

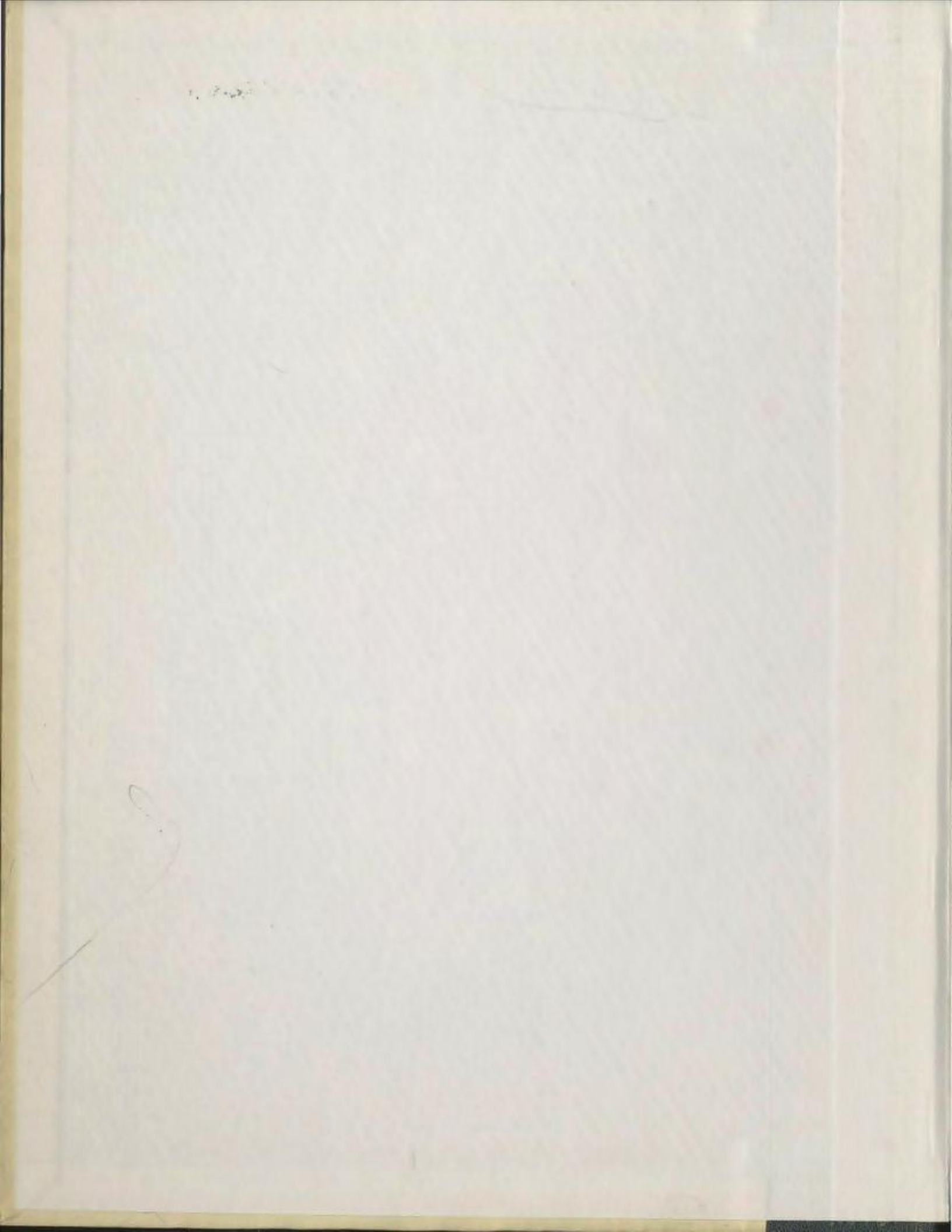
DISCRIMINANT ANALYSIS BETWEEN DROPOUTS AND NON-DROPOUTS
IN NEWFOUNDLAND

CENTRE FOR NEWFOUNDLAND STUDIES

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DISCRIMINANT ANALYSIS BETWEEN DROPOUTS AND
NON-DROPOUTS IN NEWFOUNDLAND

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ABSTRACT

DISCRIMINANT ANALYSIS BETWEEN DROPOUTS AND NON-DROPOUTS IN NEWFOUNDLAND

Terence L. Stack

The purpose of this study was to develop a model which could be used in the identification and prediction of potential school dropouts. This model has attempted to determine the extent to which certain selected variables studied could all be used by schools in the future, special instrumentation was avoided.

The variables used were the five Canadian Test of Basic Skills subtests Vocabulary, Reading Comprehension, English Usage, Mathematical Concepts, and Mathematical Problem Solving; school achievement in the form of grade average and overage variables; the two mental ability variables of verbal and non-verbal IQ from the Canadian Lorge-Thorndike Group Intelligence Test; father's occupational level; mother's level of education and father's level of education; number of natural parents in the home; two dwelling area variables community 1 and community 2; percent of time absent; and the nine variables involving teacher ratings of student self-control, courtesy, leadership, co-operation, attitude toward criticism, concentration, attention, tenacity and self-reliance.

Twenty-three of these initial twenty-five variables were found to discriminate statistically between the two groups from the analysis of variance. The two exceptions, number of natural parents and community variable 1, were eliminated from further consideration. The school achievement variables of grade average and overage were also eliminated from the discriminant analysis because a new promotion policy in the district was eliminating the strength of these variables for future studies.

The remaining twenty-one variables provided the model that discriminated between the two groups. The most important variables were verbal IQ, absence, self-reliance, co-operation, vocabulary and mother's level of education. These 6 variables accounted for 79 percent of the between groups variance between the dropouts and non-dropouts. This model would correctly classify 87.3 percent of the sample.

An extreme difference was found between the verbal and non-verbal IQ's of the two groups, with the suggestion, however, that reading ability was not the cause of the difference.

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Chapter 1

INTRODUCTION

STATEMENT OF PURPOSE

The purpose of this study was to develop a model which could be used in the identification and prediction of potential dropouts. This model was to determine the extent to which selected variables would effectively discriminate between dropouts and non-dropouts. This model was intended to be the basis for the evaluation of current programs intended to reduce the dropout rate, in the school district where this study was undertaken.

