upgrade school facilities. A list of essential materials and facilities has to be constructed and efforts made to make sure all schools reach the minimum standards. Otherwise, the smaller community schools are going to continue to have inferior facilities and the pupils in these schools will be disadvantaged accordingly.

Finally, teacher resources have to be considered when examining student achievements. The reader should be cautioned that because teacher specialization, teaching experience and certification had no significant impact on student achievement in mathematics, this finding should

not be interpreted to mean that they are not important at all. Rather, it might suggest that after a certain level of training and experience has been reached, additional training and experience might not contribute much to an increase in student academic achievement.

Furthermore, as mentioned periodically throughout this study, the measurement of teacher specialization variable had been very weak. This discovery has particular implications for researchers engaged in the collection and compiling of this data. If data collected by such organizations as Statistics Canada is to be of any use for research such as this, careful steps have to be taken to ensure the information gathered is precise and accurate. Otherwise, data of this kind can never serve any constructive purpose in bringing about improvements in the field of education.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

The purpose of this study was to gain a better understanding of why some students are higher achievers than others in the area of mathematics. More specifically, the study was designed to examine the impact of teacher qualifications on student achievement, using student scores in algebra and trigonometry as measures of achievement. However, in order to isolate the strength of teacher qualifications, other important variables had to be included and then controlled, to give the net effect of the teacher qualifications. All the determinants considered in this study were grouped under three categories:

(a) Teacher Resources

(b) Student Resources

(c) School Resources

The teacher resources examined were teacher specialization in the area of mathematics, the level of teacher certification, number of years of teaching experience, and teacher salary. The student resources that were examined were the student's socioeconomic status, the age of the student, the student self-concept of ability, student ambition and whether the students were residents of urban or non-urban

regions of Newfoundland. Finally, the factors examined under the school resources were the school plant (i.e. the adequacy of school facilities), the school enrolment and the type of school (i.e. whether it was classified as central or all-grade).

The extent to which each of the factors under each category were accounting for the variance in student achievement in algebra and trigonometry were examined through the analysis of a conceptual model (Figure 1). A set of hypotheses was then formulated for each category which were based on the major question of the study. The factors chosen and the hypotheses formulated were based on the review of related literature presented in Chapter II.

The statistical analyses used in this study included Pearson product moment correlations and regression analyses. The purpose of the Pearson product moment correlations was to measure the association between the different variables involved. The regression analysis was used to determine the relative effect of each variable on student achievement in mathematics, while controlling for the remaining variables. The regression analyses was introduced as a more precise and rigorous measure of association.

In the teacher resource model, none of the factors appeared to have any significant influence on student achievement in mathematics. Overall, the specialization variable had the greatest positive impact on the level of

mathematics achievement. However, weaknesses in the measurement of this variable may have been a determining factor of such weak association.

Of the five factors considered under the student resources model, only socioeconomic status and self concept of ability were statistically significant in contributing to higher student achievement in both algebra and trigonometry. In both cases, the associations were positive. Also, the ambition factor was a significant positive determinant of trigonometry achievement. Therefore, the higher the student socioeconomic status, self-concept of ability and ambitions, the more likely they are to do well in school, as measured by their achievement in mathematics.

Finally, neither of the factors considered under the school resources had any significant effect on how well the student did in algebra. However, when trigonometry scores were considered, which by the way involved more students, two of the factors came through as having a significant positive effect. These two variables were school plant and enrolment. These two factors go hand in hand. The larger the enrolment usually means the better the school facilities, therefore, the better the instruction. It is fairly safe to assume that larger schools have more and better facilities allowing them to offer sounder programs.

Conclusions

This study found that the positive determinants of student achievement in mathematics were socioeconomic status, self-concept of ability, ambition, school plant, and school enrolment. These factors were statistically significant as determinants of mathematics achievement. With the exception of the teacher specialization, all other variables had very little effect on how well students did in mathematics. Teachers who were mathematics specialists were considered to be a positive determinant of student mathematics achievement, though not statistically significant. Reasons for a non-significant relationship were dealt with in the beginning of interpretation of results in Chapter V.

However, everything considered, these findings are very much in line with results reported by similar studies. Extensive studies conducted by Coleman et al. (1966) with a sample of 645,000 American students and involving 3,100 schools, reported similar findings. Averch et al. (1970) in reviewing a number of studies of educational effectiveness, reported the same type of results. These studies, and others, are discussed in the review of literature in Chapter II.

If one were to choose a concluding statement, it would have to be that whether students are going to be high, medium or low achievers in school still very much rests with the quality of the students themselves. Student

backgrounds, their confidence in their abilities, and their aspirations will continue to carry the greater weight in determining their level of academic achievement.

Suggestions for Further Study

1. This study deals only with achievement of students in the area of mathematics. A number of other studies of the same nature could be conducted to determine if such findings as these would repeat themselves for the other subject areas. It is only then that conclusions could be drawn concerning the general achievement of Newfoundland students.

2. In a study similar to this one, numerous factors, in addition to the ones used here, could be used to examine whether or not there are other factors that play a more significant role in the outcome of student achievement. The selection of these factors, however, would have to be supported by related literature.

3. Another study could be conducted to examine the importance of what a teacher does in the area of control, encouragement, grouping, effort, curriculum coverage, etc., as opposed to what a teacher is, which usually involves his/her educational qualifications and experience.

4. Finally there is a need for longitudinal designs where the data can be aggregated at the level of the classroom. This would enable the researcher to assess the impact of entry behaviors (prior achievements and attitudes) on later outcomes. It would also permit more accurate assessment of the influence of the teaching quality and the students' opportunity to learn — important factors which were not considered in the present study.

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APPENDIX A

APR 23 1982

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Department of Educational Administration

Telex: 016-4101
Telephone: (709) 737-7647/8

April 22, 1982

Dr. Ishmael Baksh
Head
Department of Educational Foundations

Dear Dr. Baksh:

I am pleased to grant Mr. Brian Winsor permission to reproduce our questionnaire on school facilities for use in his thesis. Please extend to him my best wishes for success in his work.

Yours sincerely,

P.J. Warren
Professor
Department of Educational Administration

PJW
/dj

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MAY 04 1982

April 26, 1982

TO: Dr. Ishmael J. Baksh
Head, Department of Educational Foundations

FROM: G.L. Parsons, Educational Administration

SUBJECT: Permission to Reproduce Questionnaire

This is to certify that Mr. Brian Winsor is hereby granted permission to reproduce the questionnaire "Career Decisions of Newfoundland Youth" in his thesis entitled "Teacher Qualifications As Predictors of Student Achievement in Mathematics".