SIGNIFICANCE OF THE STUDY

Over the past fifty years numerous studies and surveys on the dropout have been conducted. This research has studied the nature and scope of the dropout phenomenon, as well as characteristics of the dropout. Proposals have been made in these studies for changes which are aimed at reducing the number of dropouts.

Once a student has decided to terminate his formal education, the combined efforts of school personnel and concerned investigators have little, if any, effect upon that decision (Hamreus, 1964, p. 1). Early identification of the potential dropout, therefore, becomes an important factor in reducing the number of dropouts. The student who is a potential dropout must be identified at a point when preventive action can still be applied successfully

to enable him to progress in school.

School districts throughout Newfoundland, including the one which was under study, are establishing special programs in an attempt to overcome dropping out. Evaluating the success of these programs will be a difficult proposition. It is unlikely that the programs will be totally successful in eliminating dropouts. It is possible that the new programs will themselves introduce factors which will contribute to dropping out, thereby adding a new dimension to the problem. In order to measure the impact of new programs, the present characteristics of dropouts must be determined to provide a basis for comparison with the characteristics of students who are involved in the new programs. Thus, this study was intended to provide one basis for the future revision and improvement of these programs.

Some of the findings in this study may aid schools in the selection of students for their remedial programs for potential dropouts. The prediction of future dropouts can be based upon the way students still in school resemble, in significant ways, students who have dropped out. Such a prediction could be used in the selection of students for the remedial programs.

Broader Significance

The broad significance of this study is that it was the application of a general model to a specific setting. Only presently existing data were used to ensure that similar studies could be made at the local level in the future. This model could also be applied to other Newfoundland school districts which employ reasonable effort in data collection.

DEFINITION OF TERMS

Dropout

A dropout was a former student who had been in school during the regular school year, and who had withdrawn from school before graduating from Grade XI. Such an individual was considered a dropout whether his dropping out occurred during or after he had passed the compulsory school attendance age and if he did not enter other educational or training programs for a period of one year after dropping out of school.

Non-dropout

A student who was still in school, or who had graduated from Grade XI, or who entered some other educational or training program within one year after dropping out of school, was considered a non-dropout.

RESEARCH QUESTIONS

This study has attempted to answer these two questions:

1. What are some of the variables, obtainable from readily available sources, which could provide a basis for effective discrimination between potential dropouts and non-dropouts in one Newfoundland school district?
2. Can a model be devised, incorporating variables so identified, that will discriminate between dropouts and non-dropouts?

LIMITATIONS

The model which this study presents for the identification and prediction of dropouts has relevance for future dropout studies. However, application of the model must be limited to schools and populations similar

to those used in this study.

It is possible that some important variables related to school dropouts are omitted from this study. Also, the nature of the selected variables, and some peculiar scaling difficulties lead to conservative interpretation of findings regarding the discriminating abilities of these variables.

ORGANIZATION OF THE REMAINDER OF THE STUDY

A review of the literature related to the dropout phenomenon will be presented in Chapter 2. A detailed account of the experimental design and the data collection procedures will be given in Chapter 3. Chapter 4 contains the analysis of the data. Chapter 5 includes a summary, the conclusions reached, along with the recommendations for further research.

Chapter 2

REVIEW OF THE LITERATURE

The purpose of this chapter was to review the literature as it pertained to research on dropouts. Since there are a vast number of studies on school dropouts, this chapter could be very lengthy, especially if studies were reviewed individually. In order to keep this chapter relevant, dropout studies have been investigated under three main sub-headings. The first is a look at the types of studies which have been carried out on dropouts, with particular emphasis on studies similar to this one. The second section deals with the factors related to dropping out of school, particularly those variables which this study has investigated. The third section summarizes previous research on Newfoundland dropouts.

TYPES OF RESEARCH ON THE DROPOUT

Many research studies have been made on the school dropout. Methods of study are almost as numerous as the studies themselves. Researchers have reported contradictory results of investigation of the same variable. While some disagreement has resulted from differences in populations studied, such as rural versus urban dropouts, many contrasting conclusions must be attributed to the design and conduct of the study. A discussion of the five basic types of research on the dropout reported in the literature (Varner, 1967, p. 9) follows.

Number of Dropouts

One type of study asks the question-- How many students drop out of school? Various methods have been used to determine the number of dropouts. While useful in assessing the magnitude of the problem, this approach ignores the question of why students drop out of school, which needs to be answered before preventive or corrective action can be initiated.

Reasons for Dropping Out

Studying the reasons for dropping out of school is another type of research. Data from several sources have been used to find reasons. The most obvious source is the dropout himself, but he may not recognize the reason, or may tend to give the most socially acceptable answer. He may be forced to check one item from a list, when his reasons are multiple or not among the possibilities. One choice may mean different things to different students. For example, financial necessity may mean helping to support his family, or buying a car. Marriage may be a result or a cause of withdrawal. If dropouts gave open-ended responses, interviewers usually categorized their responses for purposes of reporting. Teachers, counsellors, or administrative personnel may not have known the reason, or may simply have referred to school records to find what reason was given by the dropout when he left school. In general, there is no way to determine the degree to which shortcomings of this type affected the outcome of the studies reviewed.

Descriptive Studies

A third type of study involved describing what dropouts were like.

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Characteristics such as intelligence, parents' level of education, or the size of the school attended were investigated. Results were usually reported in statistical form.

Methods of obtaining data for these descriptive studies differed. School records were commonly used, but often were incomplete and sometimes inaccurate. Personal interviews involved more "in depth" investigations and understanding of school dropouts, their characteristics and causes, but may have been subjective; analysis is difficult and recorded data may have reflected the bias of the interviewer. Questions selected for questionnaires again may have reflected bias. Open-ended questions allowed the subject to express himself more completely, but made results difficult to categorize for purposes of analysis.

In addition, because many dropouts moved and left no forwarding address, did not submit to interviews, or failed to return questionnaires, data from a selective rather than a representative sample may have resulted in many studies.

Predicting Dropouts

The predictive approach tried to answer the question-- Which students will drop out? A number of characteristics tentatively assumed to be associated with dropouts, but differentiating them from non-dropouts, were applied to a given population. The purpose of these studies was to identify potential dropouts before they became dropouts.

Follow-up Studies

The final type of research reported in the literature studied what happened to dropouts. The employment status and earning power of dropouts have typically been investigated.

Results have been used as a means of persuading students to remain in school through graduation.

This Study: What Type?

This study has combined the third and fourth types of studies discussed. Discriminant analysis makes it possible to describe and predict in the one operation. The discrimination between the dropout and the non-dropout gives a description of the dropout which enables prediction, based on how well students compare with the dropout.

Very few studies in the dropout literature exemplify this approach.

FACTORS RELATED TO DROPPING OUT

For this section of the review of the literature, research was investigated which concerned the factors related to dropping out of school.

Standardized Achievement

Researchers reported contradictory results when standardized achievement was investigated in studies of dropping out.

Schreiber (1968) and Livingston (1958) both found that reading ability, measured by standardized reading tests, was significantly lower for dropouts than for non-dropouts. Childers (1965) reported the same results for male dropouts, but not for female dropouts. Markus (1964) and Hopkins (1964) both discovered that reading ability made very little contribution, as compared with other variables studied, in distinguishing dropouts and non-dropouts. Walters and Kranzler (1970) also found that reading ability was "somewhat overrated as a predictor of dropouts (p. 103)."

Lloyd (1967) found that standardized arithmetic and language test scores were significantly lower for dropouts than for non-dropouts. One study previously cited (Walters and Kranzler, 1970), concluded that "Arithmetic achievement, rarely mentioned as a predictor of dropouts, appears to be more important than some of the often-mentioned variables (p. 103)."

School Achievement

Many studies (Cook, 1956; Kennedy, 1966; Mink and Barker, 1968; Nachman, Gelson and Odgers, 1964) agreed that school achievement was a significant variable in distinguishing dropouts from non-dropouts. Indeed, these studies support the evaluation of our school system made by Alec Clegg (1973):

Another force which leads to gross inequalities and much waste of human potential is the way we wield the weapon of success and failure. We are lavish in our praise of success, acknowledging the good that it can do, but we all too often completely ignore the damage that can be done in insensitively plunging a child time and again into failure (p. 44).

School achievement has been studied by using either grade averages, or the number of grades repeated.

Grade averages. Markus (1964) found the Grade IX averages of dropouts to be significantly lower than those of non-dropouts. The same results have been obtained using eighth grade achievement (Hamreus, 1963), while Lloyd (1967) even discovered that Grade VI averages significantly discriminated between dropouts and non-dropouts. Schreiber (1968), using no specific grade level, reported that dropouts were in the lowest academic quartile. In Newfoundland, Kennedy (1966) found that failure of grades, based on low school achievement, was a dominant factor causing students to drop out of school.

Failure of grade(s). The majority of studies on dropouts which have investigated grade failure and retention have found it to be a significant variable. The number of grades repeated, or an overage score calculated from the date of birth and the normal age per grade, are the two methods usually used to study this variable.

An older study (Douglass & Wind, 1937) found grade retardation to be "one of the two most significant factors (p. 379)" from those they investigated. A recent study (Howard, 1972, p. 7) showed that 31 percent of dropouts have repeated at least one year, as compared with only 6 percent of graduates. Smith, Tseng, & Mink (1971) also found grade failure to be a very significant variable.

Kennedy (1966) discovered that failure and consequent retention were the dominant and influential factors for Newfoundland dropouts. Martin (1962) also confirmed that Newfoundland dropouts repeat grades more often than non-dropouts.

Bert Greene (1966, p. 37) believes withdrawal from school is an ego protecting device which results from consistent failure to achieve along with the discrepancy in ages between the dropout and his classmates.

Mental Ability

Group or individual intelligence test scores of dropouts and non-dropouts have been compared to study the mental ability variable. This variable has most often been found to be the primary variable in the early identification of dropouts (Walters & Kranzler, 1970, p. 103). Many writers (Hoyt, 1962; Mink & Barker, 1968; Schreiber, 1968) have described the dropout as below average in intelligence.

Studies by Drummie (1964), Hamreus (1963), Livingston (1958), Van Dyke & Hoyt (1958), and Walters & Kranzler (1970) all found that intelligence test scores were significantly lower for dropouts than for non-dropouts. Walters and Kranzler (1970, p. 104) reported that IQ combined with the three variables, age, arithmetic achievement, and father's occupation made it possible to identify dropouts with a 91 percent accuracy while maintaining a total accuracy of 80 percent.

Martin (1962) found that Grade IX dropouts in Newfoundland were significantly lower than non-dropouts in mental ability, as measured by standardized intelligence test results. Warren (1967) includes lower intelligence as one of the causes of dropouts in Newfoundland.

Father's Occupation

The occupational status of parents of dropouts and non-dropouts has been studied by using various categories such as unskilled labour, skilled labour, and professional worker.

Some studies (Hamreus, 1963; Lloyd, 1967) found the occupational level of the father to be significantly lower for dropouts. Others (Hopkins, 1964; Tuel, 1966) reported similar findings for the occupational status of both parents. According to one study, most fathers of Newfoundland dropouts were semi-skilled or unskilled workers (Kennedy, 1966). Walters and Kranzler (1970) found this variable very important: "No combination of variables can be used as predictive variables to an efficient degree unless some measure of socioeconomic status is included (p. 103)."

Parents' Level of Education

Mink & Barker (1968) described the dropout as "coming from a family that does not value education highly and has a history of low educational attainment (p. 17). Zeller (1966, p. 20) reported that parents of most dropouts had less than a Grade VIII education, indicating, as other studies have (Kennedy, 1966; Schreiber, 1966), that parents of dropouts were often premature dropouts themselves. Many studies (Hamreus, 1963; Hopkins, 1964; Lloyd, 1968; Tuel, 1966; Van Dyke & Hoyt, 1958) found the educational attainment for the parents of dropouts was significantly lower than for the parents of non-dropouts.

Number of Natural Parents in the Home

Dropouts were found to be more likely to have separated parents than non-dropouts in four investigations (Hamreus, 1963; Livingston, 1958; Lloyd, 1968; Tuel, 1966). Another study (Childers, 1965) discovered the number of natural parents with whom the subject resided to be significant for female dropouts, but not for male dropouts. Lloyd (1968) reported the marital status of parents to be significant for both male and female dropouts, but more so for females. Stack & Wilbur (1971) discovered that approximately ninety percent of the foster children in the area of this study become Newfoundland dropouts.