G. Llewellyn Parsons
Professor

GLP/mk

GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
DEPARTMENT OF EDUCATION

P.O. BOX 4750
ST. JOHN'S, NFLD.
A1C 5T7

May 4th., 1982.

Dr. Ishmael J. Baksh,
Head,
Department of Educational Foundations,
Memorial University of Newfoundland,
St. John's, Nfld.
A1C 5S7.

Dear Dr. Baksh:

As per your recent request, I am pleased to enclose two copies of the "Educational Staff Record".

I am also pleased to give permission for Mr. Brian Winsor to include a copy of this form in his thesis.

Yours sincerely,

B.T. Fradsham, Ed.D.,
Director of School Services.

BTF:mff

Encl.

APPENDIX A

PLEASE NOTE

THIS QUESTIONNAIRE IS TO BE ANSWERED BY THE PRINCIPAL OR TEACHER-IN-CHARGE. IF YOUR SCHOOL CONSISTS OF MORE THAN ONE BUILDING UNDER YOUR CONTROL, NOT INCLUDING "TEMPORARY" OR "TRAILER-TYPE" STRUCTURES, PLEASE COMPLETE A SEPARATE QUESTIONNAIRE FOR EACH BUILDING. (PHONE "COLLECT" FOR ADDITIONAL QUESTIONNAIRES.)

****

INSTRUCTIONS

You are requested to answer all sections of this questionnaire.

Your early reply is essential, but accuracy is also important. A pre-stamped return envelope is included for your convenience.

Many of the questions that follow can be answered by checking. Please check (✓) in the space provided, where applicable. N/A indicates that the question is not applicable to your situation.

In some instances a comment is requested - or you may desire to make a comment. Please be as lavish with comments as possible.

If you have any difficulties please call the telephone number shown on the cover sheet.

Thank you for your cooperation!

P. J. Warren
R. D. Fisher

SECTION I: IDENTIFICATION AND LOCATION

1. Full name of school district (Print) _____

2. Type of district (Check one) ☐ R.C. ☐ Integ. ☐ Pent. ☐ S.D. Advent.

3. YOUR NAME, TITLE (Print) _____ Name _____ Title

4. Full name of your school (Print) _____

5. Name of community in which school is located (Print) _____

6. Full P.O. address of your school (Print) _____

7. Your telephone numbers _____ School _____ Home

8. Name of district superintendent (Print) _____

9. How many regular classrooms are contained in the structure? (Include all areas in which instruction is or may be given. Include labs and other similar areas in which instruction is given. Do not include temporarily used spaces.) _____

10. How many students are enrolled in your school by grades?

Grades:	K	1	2	3	4	5	6
Enrol:							

Grades:	7	8	9	10	11	12	oppt. classes
Enrol:							-

Total Enrollment - ☐

11. How is your school classified?

a. ____ Primary
b. ____ Elementary
c. ____ Junior High
d. ____ Central High
e. ____ Regional High
f. ____ All-grade
g. ____ Other (Please write in) _____

12. How many full-time teachers are there in your school? (Count yourself if you teach half-time or more.) _____

13. What is the actual, average pupil/teacher ratio of your classrooms during periods of instruction? (Do not use non-teaching personnel in this calculation.)

_____ Average P/T Ratio

14. How many classes do you have in your school within each of the following pupil/teacher ratio ranges?

	No. of classes		No. of classe
a. Less than 20	____	d. 30 to 34	____
b. 20 to 24	____	e. 35 to 39	____
c. 25 to 29	____	f. 40 and over	____

SECTION II: BUILDING SYSTEMS

Electrical Services

15. Is your school wired for electricity?

Yes ☐ No ☐

If "yes", what is the present adequacy of electrical power syst (e.g. from the standpoints of numbers of electrical outlets, blowing of fuses, etc.)

Good ☐
Fair ☐
Poor ☐

16. Is auxiliary power available for the building in the event of power failure?

Yes ☐ No ☐

17. What kind of lighting does your school have? (Check appropriate blank or blanks.)

Incandescent ☐
Fluorescent ☐
Non-electric ☐
Mixture of incandescent/fluorescent ☐

If mixed or non-electric, please explain _____

18. In your opinion is there sufficient artificial lighting in all classrooms?

Yes ☐ No ☐

If "no", please explain _____

19. Is there sufficient lighting in non-instructional spaces? (i.e. office, cafeteria.)

Yes ☐ No ☐

20. Are there emergency lighting units located in your school?

Yes ☐ No ☐

Heating, Airconditioning, and Ventilation

21. How is your school heated?

Central heating ☐ Individual space heaters ☐

22. Does the school have some form of mechanical ventilation?

Yes ☐ No ☐

23. Does moisture collect on window panes in classrooms in the winter?

Yes ☐ No ☐

24. Is the heating system designed to provide for

	Yes	No
(a) partial use of the building?	☐	☐
(b) different heat requirements in separate zones of building?	☐	☐
(c) separate thermostatic regulation of temperature in each learning space and classroom?	☐	☐

25. What type of fuel is used to heat your building? (If "combination", also check fuels used.)

Oil	☐	Wood	☐
Coal	☐	Gas	☐
Electricity	☐	Combination	☐

26. In your opinion how adequate, from a comfort standpoint, is the heating system? (Please comment.)

_____

_____

27. For each of the following facilities which your school has, check "Yes" or "No" to indicate whether airconditioning (refrigerated cooling) is included.

	Yes	No	N/A
(a) Classrooms	☐	☐	
(b) Gymnasium	☐	☐	☐
(c) Cafeteria	☐	☐	☐
(d) Auditorium	☐	☐	☐
(e) Library	☐	☐	☐

(f) Other airconditioned spaces (specify)

_____

_____

Fresh Water Plumbing

28. How many drinking fountains are provided in your school? _____

29. Are washing facilities (sinks) provided for pupils?

Yes ☐ No ☐

30. Is hot water piped to the sinks?

All ☐ Some ☐ None ☐

If "some", please explain _____

_____

31. In your opinion, what is the present physical condition of the fresh water plumbing? (i.e., condition of pipes, taps and pumps.)