Dwelling Area

Differences in dwelling areas distinguished Chicago dropouts and non-dropouts in a study by Markus (1964). Different communities within the district under study in Newfoundland were reputed to have differing percentages

of dropouts (Stack & Wilbur, 1971).

Time Absent

The number of days absent or the percentage of time absent have been studied to find if dropouts miss more school through absence than non-dropouts.

Most of the investigations considering this variable found that dropouts were absent from school significantly more often than non-dropouts (Hamreus, 1963; Hopkins, 1964; Howard, 1972, Livingston, 1958; Lloyd, 1968, Stroup & Robins, 1972; Tuel, 1966, Zellar, 1966).

Howard (1972) discovered that in their last full year in school nearly 23 percent of the dropouts miss over 25 school days while for non-dropouts only 0.5 percent were absent that often.

Greene (1966), Silberman (1970), and Tuel (1966) all reported the frequency of absence increased as the dropout progressed through school.

Teacher Ratings of Student Behavior

Very few dropout studies have included teacher ratings of student behavior. The one available study (Amble, 1967) reported that teachers rated students who later graduated from high school much more favorably than students who later dropped out of school. This was true for all seven of the characteristics (co-operation, leadership, etc.) on which the teachers rated the students. Related to this variable, dropouts scored less on attitudes toward school than did non-dropouts (Hamreus, 1963), and Scriber (1968) found that dropouts felt rejected by the school.

NEWFOUNDLAND STUDIES ON DROPOUTS

Kennedy

Sister Mary Perpetua Kennedy (1966) found failure and consequent retention were the dominant and influential factors for Newfoundland dropouts. Other important findings were that parents and siblings of dropouts were often premature dropouts, most fathers of dropouts were semi-skilled or unskilled workers, only 13.6 percent of the dropouts had taken part in any extra-curricular activities in the school, and only 13.6 percent had mothers working outside the home.

Martin

George E. Martin (1962) surveyed the factors related in dropping out in Grade IX for the Newfoundland Central High Schools in the school year 1961-62. He found that the mental ability of dropouts was significantly lower than that of non-dropouts. Dropouts also repeated grades more often, had less interest in school and spent less time in lesson preparation outside the classroom. The most important reason the dropouts gave for leaving school was that they were not interested in what the school had to offer them.

Stack & Wilbur

Stack and Wilbur (1971) carried out an informal survey of the dropout problem in the district of this study, questioning school administrators, teachers, and students, as well as child welfare workers, a social assistance worker, and a guidance counsellor. The important question they asked these people was--What are some of the causes of the dropout problem?

One of the answers received was that some communities within the district were believed to have many more dropouts than others. Another finding was that there were many more foster children in the area than in most areas of the Province, of whom it was estimated over 90 percent drop out of school. The other answers received were not peculiar to this area and have already been discussed in this chapter.

SUMMARY

Many studies have been made on the school dropout. Methods of study were almost as numerous as the studies themselves. Differences in the design and conduct of the investigations, as well as differences in populations studied, were responsible for sometimes contradictory results.

The five different types of dropout research were evaluated.

The factors which have often been found to be related to school dropouts were individually studied. These variables are standardized achievement, school achievement (grade average and overage), mental ability, father's occupation, parents' level of education, number of natural parents in the home, dwelling area, time absent, and teacher ratings of student behavior.

Newfoundland studies on dropouts were reviewed to investigate factors peculiar to the setting of this study.

Chapter 3

EXPERIMENTAL DESIGN, DATA COLLECTION, AND STATISTICAL PROCEDURES

This chapter contains a discussion on the subjects and variables selected for the study, the data sources and method of collection, as well as the statistical procedures used.

SELECTION OF SUBJECTS

The setting for the study, the samples selected, and a discussion of the theory behind the choice of samples are discussed in this section.

Setting

All subjects for this study were selected from the schools within one educational district in Newfoundland. This district is composed of eight elementary schools, one junior high school (Grades VII and VIII), and one senior high school (Grades IX, X and XI). In terms of the number of students, it is the smallest district in the province. There are ten communities in the district which are connected to one another by a highway. The communities at one end of the district are close to an urban center, where many of the residents work. The communities at the other end of the district have few residents who commute to the city.

The Samples

The dropout sample. This group was composed of all the individuals who had dropped out of the schools in the district during the school years 1969-70

and 1970-71. This dropout group numbered one hundred and eleven.

The non-dropout sample. One hundred and eleven subjects were also selected for this group from the total body of 1970-71 students in the district by using random sampling stratified by grade and sex, proportional to the grade and sex of the dropout group.

The Choice of Samples

The non-dropout group was a much younger group than the dropout group, because many dropouts had repeated grades. Overageness was considered to be a significant variable when considering the difference between dropouts and non-dropouts. The aim of some of the present programs in the district was to eliminate this overageness. In this study, age was controlled in the sense that the age of the non-dropout sample would be typical of the age of dropouts if the overageness factor were eliminated statistically.

VARIABLES STUDIED

One purpose of this study was to use data which was presently employed by the school district to evaluate its programs, or to use data which could be collected with reasonable effort by the schools in the future. For this reason, special instrumentation was avoided. The variables which were studied are described in the following paragraphs.

Standardized Achievement

The Canadian Test of Basic Skills (King, 1967) was used as the measure of standardized achievement. The school district had recently adopted this test as part of its testing program.

The test has eleven subtest scores: vocabulary, reading comprehension, spelling, capitalization, punctuation, English usage, map reading, reading graphs and tables, use of reference materials, mathematical concepts, and mathematical problem solving.

The standardization of the Canadian Test of Basic Skills late in 1966 was a co-operative enterprise involving the publishers and authors of the Canadian Lorge-Thorndike Group Intelligence Test and the Canadian Test of Basic Skills, together with a stratified random sample of Canadian schools.

The authors of the Canadian Test of Basic Skills claim all the commonly used principles in the validation of test content have been applied in the preparation of individual test items. The test was not designed as an aptitude test, or as a predictor of future academic success. No data on predictive validity is given (King, 1967).

No information on reliability was provided in the teacher's manual for the test (King, 1967). Adequate reliability was assumed but this must be considered a limitation in interpreting the findings of the study.

Five of the eleven subtest scores were selected for study. These were vocabulary, reading comprehension, English usage, mathematical concepts, and mathematical problem solving. These subtests were considered to be the most important ones and were found to be significant in the studies reviewed in the previous chapter.