Adequate ☐
Fair ☐
Poor ☐

If "fair" or "poor" please explain _____

_____

32. What is the source of the school's water supply?

Well ☐
Cistern ☐
City Mains ☐
Other (Specify) ☐ _____

33. In your opinion is the water supply adequate for the needs of your school?

Yes ☐ No ☐

If "no", please explain _____

_____

34. Is the water pressure adequate?

Yes ☐ No ☐

If "no", please explain _____

_____

35. Has the water supply ever been tested as to whether it is safe to drink?

Yes ☐ No ☐

If "yes", when was it last tested? _____ (year)

Toilets

36. Where are the toilets located?

Indoors ☐ Outdoors ☐

37. If located indoors, are toilet facilities provided

	Yes	No
(a) on each floor where instruction is given?	☐	☐
(b) separately for staff?	☐	☐

38. Are entrances, windows, and facilities of all toilet rooms shielded for privacy?

Yes ☐ No ☐

If "no", please explain _____

_____

39. What kind of toilets does your school have?

Flush ☐ Non-flush ☐ Bucket-a-day ☐

40. Are there enough toilet bowls?

Yes ☐ No ☐

41. Are there enough urinals?

Yes ☐ No ☐

42. In your opinion, what is the present physical condition of the toilets, including both rooms and facilities?

Good ☐
Fair ☐
Poor ☐

If "fair" or "poor", please explain _____

_____

Communications

43. Does your school have an electric bell or buzzer system to signal class changes, etc.?

Yes ☐ No ☐

44. For each telephone in the school, state the location and the people who normally use it. If none, so state.

Location	Normally used by Teachers	pupils
1. _____	☐	☐
2. _____	☐	☐
3. _____	☐	☐

45. Does your school have an inter-communication system?

Yes ☐ No ☐

46. Does your school have a public address system in the auditorium or other large assembly area?

Yes ☐ No ☐

Fire Protection

47. Does your school have a special fire alarm device or system separate from other signal systems?

Yes ☐ No ☐

48. Does your school have lighted signs to designate exits?

Yes ☐ No ☐

49. Does your school have exit signs other than lighted signs?

Yes ☐ No ☐

50. Do the exit doors of your school have "panic" hardware? (i.e., crash bars.)

Yes ☐ No ☐ Some ☐

If "some", please explain _____

51. In your opinion does your school have safe and adequate numbers of fire exits?

Yes ☐ No ☐

If "no", please explain _____

52. Do all the exterior doors of your school open outward?

Yes ☐ No ☐

If "no", please explain _____

53. Are all corridors and stairways made of fire resistant materials?

Yes ☐ No ☐

If "no", please explain _____

54. Does your school have an automatic fire sprinkler system?

Yes ☐ No ☐

55. If your school has more than one storey, are fire escapes or other escape devices provided?

Yes ☐ No ☐ N/A ☐

56. Does your school have fire extinguishers? How many?

Yes ☐ No ☐ Quantity ☐

57. Are fire extinguishers checked and recharged periodically? (At least once a year.)

Yes ☐ No ☐

58. If "yes", when were your fire extinguishers last checked or tested? _____

59. Does your school have fire hoses connected to a water supply?

Yes ☐ No ☐

60. To your knowledge, has your school ever been inspected for fire safety by a member of the fire department or other inspection agency?

Yes ☐ No ☐

If "yes", please state month and year _____

61. Are automatic fire detectors installed in areas in which fires would be most likely to originate? (i.e. furnace rooms, custodial lockers, and kitchens.)

Yes ☐ No ☐

	Yes	No	N/A
62. Do <u>all</u> exit doors open outwards?	☐	☐	
63. Does the furnace room have a <u>direct</u> outside entrance?	☐	☐	☐
64. Are the walls, floor and ceiling of the furnace room made of non-combustible materials?	☐	☐	☐

Comment _____

65. Is the interior door of the furnace room of all-metal construction or completely faced with non-combustible material?	☐	☐	☐
66. Is the interior furnace room door furnished with an automatic closer?	☐	☐	☐
67. Does every room have direct access to main corridors?	☐	☐	
68. Are corridors free from obstructions and dead-ends?	☐	☐	
69. If the stage in your auditorium is equipped with the following, are they fire-proof or have they been treated for fire resistance? (Use N/A if you have no stage, or none of the equipment mentioned.)			
(a) curtains	☐	☐	☐
(b) drapes	☐	☐	☐

70. Can the fire alarm be sounded from

	Yes	No
(a) at least one location in the corridor of each floor?		
(b) the principal's office?		
(c) the janitor's quarters?		
(d) the heating plant area?		

SECTION III: STRUCTURAL CHARACTERISTICS

Interior Wall Finish

71. From what materials are the interior walls of the building finished? (Check appropriate item(s) and describe on reverse.)

- wood covered ☐
- fibreboard ☐
- metal ☐
- plasterboard ☐
- plaster ☐
- concrete ☐
- Other (Describe on reverse side)

Windows

72. From what material are the window frames constructed?

Wood ☐ Aluminium ☐ Steel ☐

73. Is a "safety-type" of window glass used where glass breakage might be a hazard to students? (i.e., wire-reinforced, tempered.)

Yes ☐ No ☐ Don't know ☐

74. In your opinion, are the windows of a proper quantity and size to provide adequate amounts of natural light?

Yes ☐ No ☐

75. Are the operable windows in the school functioning properly?

Yes ☐ No ☐

Interior Stairways

76. From what material are the interior stairways constructed?

Wood ☐ Metal ☐ Concrete ☐

77. Are the interior stairways non-skid treated?

Yes ☐ No ☐

78. Are handrails provided for the interior stairs?

Yes ☐ No ☐

Exterior Stairways

79. From what material are the exterior stairways constructed?

Wood ☐ Metal ☐ Concrete ☐

80. Are handrails provided for the exterio stairs?

Yes ☐ No ☐

81. Are the exterior stairways non-skid treated?

Yes ☐ No ☐

General

82. How many storeys does the building have? (Do not count basement.)

One ☐ If more, specify ☐

83. Does the school have a basement?

Yes ☐ No ☐

If "yes", and it is used for instruction, please explain its instructional usage(s) _____

84. Is your school a "prefabricated" unit? (e.g. factory produced, trailer.)

Yes ☐ No ☐ Partially ☐

If "yes", or "partial", please explain _____

85. In the table below state the basic flooring material, the condition of the flooring, and the type and condition of the floor covering.

Space	Basic Floor: Type of floor (softwood, hardwood, marble, terrazo, concrete)	Basic Floor: Condition of floor (good, fair, poor)	Covering: Type of floor covering (bare, tile, "linoleum", carpet or N/A)	Covering: Condition of floor covering (good, fair, poor)
a) General instructional spaces				
b) Gymnasium				
c) Auditorium				
d) Library/study areas				
e) Corridors				

86. Please provide information on seating capacities of various facilities, number of lockers and pupils transported.

	Approx. number	N/A
(a) seating capacity of library?	____	☐
(b) seating capacity of auditorium?	____	☐
(c) number who eat lunch at school?	____	☐
(d) seating capacity of cafeteria or dining room?	____	☐
(e) spectator capacity of gymnasium for athletic events?	____	☐
(f) number of student lockers (exclusive of physical education lockers)?	____	
(g) number of pupils transported to this building at board expense?	____	

SECTION IV: FACILITIES INVENTORY

87. Does your school have the following rooms or facilities? (✓Check "yes" or "no". Make a comment if you wish.)

	Yes	No	Comment
a. Pre-kindergarten	____	____	_____
b. Kindergarten	____	____	_____
c. Home Economics	____	____	_____
d. Industrial Arts	____	____	_____
e. Library and/or Instructional Materials Center	____	____	_____
f. Health Room	____	____	_____
g. Chemistry Lab*	____	____	_____
h. Physics Lab*	____	____	_____
i. Biology Lab*	____	____	_____
j. All-Purpose Science Room	____	____	_____
k. Music Room	____	____	_____
l. Art Room	____	____	_____
m. Business Education	____	____	_____
n. Principal's Office	____	____	_____
o. Vice-Principal's Office	____	____	_____
p. Secretarial Office	____	____	_____
q. Gymnasium	____	____	_____

* Please comment if one room serves multi-laboratory purposes

_____

_____

	Yes	No	Comment
r. Separate Auditorium			
s. Cafeteria or lunchroom			
t. Staff Room (lounge)			
u. Staff Work Room(s)			
v. Staff Toilets			
w. Caretaker's Room(s)			
x. Audio-Visual Storage Room			
y. Storage Room for School Supplies			
z. Storage Room for Sports Equipment			
aa. Pupil Lockers (State with or without doors)			
bb. Language Laboratory			
cc. Guidance Room or Suite			
dd. Pupil Showers (Comment on Adequacy)			
ee. Swimming Pool			
ff. Community Meeting Rooms			
gg. "Opportunity" Class Room(s)			
hh. Stage			
ii. Handwashing Sinks for pupils			
jj. Fuel Storage Room			
kk. Superintendent's Office			
ll. Business Manager's Office			
mm. Supervisor's Office			
nn. Automobile/Bus Electrical Heater Connections			
oo. Emergency or Standby Electric Power			
pp. Kitchen			

	Yes	No	Comment
qq. Automatic Hot Water Supply	____	____	_____
rr. Fire Extinguishers	____	____	_____
ss. "Panic" Type Exit Door Hardware	____	____	_____
tt. Special Fire Bells	____	____	_____
uu. Inter-Communication System	____	____	_____
vv. Drinking Fountain(s) (State Quantity)	____	____	Quantity: _____
ww. Ice Skating Rink	____	____	_____

SECTION V: EXEMPLARY FACILITIES

88. Some buildings have both good and bad features. We wish to identify highly outstanding features that your building might have. From the point of view of such factors as program adequacy, flexibility, list those special features or portions of your building which you consider to possess excellent potential, and indicate in what particular respect(s): (If none, so state.)

Outstanding Features	Comment
1.	
2.	
3.	
4.	
5.	

SECTION VI: AGE, CAPACITY, SITE, SAFETY AND COMMUNITY USAGE

Age

89. Fill in the blanks below to the best of your knowledge. (Estimate if necessary.)

	Date of Construction	Number of Classrooms	Fire resistant (Yes or No)
Original Building			
Addition			
Addition			
Addition			
Addition			
Addition			

Capacity

90. In your opinion, how many students can the building accommodate adequately with the present program? (i.e. providing adequate space for desirable class scheduling with an appropriate pupil - teacher ratio)? _____ students

Site

91. A school site is defined to be the land upon which the school is built, together with the surrounding related areas such as parking areas, playgrounds, ball-fields, etc. Estimate below the approximate acreage of your school site. (One acre equals 43,560 sq. ft., or it can be visualized as a square plot of ground measuring approximately 210 feet on each side.)

_____ acres

92. Is additional land available for expansion adjacent to the site?

Yes ☐ No ☐

93. Is the land adjacent to the school site free from undesirable physical and cultural features? (i.e., ponds, streams, railway tracks, barns, service stations, etc.)

Yes ☐ No ☐

If "no", please explain _____

94. All things considered, from the standpoints of safety, health, and program requirements, do you consider the school site to be adequate?

Yes ☐ No ☐

95. If the answer to Item 94 is "no", please elaborate below.

Safety

96. Is student pedestrian traffic to the school controlled by (Check N/A if not necessary.)

	Yes	No	N/A
(a) crosswalks?			
(b) traffic lights?			
(c) directly by police or other adults?			

97. Are play areas fenced where they border streets, streams, or other hazardous areas? | | | |

98. If the school is in more than one building on one site, are provisions made for protection of students from weather or dangerous traffic if they must move between buildings? | | | |

99. Have provisions been made to minimize slipping on

(a) walking surfaces exposed to rain?			
(b) stair treads?			
(c) floors in kitchens?			
(d) shower and/or lavatory areas?			

Community Usage

100. Is your school used by community groups during school hours?

Yes ☐ No ☐

If "yes", please complete the table below. (See "note" below.)

Name of Group	Average No. of Users	Type of Activity	Rooms used (i.e. auditorium)	Frequency per month	Total No. of hours per month
1.					
2.					
3.					
4.					
5.					
6.					
7.					

Note: Some schools are used occasionally for special or infrequent community events such as wedding receptions, political meetings, etc. If such is the case with your school, please list and note "infrequent" in the frequency column.

101. Is your school used by community groups <u>after</u> school hours and on the weekends? (See "note" at bottom of previous page.)

Yes ☐ No ☐

If "yes", please complete the table below.

Name of Group	Average No. of Users	Type of Activity	Rooms used (i.e. auditorium)	Frequency per month	Total No. of hours per month
1.					
2.					
3.					
4.					
5.					
6.					
7.					