The scores were recorded in grade-month level by the school personnel, but were converted to percentile scores within grades to facilitate comparisons.

across different grade levels. National norms were used to make the conversions.

This variable caused problems because it was not obtained for all subjects. The test was administered to students from Grade III to Grade VIII inclusive in December, 1969. Therefore, scores were not obtained for the Grade X and Grade XI subjects in both groups and the Grade IX dropout group for the school year 1969-70 for those students who dropped out before December.

Table 1 shows the mean scores and standard deviations for both groups considering the five standardized achievement variables studied. Discrimination was strong in the expected direction for all five variables.

Table 1

Means and Standard Deviations on the Five
Standardized Achievement Variables

Variable	Dropout Group (n=64)		Non-dropout Group (n=76)	
	Mean	S.D.	Mean	S.D.
Vocabulary	16.05	16.76	27.57	25.08
Reading	11.97	12.54	24.96	22.90
English	19.59	20.58	28.11	26.66
Math Concepts	15.61	15.30	31.08	25.24
Math Problems	22.71	20.77	34.03	25.74

Since absence on the day of administration of the test was probably on a random basis, and because these variables discriminated strongly on mean scores, it was decided to include in the final data analysis only those subjects who had completed this standardized achievement test battery. This was necessary as the computation of the discriminant function which was used in the analysis required each subject to have a complete set of data.

School Achievement

School achievement was measured by the two variables of grade average and overageness.

Grade average. The individual student cumulative record forms contained space for the final mark for each school subject for each school year. These final marks were based on the entire year's work and were not the result of one final examination. The total of the final marks divided by the number of school subjects studied was used to find the grade average for each student. This grade average was used as the measure of school achievement.

The school grade average for the year before the year of interest was calculated for each subject. Thus, the 1968-69 grade average was found for the 1969-70 subjects and the 1969-70 average was used for the 1970-71 subjects. The grade average of the year before was chosen because some of the subjects dropped out of school early in the school year, before grades were given. This decision also eliminated possible teacher bias due to knowledge of dropping out or staying in school before giving grades.

The mean grade average obtained for the one hundred and eleven subjects in the dropout group was 45.14. For the same number of non-dropouts the mean average was found to be 60.14.

Overageness. In the majority of cases, overageness is a result of repetition of grades. The formula $\text{Age} - (\text{Grade} + 5)$ was used to obtain this variable score. Age in years as of December 31 in the school year of interest was used for each subject.

The mean overage score for the dropout group was 2.20 and for the non-dropout it was found to be 0.65. These scores indicated strong differences between the two groups.

Mental Ability

The Canadian Lorge-Thorndike Group Intelligence Test was used as the measure of mental ability. The district had adopted this test as part of its testing program.

The standardization of this test was a co-operative enterprise involving the publishers and authors of this test and the Canadian Test of Basic Skills, together with a stratified random sample of Canadian Schools (Wright, 1968).

The authors define their test as a series of tests of abstract intelligence. Abstract intelligence is defined as the ability to work with ideas and the relationships among ideas. They believe most abstract ideas with which the school child deals are expressed in verbal symbols, so that verbal symbols are the appropriate medium for the testing of abstract intelligence. Nevertheless, they take account of the fact that for some--the poorly educated or the poor reader--printed words may constitute an inadequate basis for appraising an individual's abilities. Consequently, a parallel set of nonverbal tests accompany the basic verbal scores (Wright, 1968).

Odd-even reliability data based on representative single-grades samples from the standardization program range from .830 to .945 (Wright, 1968), indicating sufficient reliability for the purposes of this study.

No data on predictive validity is available for the Canadian Lorge-Thorndike Intelligence Test. The authors state that the test correlates quite highly with other intelligence tests in the United States, but data for Canadian pupils have not yet been obtained (Wright, 1968). The authors report items were selected so that for the most part they deal with symbolic relationships.

In answering most questions a pupil is required to discover a principle and then apply it. The test, then, has been designed to measure reasoning ability, suggesting adequate content validity (Wright, 1968).

The Canadian Lorge-Thorndike Group Intelligence Test was given to all students from Grade III to Grade XI in December, 1969. Both Verbal and Non-verbal test results were recorded on the school records. These scores were obtained for each subject and used as two separate variables.

The mean Verbal IQ scores obtained were 85.84 for the 111 dropouts and 98.72 for the same number of non-dropouts. The Nonverbal means were 84.92 for the dropouts and 97.83 for the non-dropouts. These mean scores indicated strong discrimination between the dropout group and the non-dropout group for both the Verbal IQ and Non-verbal IQ variables.

Father's Occupation

An adaptation of categories devised by Warner (1960) was used to categorize the occupation of the father of each subject. The information was collected from individual student records kept at the board office. The occupation listed was placed into one of the following nine categories:

1. Unemployed
2. Unskilled workers, laborers, domestic servants
3. Farmers and fishermen
4. Semi-skilled workers
5. Proprietors of small businesses
6. Skilled workers
7. Clerks and kindred workers
8. Semi-professionals, officials of large businesses
9. Professionals, proprietors of large businesses.

The results of this categorization for both groups of 111 are recorded in Table 2.

Table 2

Father's Occupation: Adapted Categories of Warner ^a

Groups	Categories									
	1	2	3	4	5	6	7	8	9	nil ^b
Dropouts (n=111)	20	24	8	41	2	3	1	0	0	12
Non-dropouts (n=111)	10	27	3	43	4	2	10	6	1	5

^a Warner (1960)^b Foster children or father deceased

Category 1 referred to the unemployed group, Categories 2 through 6 referred primarily to unskilled and skilled workers, and categories 7 to 9 referred to "white collar" occupations. Differences in these categorizations seemed to be reflected in the data presented in Table 2, and led to three new categories, presented in Table 3.

Table 3

Father's Occupation: Adapted from Table 2

Groups	Categories				Means
	1 ^a	2 ^b	3 ^c	nil ^d	
Dropouts (n=111)	20	78	1	12	1.808
Non-dropouts (n=111)	10	79	17	5	2.066

^a Category 1 in Table 2^b Categories 2 through 6 in Table 2^c Categories 7 through 9 in Table 2^d Foster children or father deceased

Parents' Level of Education

The level of education of the father and mother of each subject was studied. This information was present on the cumulative record form of each student.