102. Do you have any facilities or rooms in your school that are for the <u>exclusive</u> use of a community group?

Yes ☐ No ☐

If "yes", please identify the group and explain the circumstances.

_____

_____

103. Do you have requests for community use of your school that you find necessary to refuse?

Yes ☐ No ☐

If "yes", please explain the circumstances. _____

_____

_____

104. Are there certain types of facilities or rooms which you would like to have in your school in order to improve your capability to service the requests of community groups?

Yes ☐ No ☐

If "yes", please explain below.

_____

_____

_____

105. Sometimes community usage of school property poses significant problems for school principals. If you have such problems we would like for you to describe them briefly below. If there are no significant problems, please state "No problems".

SECTION VII: PRINCIPAL'S OVERALL EVALUATION

106. In your opinion which statement below best describes the building from the standpoint of overall physical condition?

	✓ Check one only
(a) It is in excellent condition	____
(b) It is in good condition	____
(c) It is in fairly good condition	____
(d) It is in fair or average condition	1
(e) It is in bad condition but would be usable if minor expenditures were made	____
(f) It is in bad condition but would be usable if major expenditures were made	____
(g) It is in bad condition and should be replaced	____

107. Indicate below, your opinions regarding the major needs for improvement of this building. Continue on the back of this page if necessary.

108. On this sheet, list every room used or designed for use for instructional purposes, offices, clinics, restrooms, or other pupil or teacher facilities. Omit small auxiliary rooms such as a storage room for a science laboratory. Omit boiler rooms and other rooms used solely for building operation and maintenance. (If in doubt, list the room.)

Room No. or name	On which floor	Dimensions in feet (length, width)	Suitable for classrooms (yes or no)	Present use	Remarks

Continue table on back of page if necessary.

CAREER DECISIONS OF NEWFOUNDLAND YOUTH

Post-secondary schools, such as universities, institutes of technology, trade schools, and the like, need to plan ahead to be able to provide for the needs of the students who go there. What we are trying to do here is help them in their planning for the 1974-75 year. To do this we need to know what this year's grade eleven students intend to do in 1974-75. Please answer the questions set out below to the best of your knowledge. By so doing, you will help the post-secondary schools in Newfoundland plan for the best education of the students who arrive in 1974-75.

* * * * * * * * *

ALL THE INFORMATION YOU PROVIDE HERE WILL BE COMPLETLY CONFIDENTIAL. THE ANSWERS YOU GIVE WILL BE USED FOR RESEARCH PURPOSES ONLY. NO INDIVIDUAL WILL EVER BE IDENTIFIED BY NAME. YOUR NAME WILL NEVER BE REVEALED.

The value of this research could be increased ten-fold if the information you provide here could be added to some time in the future. For example, in addition to knowing what all grade eleven students in Newfoundland plan to do in 1974-75, it would be very valuable to know what they actually did when the time came. We could get this information a year from now, and even more information in subsequent years. Research of this sort provides a factual basis on which to formulate policy concerning the educational and occupational careers of this Province's youth.

You need not give your name and birthdate. But, to be able to add to the information you provide here we need to have your name and birthdate in order to match this information with subsequent data. Unless you have any strong objections would you please give us this information in the space provided below. Your name and birthdate would remain completely confidential information, and would be used only to add data to what you have already provided.

To keep this questionnaire confidential seal it in the envelope provided when it is completed. No one, other than the research personnel on this project, will ever see it.

NAME: _____ _____ _____
SURNAME FIRST NAME SECOND NAME

DATE OF BIRTH: _____ _____ _____
DAY MONTH YEAR

1. SEX

male	☐ 1
female	☐ 2

2. WHAT ARE YOUR PARENTS' OCCUPATIONS? (Please read all classifications before answering. Check the occupational group that best describes his/her job.)

	father	mother
Owner/manager of a large business (e.g. employs three or more people)	☐ 1	☐ 1
Owner/manager of a small business (e.g. employs less than three people)	☐ 2	☐ 2
Professional/technical (e.g., lawyer, doctor, teacher, etc.)	☐ 3	☐ 3
Clerical (e.g., clerk, bookkeeper, office worker, etc.)	☐ 4	☐ 4
Home duties (housewife)	☐ 5	☐ 5
Sales (e.g., insurance, real estate salesman, etc.)	☐ 6	☐ 6
Service and recreation (e.g., policeman, cook, barber, etc.)	☐ 7	☐ 7
Transport and communication (e.g., bus driver, radio announcer)	☐ 8	☐ 8
Fishing	☐ 9	☐ 9
Farmers and farm workers (e.g., farmer, farm laborer, etc.)	☐10	☐10
Logging and mining (e.g., lumberman, miner etc.)	☐11	☐11
Craftsman (e.g., carpenter, plumber, electrician, machinist, etc.)	☐12	☐12
Laborer (e.g., construction laborer, etc.)	☐13	☐13
Unemployed	☐14	☐14
Other (Please specify): father _____	☐15	☐15
mother _____	☐16	☐16
Deceased	☐17	☐17

3. HOW MUCH UNEMPLOYMENT, IF ANY, HAVE YOUR PARENTS EXPERIENCED OVER THE PAST TWO OR THREE YEARS?

	father	mother
none at all	☐ 1	☐ 1
once or twice for short periods	☐ 2	☐ 2
frequently for short periods	☐ 3	☐ 3
for long periods of time	☐ 4	☐ 4
most of the time	☐ 5	☐ 5
not applicable	☐ 6	☐ 6

4. HOW FAR DID YOUR PARENTS GO IN SCHOOL?

	father	mother
grade five or less	☐ 1	☐ 1
grade six	☐ 2	☐ 2
grade seven	☐ 3	☐ 3
grade eight	☐ 4	☐ 4
grade nine	☐ 5	☐ 5
grade ten	☐ 6	☐ 6
grade eleven	☐ 7	☐ 7
some university	☐ 8	☐ 8
graduated from university	☐ 9	☐ 9
other post-secondary school (e.g., college of fisheries, etc.)	☐10	☐10
post-secondary technical training (e.g., armed forces training, apprenticeship training, etc.)	☐11	☐11
nursing school	☐12	☐12
other (please specify): father _____	☐13	☐13
mother _____	☐14	☐14

5. WHICH OF THE FOLLOWING STATEMENTS DESCRIBES YOUR FAMILY SITUATION?

I live with both my parents	☐ 1
I live with my mother only	☐ 2
I live with my father only	☐ 3
I live with foster parents	☐ 4
Other	☐ 5

6. HOW MANY BROTHERS AND SISTERS DO YOU HAVE?

- none ☐ 1
- one ☐ 2
- two ☐ 3
- three ☐ 4
- four ☐ 5
- five ☐ 6
- six ☐ 7
- seven ☐ 8
- eight or more ☐ 9

7. HOW MANY OF YOUR BROTHERS AND SISTERS ARE OLDER THAN YOU?

- none ☐ 1
- one ☐ 2
- two ☐ 3
- three ☐ 4
- four ☐ 5
- five ☐ 6
- six ☐ 7
- seven ☐ 8
- eight or more ☐ 9

8. HOW MANY OF YOUR BROTHERS AND SISTERS GO TO POST-SECONDARY SCHOOLS (E.G., UNIVERSITY, COLLEGE OF FISHERIES, VOCATIONAL SCHOOLS, ETC.), AND HOW MANY HAVE JOBS?

	university	other post-secondary schools	job
none	☐ 1	☐ 1	☐ 1
one	☐ 2	☐ 2	☐ 2
two	☐ 3	☐ 3	☐ 3
three	☐ 4	☐ 4	☐ 4
four	☐ 5	☐ 5	☐ 5
five	☐ 6	☐ 6	☐ 6
six	☐ 7	☐ 7	☐ 7
seven	☐ 8	☐ 8	☐ 8
eight or more	☐ 9	☐ 9	☐ 9

9. WHICH PROGRAM OF STUDIES ARE YOU ENROLLED IN THIS YEAR?

- Academic ☐ 1
- General ☐ 2

10. HOW MUCH DO YOU KNOW ABOUT THE COURSES OF STUDY AVAILABLE AT EACH OF THE VARIOUS POST-SECONDARY SCHOOLS IN THE PROVINCE? (Circle the appropriate number to indicate your response in each case.)

	nothing				a lot
College of Trades and Technology	1	2	3	4	5
College of Fisheries	1	2	3	4	5
Vocational Schools	1	2	3	4	5
Memorial University	1	2	3	4	5
Other universities (outside the Province)	1	2	3	4	5
Nursing School	1	2	3	4	5
Other (Please specify) _____	1	2	3	4	5

11. HOW MUCH DO YOU KNOW ABOUT THE COSTS INVOLVED IN ATTENDING EACH OF THE VARIOUS POST-SECONDARY SCHOOLS IN THE PROVINCE? (Circle the appropriate number to indicate your response in each case.)

	nothing				a lot
College of Trades and Technology	1	2	3	4	5
College of Fisheries	1	2	3	4	5
Vocational Schools	1	2	3	4	5
Memorial University	1	2	3	4	5
Other Universities (outside the Province)	1	2	3	4	5
Nursing School	1	2	3	4	5
Other (please specify) _____	1	2	3	4	5

12. HOW MUCH DO YOU KNOW ABOUT THE ENTRANCE REQUIREMENTS OF EACH OF THE VARIOUS POST-SECONDARY SCHOOLS IN THE PROVINCE? (Circle the appropriate number to indicate your response in each case.)

	nothing				a lot
College of Trades and Technology	1	2	3	4	5
College of Fisheries	1	2	3	4	5
Vocational Schools	1	2	3	4	5
Memorial University	1	2	3	4	5
Other Universities (outside the Province)	1	2	3	4	5
Nursing School	1	2	3	4	5
Other (please specify) _____	1	2	3	4	5

13. DURING THE NEXT FEW YEARS, HOW EASY DO YOU THINK IT WILL BE FOR GRADUATES OF EACH OF THE SCHOOLS LISTED BELOW TO GET JOBS? (Circle the appropriate number to indicate your response in each case.)

	difficult				easy
College of Trades and Technology	1	2	3	4	5
College of Fisheries	1	2	3	4	5
Vocational Schools	1	2	3	4	5
Memorial University	1	2	3	4	5
Other universities (outside the Province)	1	2	3	4	5
Nursing School	1	2	3	4	5
Other (please specify) _____	1	2	3	4	5

14. DURING THE NEXT FEW YEARS, HOW EASY DO YOU THINK IT WILL BE FOR GRADUATES OF EACH OF THE FOLLOWING UNIVERSITY DEGREE PROGRAMS TO GET JOBS? (Circle the appropriate number to indicate your response in each case.)

	difficult				easy
Bachelor of Arts	1	2	3	4	5
Bachelor of Science	1	2	3	4	5
Bachelor of Commerce	1	2	3	4	5
Bachelor of Nursing	1	2	3	4	5
Bachelor of Physical Education	1	2	3	4	5
Bachelor of Arts (Education) – Primary	1	2	3	4	5
Bachelor of Arts (Education) – Elementary	1	2	3	4	5
Bachelor of Education/Bachelor of Arts	1	2	3	4	5
Bachelor of Education/Bachelor of Physical Education	1	2	3	4	5
Bachelor of Education/Bachelor of Science	1	2	3	4	5
Bachelor of Engineering	1	2	3	4	5
Pre-Forestry	1	2	3	4	5
Bachelor of Medical Science	1	2	3	4	5

15. You have probably heard by now something about the type of environment that exists in the various post-secondary schools in this Province. Consider one aspect of this environment, the ACADEMIC ENVIRONMENT. By this we mean the set of experiences that one would get from participating in the school's educational program. PLEASE RATE THE QUALITY OF THE ACADEMIC ENVIRONMENT OFFERED BY EACH OF THE POST-SECONDARY SCHOOLS LISTED BELOW. (Circle the appropriate number to indicate your response in each case.)

	not so good				very good
College of Trades and Technology	1	2	3	4	5
College of Fisheries	1	2	3	4	5
Vocational Schools	1	2	3	4	5
Memorial University	1	2	3	4	5
Other Universities (outside the Province)	1	2	3	4	5
Nursing School	1	2	3	4	5
Other (please specify) _____	1	2	3	4	5

16. One other major aspect of the school environment is the SOCIAL ENVIRONMENT. By this we mean the set of experiences that one would get from participating in the social life that exists among students at the school. PLEASE RATE THE QUALITY OF THE SOCIAL ENVIRONMENT OFFERED BY EACH OF THE POST-SECONDARY SCHOOLS LISTED BELOW. (Circle the appropriate number to indicate your response in each case.)