The literature reviewed previously showed that this variable has been studied for both father and mother and often for just one or the other. The level of education of both the father and mother were included in this study as separate variables because there was no rationale for selecting one over the other. It was hoped to discover if one was more significant than the other in Newfoundland.

Twelve categories of level of education for both the father and mother were used: Grade completed from Grade 1 to Grade XI and a twelfth category of post Grade XI education. The mean scores obtained for the two groups are recorded in Table 4. These means showed father's level of education to be a better discriminator between the groups than was mother's level of education.

Table 4

Mean Scores for Parents' Level of Education

Variables	Dropouts (n=111)	Non-dropouts (n=111)	Difference
Father's level	5.34	7.09	1.75
Mother's level	6.16	7.29	1.13

Number of Natural Parents in the Home

The school district reported large numbers of foster children enrolled in school (Stack & Wilbur, 1971). Children from broken homes, or orphaned children were believed more prone to dropping out of school. The number of natural

parents in the home was therefore included as a variable. The three possible categories were zero, one or two parents.

In the dropout group 12 subjects had no parents and 7 had one parent. For the non-dropouts 5 had no parents and 9 had one parent in the home. The mean scores of 1.72 for the dropout group and 1.83 for the non-dropouts did not discriminate strongly between the groups.

Dwelling Area

Different communities within the district under study were reputed to have differing percentages of dropouts (Stack & Wilbur, 1971). This hypothesis was based, in part, on the fact that some communities were closer to an urban center than were other communities in the district.

The ten communities within the district were numbered 0 to 9 depending on their distance from the major center, the low values being assigned to communities close to an urban center. The number of subjects in each community is shown in Table 5 and was called community variable one.

Table 5

Community Variable One

Groups	C o m m u n i t i e s										Means
	0	1	2	3	4	5	6	7	8	9	
Dropouts (n=111)	5	6	6	20	8	14	14	23	5	10	4.91
Non-dropouts (n=111)	5	5	12	19	7	9	13	18	14	9	5.01

A second community variable was calculated in an attempt to better show the differences which existed in the various communities. The proportion of dropouts

and non-dropouts for each community was calculated as shown in Table 6. If there are no relationships between dropping out and distance from the urban center, then the proportions in Table 6 should have been .50 for each community. The dropout proportion was then subtracted from the non-dropout percentage in each community to find a positive (higher proportion of non-dropouts) or negative value for each community. The resulting values, also shown in Table 6, were used as community variable two.

Table 6

Percentages of Dropouts and Non-dropouts for each
Community and the Subtracted Values
Used as Community Variable Two

Groups	Communities									
	0	1	2	3	4	5	6	7	8	9
Non-dropouts	.50	.45	.67	.49	.47	.39	.48	.44	.74	.47
Dropouts	.50	.55	.33	.51	.53	.61	.52	.56	.26	.53
Community Variable Two	.00	-.10	.34	-.02	-.06	-.22	-.04	-.12	.48	-.06

This community variable two discriminated between the two groups more strongly than did the first community variable. The mean scores were -4.04 for the dropout group and 4.30 for the non-dropouts.

Time Absent

Studies previously reviewed indicated that the dropout begins to drop out, through absenteeism, before actually becoming a dropout.

The percentage of time absent for the two full school years before the year of interest was calculated for each subject. The mean percentages of time

absent obtained were 14.6 percent for the dropout group and 6.0 percent for the non-dropout group, indicating strong differences between the groups.

Teacher Ratings of Student Behavior

The cumulative record of each student in the district contained space for the evaluation of student behavior by homeroom teachers. The evaluations made on each subject during his last full year of school were studied. These evaluations were therefore made the year before the student actually dropped out.

The following nine behaviors on which the teachers rated students were selected for study: self-control; courtesy; leadership; co-operation; attitude toward criticism; concentration, attention; tenacity; and self-reliance.

These nine behaviors were selected from twenty categories on the cumulative record form on the basis of their similarity with behaviors rated by teachers in the previously reviewed studies in the literature. Other categories such as singing and music were eliminated as no music programs were operated in the district.

The teacher rated each student on each category either H (high), M (medium) or L (low). These ratings were scored H = 3, M = 2, L = 1. Table 7 shows the mean scores obtained for both groups on the nine variables. The concentration variable had the greatest mean difference, followed by attention and then tenacity.

SOURCES OF DATA

Data for this study were collected from the following sources:

Table 7

Mean Scores for the Nine Teacher Ratings

Variables	Dropouts (n=111)	Non-dropouts (n=111)	Difference
Self-control	2.01	2.33	0.32
Courtesy	2.04	2.44	0.40
Leadership	1.69	2.01	0.32
Co-operation	1.90	2.31	0.41
Attitude to Criticism	1.88	2.16	0.28
Concentration	1.58	2.28	0.70
Attention	1.63	2.22	0.59
Tenacity	1.60	2.15	0.55
Self-Reliance	1.77	2.21	0.44

1. Class lists used to draw students from the school population for the non-dropout sample.
2. Individual student cumulative folders that follow the student from Grade I to Grade XI in the system.
3. Classroom registers.
4. Individual student records kept at the board office, which originated with the testing program in 1969.

STATISTICAL PROCEDURES

The linear discriminant function, a multivariate statistic equivalent to discriminant analysis, was used to find the variables which most effectively discriminated between the dropout and non-dropout sample. The reasons for this choice were as follows:

1. With scores on several variables for groups of individuals, members of the same group tend to have similar scores. They tend to have scores different from other groups with different characteristics.

2. It is difficult to tell which variables are most important in determining differences between groups by observing the several variables separately. This is because of the intercorrelations which typically occur among variables measured on the same individuals.

3. Because of individual differences, it is difficult to tell which group an individual belongs to by observing the variables separately.

4. A single discriminant function will give the best combination of several variables discriminating between the dropout and non-dropout groups.

5. The relative importance of each variable in the discrimination can be found by examining its weight in the discriminant function.

6. The discriminant function can be used to give the best statistical prediction of group membership (Spain, 1970; Cooley & Lohnes, 1962).

The main application of the linear discriminant function reported in the guidance literature has been with career studies by Cooley (1963). Considering only two variables, each subject can be represented as a point in a two-dimensional plane depending on his combination of scores on the two variables. Questions can be asked about people having a particular combination of variable scores--What proportion are dropouts and what proportion are non-dropouts? These proportions are computed from the frequency of dropouts and non-dropouts with a given score combination. The concept is extended to more than two variables, and the complex computations handled using modern electronic computers (Cooley & Lohnes, 1962, p. 6).