	not so good				very good
College of Trades and Technology	1	2	3	4	5
College of Fisheries	1	2	3	4	5
Vocational Schools	1	2	3	4	5
Memorial University	1	2	3	4	5
Other Universities (outside the Province)	1	2	3	4	5
Nursing School	1	2	3	4	5
Other (please specify) _____	1	2	3	4	5

17. Please think about your academic abilities and performances; for example, how well you did in school last year. Then, RATE YOURSELF ALONG EACH OF THE DIMENSIONS LISTED BELOW. (Circle the appropriate number to indicate your response in each case.)

	low				high
Your ability compared with that of your close friends	1	2	3	4	5
Your ability compared with other members of your school class	1	2	3	4	5
Your ability to complete a university degree	1	2	3	4	5
Your ability to complete a post-graduate university degree like an M.A.	1	2	3	4	5
The quality of your own work at present	1	2	3	4	5
The kind of grades (marks) you are capable of getting	1	2	3	4	5

18. PLEASE INDICATE THE EXTENT TO WHICH YOU AGREE WITH EACH OF THE FOLLOWING STATEMENTS. (Circle the appropriate number to indicate your response in each case.)

	strongly agree				strongly disagree
Knowing the right people is important in deciding whether a person will get ahead	1	2	3	4	5
When I make plans I am almost certain that I can make them work	1	2	3	4	5
Becoming a success is a matter of hard work, luck has little or nothing to do with it	1	2	3	4	5
As far as world affairs are concerned, most of us are victims of forces we can neither understand nor control	1	2	3	4	5
There will always be wars, no matter how hard people try to prevent them	1	2	3	4	5
This world is run by the few people in power and there is not much the little guy can do about it	1	2	3	4	5

23. HOW IMPORTANT WAS EACH OF THE FOLLOWING IN HELPING YOU DECIDE ON WHICH POST-SECONDARY SCHOOL YOU WILL ATTEND IN 1974-75? (Circle the appropriate number to show how important each influence was.)

	not important				very important
The school is close to my home	1	2	3	4	5
My parents advised me to go there	1	2	3	4	5
The school offers courses that interest me	1	2	3	4	5
Most of my friends will be going there	1	2	3	4	5
Financial considerations	1	2	3	4	5
The school will give me the job qualifications I need	1	2	3	4	5
I can get paid to attend that school	1	2	3	4	5
Teachers and/or guidance counsellors advised me to go there	1	2	3	4	5
Graduates from that school can get jobs easily	1	2	3	4	5
Advice from friends at university	1	2	3	4	5
Advice from friends at other post-secondary schools	1	2	3	4	5
The job market for university graduates	1	2	3	4	5
The shorter period of training	1	2	3	4	5
The money I will earn when I graduate	1	2	3	4	5
I can find accommodation with relatives or family friends	1	2	3	4	5
Other family members or relatives attended that school	1	2	3	4	5
Information provided by the mass media (e.g., T.V., radio, newspapers, etc.)	1	2	3	4	5
Information provided by personnel from post-secondary schools	1	2	3	4	5
Other (please specify) _____	1	2	3	4	5
Other (please specify) _____	1	2	3	4	5
Other (please specify) _____	1	2	3	4	5

24. PLEASE INDICATE APPROXIMATELY HOW MUCH OF YOUR TOTAL FINANCIAL SUPPORT FOR NEXT YEAR (1974-75) WILL COME FROM EACH OF THE SOURCES LISTED BELOW. (Circle the appropriate number to indicate your response in each case.)

	nothing				all
Parents	1	2	3	4	5
Other family members or relatives	1	2	3	4	5
Summer job or part-time job during year	1	2	3	4	5
Scholarship or bursary	1	2	3	4	5
Canada Student Loan	1	2	3	4	5
Other (please specify) _____	1	2	3	4	5

25. IF THERE ARE ANY REMARKS YOU WOULD CARE TO MAKE—REMARKS RELEVANT TO THE MATTER OF CAREER DECISIONS—PLEASE NOTE THESE DOWN IN THE SPACE BELOW.

THANK YOU. THAT'S ALL. PLEASE CHECK YOUR ANSWERS, THEN SEAL THE QUESTIONNAIRE IN THE ENVELOPE PROVIDED.

EDUCATIONAL STAFF RECORD

H

DO NOT PRINT IN SHADED AREAS. FOR CORRECTIONS, DRAW A LINE THROUGH THE ERROR AND PRINT YOUR RESPONSE IN THE UNSHADED SPACE PROVIDED.

1. Province or Territory / *Province ou Territoire* | District | School - *École*

2. Surname - *Nom de famille* | First name and initial / *Prénom et initiale*

3. Social insurance number / *Numéro d'assurance sociale*

4. Year of birth / *Année de naissance* — 19 _ _

5. Sex / *Sexe* — M 1 / F 2

6. **Salary Factors — *Facteurs salariaux***

a) Present teaching certificate, licence or permit. / *Certificat d'enseignement, brevet ou permis détenus.*

b) Number of years service approved for **salary scale purposes.** – *Nombre d'années de service approuvées servant à déterminer votre échelle salariale.*

0	1	2	3	4	5	6	7	8	9	10	11	12

c) If employment is part-time, indicate as a % of full-time. / *Si l'emploi est à temps partiel, indiquez la charge de travail comme un % d'une charge à temps plein.* — _ _ %

d) ANNUAL salary (to nearest dollar) at rate applicable Sept. 30. / *Traitement ANNUEL (arrondir au dollar près) au taux du 30 sept.*

Basic scale - *Échelle de base*	$
Allowances - *Allocations spéciales*	$
Total	$

7. **Indicate the Province or Territory in Canada** (or country if outside Canada) where you received:
Indiquez la province ou le territoire (si au Canada), le pays (si à l'extérieur du Canada) où vous avez reçu:

Your initial teaching certificate: *Votre premier certificat d'enseignement:*	
Your initial teacher education: *Votre première formation de maître:*	

8. Degrees (Code from list 3 on back) / *Grades universitaires (Codez suivant la liste 3 au verso).*
If you have one degree complete only the first line.
Si vous n'avez qu'un seul grade universitaire, n'utilisez que la première ligne.