The squared standardized discriminant weight gives the proportion of independent between groups variance accounted for by a variable. Therefore, the pattern of intercorrelations of the variables becomes important as the weights can be ranked in order of independent variance attributable to each variable (Spain, 1971).

SUMMARY

The 111 dropouts of the school year 1969-70 and 1970-71 were matched by a non-dropout group from the student body by using random sampling stratified by grade and sex, proportional to the grade and sex of the dropout group.

The variables of standardized achievement, school achievement, mental ability, father's occupation, parents' level of education, number of natural parents in the home, dwelling area, time absent, and teacher ratings of student behavior were studied for both groups of subjects.

Data for the study were collected from class lists, individual student cumulative folders, classroom registers, and board office records.

The linear discriminant function was used to find the most effective discriminators from the selected variables.

Chapter 4

ANALYSIS OF DATA

The purpose of this chapter is to present the analysis of the data as it is relevant to the two research questions posed in Chapter 1. This chapter first presents descriptive statistics and the analysis of variance for each variable. The second section presents the results of the discriminant analysis.

RESEARCH QUESTION ONE

The purpose of this section is to answer the research question--What are some of the variables which could provide a basis for effective discrimination between dropouts and non-dropouts in the Newfoundland school district studied?

Descriptive Statistics

Table 8 presents the means and standard deviations for both groups on all the twenty-five investigated variables. A study of the means on this table suggests discrimination between the two groups in an expected direction for all variables. For the overageness and time absent variables, the mean scores for the dropout group were higher than those of the non-dropout group, as expected. For all other variables the means for the non-dropout group were higher, as anticipated. Some variables seemed to discriminate better than others between the two groups.

The non-dropout group showed some surprising mean scores. Their performance on the Canadian Lorge-Thorndike Verbal and Non-verbal IQ was slightly

below average (mean = 100), yet their Canadian Test of Basic Skills scores on the five subtests investigated were relatively low (mean = 50). This indicates that achievement, even for the students staying in school, was below potential.

Analysis of Variance

The analysis of variance between the dropout group and the non-dropout group for all variables studied is also presented in Table 8. Statistically significant differences were found for all but two of the twenty-five variables using ANOVA. These two variables, number of natural parents and community variable 1, were dropped from further consideration, as the between groups variance accounted for by these variables would be attributed to sampling error. All other variables potentially contributed to discrimination, as the between groups variance of each, taken by itself, was possibly due to other factors in addition to sampling error.

RESEARCH QUESTION TWO

This section answers the second research question posed for this study-- Can a model be devised, incorporating the identified variables, that will provide statistically significant discrimination between dropouts and non-dropouts?

Discriminant Analysis

In making a prediction about dropping out of school, overageness and grade average are more arbitrary variables, in that school policy can control both, and in this particular school system, a policy of higher grades and greatly reduced grade repetition had been instituted subsequent to the years for which data was gathered. Therefore, in the discriminant analysis the

Table 8

Means, Standard Deviations, and Analysis of Variance

Variable	Dropouts (n=64)		Non-dropouts (n=76)		Difference		F
	\bar{X}_1	S.D.	\bar{X}_2	S.D.	$\bar{X}_2 - \bar{X}_1$		
Vocabulary percentile	16.047	16.762	27.566	25.083	11.519	9.80 ^a	
Reading percentile	11.969	12.537	24.961	22.902	12.992	16.43 ^a	
English percentile	19.594	20.580	28.105	26.657	8.511	4.34 ^a	
Math concepts percentile	15.609	15.295	31.079	25.238	15.470	18.36 ^a	
Math problems percentile	22.172	20.774	34.026	25.741	11.854	8.76 ^a	
Grade average	42.641	10.844	60.118	15.064	17.477	59.95 ^a	
Overageness	2.625	0.917	0.803	1.007	-1.822	123.41 ^a	
Verbal IQ	79.141	9.450	97.329	13.291	18.188	84.03 ^a	
Non-verbal IQ	81.125	7.837	96.763	13.831	15.638	64.37 ^a	
Father's occupation	1.766	0.463	2.039	0.502	0.273	11.11 ^a	
Father's education	4.969	2.211	6.737	2.625	1.768	18.18 ^a	
Mother's education	5.406	2.014	7.276	2.336	1.870	25.23 ^a	
Number of natural parents	1.703	0.683	1.829	0.500	0.126	1.58	
Community variable 1	4.828	2.688	5.013	2.600	0.185	.17	
Community variable 2	-4.406	15.497	5.132	22.470	9.538	8.23 ^a	
Time absent	14.234	9.783	6.513	5.325	-7.721	35.04 ^a	

Table 8 (Con't)

Variable	Dropouts (n=64)		Non-dropouts (n=76)		Difference $\bar{X}_2 - \bar{X}_1$	F
	\bar{X}_1	S.D.	\bar{X}_2	S.D.		
Teacher Rating: Self Control	1.766	0.496	2.289	0.561	.523	33.64 ^a
Teacher Rating: Courtesy	1.828	0.579	2.395	0.634	.567	30.03 ^a
Teacher Rating: Leadership	1.688	0.560	1.961	0.599	.273	7.66 ^a
Teacher Rating: Co-operation	1.719	0.548	2.276	0.602	.557	32.31 ^a
Teacher Rating: Attitude toward Criticism	1.719	0.548	2.105	0.556	.386	17.02 ^a
Teacher Rating: Concentration	1.500	0.535	2.092	0.715	.592	29.83 ^a
Teacher Rating: Attention	1.469	0.534	2.105	0.723	.636	34.02 ^a
Teacher Rating: Tenacity	1.500	0.504	2.079	0.560	.579	40.66 ^a
Teacher Rating: Self-Reliance	1.672	0.506	2.105	0.624	.433	19.89 ^a

^a Difference of means significant at the .05 level of confidence using ANOVA with 1,138 degrees of freedom.

variables grade average and overageness were eliminated as well as the non-significant variables community variable one and number of natural parents.