	Degree code / *Code du grade*	Degree abbreviation / *Abréviation du grade*	Year obtained / *Année d'obtention*	**Name of Canadian University** (or country where obtained if outside Canada) - ***Nom de l'université canadienne*** *(ou pays d'obtention du grade si à l'extérieur du Canada)*
First / ***Premier***			19	
Highest / ***Plus élevé***			19	
Most recent / ***Plus récent***			19	

9. Using lists 1 and 2 on the back of this document, code the major subject areas or fields in which you have completed the equivalent of 3 or more full year university courses and specify the number of courses for each **MAJOR SUBJECT AREA** (1 full course = 2 semester courses = 3 units = 6 semester hours = 9 quarter hours). If your subject area is not listed, print response in the unshaded area.

En employant les listes 1 et 2 au verso de ce document, inscrivez le code du principal sujet ou domaine dans lequel vous avez complété l'équivalent d'au moins 3 cours universitaires complets et précisez le nombre de cours pour chaque ***PRINCIPAL DOMAINE D'ÉTUDES*** *(1 cours complet = 2 cours semestriels = 3 unités = 6 heures semestre = 9 heures trimestre.) Si votre sujet ne figure pas sur les listes, inscrivez votre réponse en lettres moulées dans l'espace blanc.*

Code	No. of courses completed / *Nombre de cours complétés*	PRINT SUBJECT AREA (if not in list 1 or 2) / *ÉCRIVEZ EN LETTRES MOULÉES LE PRINCIPAL DOMAINE D'ÉTUDES (si non inclus dans la liste 1 ou 2).*

10. Years of **teaching experience** as of last June.
Années d'expérience à la fin de juin dernier.

NOTE: 10 months teaching = 1 year
(Report to the nearest full year).

NOTE: *Une année scolaire = 10 mois d'enseignement (Arrondissez à une année près).*

This board / *Présents commission scolaire*	Elsewhere in this province / *Ailleurs dans cette province*	Outside this province / *À l'extérieur de cette province*	Total
Years / *Années*	Years / *Années*	Years / *Années*	Years / *Années*

11. MAJOR ACTIVITY OR OCCUPATION LAST SCHOOL YEAR - check (✓) one only
POSTE OU ACTIVITÉ PRINCIPALE PENDANT LA DERNIÈRE ANNÉE SCOLAIRE - *cochez (✓) une case seulement.*

Teaching - *Enseignement*
For your present school district
Pour votre district scolaire actuel ____ 01

Elsewhere in this province or territory
Ailleurs dans cette province ou territoire

- In another school district
  Dans un autre district scolaire ____ 02
- In a private school
  Dans une école privée ____ 03

Outside this province or territory (specify below)*
*À l'extérieur de cette province ou territoire (précisez plus bas)** ____ 04

Attending university or other post-secondary institution
Fréquentation d'une université ou d'un établissement postsecondaire

- In this province or territory
  Dans cette province ou territoire ____ 05
- Outside this province or territory (specify below)*
  *A l'extérieur de cette province ou territoire (précisez plus bas)** ____ 06

Other (specify)
Autre (préciser) ____ 09

NOTE ▶ * IF YOU CHECKED ONE OF CODES 04 OR 06, please state province (or country, if outside Canada).
* *SI VOUS AVEZ COCHÉ LES CODES 04 OU 06, veuillez préciser la province (ou le pays si à l'extérieur du Canada).*

12. Indicate the percentage of YOUR school week assigned to (no decimal places): - *Indiquez en chiffres ronds le pourcentage de VOTRE semaine scolaire assigné à:*

Note: Do not include yard duty, extra curricular activities, etc.
Note: *N'incluez pas les activités de plein air, les activités parascolaires, etc . . .*

Teaching — *L'enseignement*	%
Library — *La bibliothèque*	%
Supervision of study periods — *La surveillance des périodes d'études*	%
Counselling — *L'orientation*	%
Administration and supervision of instruction — *L'administration et supervision de l'enseignement*	%
Time free of above duties — *Au temps libre des devoirs précités*	%
Total	100 %

13. a) Indicate in which of the following grade groupings you teach and/or supervise the majority of your time.

Indiquez dans lequel des groupes suivants vous enseignez et/ou supervisez la majorité de votre temps.

Kindergarten to 8
Maternelle à la 8e année ____ 1

Grade 9-12
9e à 12e année ____ 2

b) IF YOU TEACH any grades K, 1 to 6 or elementary special, check (✓) the grade levels of students you teach. *SI VOUS ENSEIGNEZ aux classes de M-1ère à la 6e année ou à des classes élémentaires spéciales, cochez le niveau où vous enseignez.*

K/M	1	2	3	4	5	6	Spec.

14. CLASS SIZE — *GRANDEUR DE LA CLASSE*

a) If you spend any of your time teaching grades K-6 or elementary special give the enrolment of the elementary class you teach most often. / *Si vous consacrez une partie de votre temps aux classes de M à 6e année ou aux classes spéciales à l'élémentaire, indiquez l'inscription de la classe où vous enseignez le plus souvent.*

b) If you teach any classes above grade 6, provide information on **EACH CLASS SEPARATELY.** If you teach the same group of children two or more subjects, treat each as a separate class. If you teach a multigrade class, code the grade as 90. An **example is given on the reverse side of this document.**
Si vous enseignez à un niveau supérieur à la sixième année, donnez l'information ***SUR CHAQUE CLASSE SÉPARÉMENT.*** *Si vous enseignez 2 sujets ou plus au même groupe, considérez les comme des classes différentes. Si vous enseignez une classe à niveaux multiples codez 90 pour l'année. Un* ***exemple est donné au verso de ce document.***

Class / *Classe*	Enrolment / *Inscription*	Subject code (See lists 1 and 2 on back) / *Code de la discipline (voir liste 1 et 2 au verso)*	Grade / *Année* (code multigrade class 90) / *(codez 90 pour une classe à niveaux multiples)*	% of school week* assigned to class / *% de la semaine d'enseignement* assigné à la classe*
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

*Note: 1/6 = 17 %
1/7 = 14 %
1/8 = 13 %
1/9 = 11 %

Round to the nearest whole number.
Total should not exceed % reported under teaching in question 12.

Arrondissez au nombre entier le plus près.
Le total ne doit pas dépasser le % rapporté sous la rubrique enseignement à la question 12.

15. Indicate in which official language you prefer your questionnaire to be preprinted next year.

English 1

Indiquez dans quelle langue officielle préférez-vous que votre questionnaire soit préimprimé l'an prochain.

Français 2