Table 9 indicates the discriminant weights and proportions of between groups variance for the remaining twenty-one variables involved in the discriminant analysis. In the interpretation of this table, the discriminant weights were standardized so that they could be compared directly to determine the variables that were most important in the discrimination. Where the discriminant weight was positive, a high variable score was associated with not dropping out of school, and a low score with dropping out. Where the discriminant weight was negative, a high variable score was associated with dropping out of school, and a low score with not dropping out.

The discriminant weight gave the proportions of between groups variance accounted for by a particular variable which was independent of the between groups variance accounted for by variables of higher rank order.

Verbal IQ. The top ranking variable in the discriminant analysis was Verbal IQ. This variable accounted for nearly 38 percent of the between groups variance. A high Verbal IQ score was associated with not dropping out of school, as expected.

Time absent. The second ranking variable was absence, which accounted for over 14 percent of the remaining variance. A high score on this variable was associated with dropping out of school, as expected. These first two variables together accounted for 52 percent of the between groups variance.

Self-reliance. The teacher rating of student self-reliance was the third ranking variable. A high score on this variable was associated with

dropping out of school, even though the mean score on this variable was lower for the dropout group (see Table 8). In examining this apparent contradiction, it was noted that the correlation with Verbal IQ was 0.54 and with time absent was -0.39. These correlations indicate that although self-reliance scores measured some of the same factors already accounted for by the higher ranking Verbal IQ and absence variables, the self-reliance score also contained an independent component not related to these scores. This unknown component accounted for nearly 10 percent of the between groups variance and discriminated in a direction opposite to that expected.

Co-operation. The fourth ranking variable was the teacher rating of student co-operation, which accounted for nearly seven percent of the between groups variance. A high co-operation score was associated with not dropping out of school, indicated as well by the mean scores obtained.

Vocabulary. Vocabulary was ranked as the fifth most important discriminator, but, like self-reliance, discriminated in a direction opposite to that expected. High scores on vocabulary were associated with dropping out. Again, vocabulary had a correlation of 0.66 with absence, and 0.28 with co-operation. The pattern of inter-correlations was fairly complex; however, it is apparent that vocabulary had a component factor that was independent of these four variables. This factor accounted for nearly six percent of the variance between the dropout and non-dropout groups. The existence of this component is noteworthy in view of the fact that verbal IQ is usually thought to be quite dependent on vocabulary and other language skills. In some way a high value of this independent component is related to dropping out, while a low value is related to staying in school.

Table 9

Discriminant Weights and Proportions of
Between Groups Variance

Variables	Rank Order	Discriminant Weight	Proportion of Between Groups Variance	Cumulative Proportions
Verbal IQ	1	7.686	0.3785	0.3785
Time absent	2	-4.692	0.1411	0.5196
Self-reliance	3	-3.896	0.0973	0.6169
Co-operation	4	3.254	0.0679	0.6848
Vocabulary	5	-2.976	0.0568	0.7416
Mother's education	6	2.696	0.0466	0.7882
English usage	7	-2.470	0.0391	0.8273
Tenacity	8	2.241	0.0322	0.8595
Attention	9	1.858	0.0221	0.8816
Attitude criticism	10	-1.843	0.0218	0.9034
Self-control	11	1.707	0.0187	0.9221
Community 2	12	1.619	0.0168	0.9389
Concentration	13	1.500	0.0144	0.9533
Father's education	14	1.441	0.0133	0.9666
Non-verbal IQ	15	1.274	0.0104	0.9770
Reading	16	1.161	0.0086	0.9856
Math problems	17	-0.909	0.0053	0.9909
Leadership	18	-0.858	0.0047	0.9956
Courtesy	19	-0.639	0.0026	0.9982
Father's occupation	20	-0.536	0.0018	0.9999
Math concepts	21	-0.078	0.0000	1.0000

Mother's level of education. The sixth ranking variable was mother's level of education, which accounted for nearly five percent of the remaining between groups variance. A high score on this variable was associated with not dropping out of school, as expected.

Twenty-nine percent of the variables studied, therefore, accounted for nearly 79 percent of the between groups variance.

The remaining variables. The fifteen remaining variables contributed less than four percent of the remaining between groups variance each. These smaller proportions of between groups variance could have been a result of sampling error rather than consistent discrimination between the groups in these variables. Hence, the fifteen remaining variables were not considered significant discriminators.

Thus, leadership is not a significant variable. Yet it correlates 0.66 with self-reliance, which is significant. Teachers reacted to similar student behaviors in rating these two variables. That part of the leadership score which was independent of self-reliance and other higher ranking variables only accounts for 0.47 percent of the between groups variance and could be accounted for by sampling error. There is more assurance, on the other hand, that self-reliance will consistently show a similar relationship in future samplings, assuming that no fundamental change occurs in the population.

Means and Variances of Discriminant Scores

The means and variances of the discriminant scores for both groups based on the discriminant analysis are presented in Table 10. Assuming that the discriminant scores are normally distributed (Cooley & Lohnes, 1962), this model

will misclassify about 12.71 percent of the students in the sample. This means 12.71 percent of the dropouts would be classified non-dropouts and 12.71 percent of the non-dropouts would be mis-classified as dropouts.

Table 10
Means and Variances of Discriminant Scores

Groups	Mean	Variance
Dropouts	5.08	0.732
Non-dropouts	7.08	0.743

SUMMARY

An analysis of variance of all the variables studied disclosed that all but number of natural parents and community variable 1 differed significantly in the dropout and non-dropout groups:

Subsequently, a discriminant analysis procedure was used which considered all the variables studied except overageness, grade average, and the two non-significant variables. It was determined that the most important discriminators were verbal IQ, absence, self-reliance, co-operation, vocabulary, and mother's level of education. This model would correctly classify approximately 87.3 percent of the sample.

The variables self-reliance and vocabulary, while discriminating significantly, did so in a direction opposite to that expected.

Chapter 5

CONCLUSIONS, IMPLICATIONS, RECOMMENDATIONS

Presented in this chapter is an overview of the study to this point, a section on the conclusions made, the implications of the study, and a final section on recommendations for further study.

OVERVIEW

The purpose of the study was to develop a model which could be used in the identification and prediction of potential school dropouts. This model has determined the extent to which certain selected variables discriminated between dropouts and non-dropouts. In order that the variables studied could all be used by schools in the future, special instrumentation was avoided.

The variables used were the five Canadian Test of Basic Skills subtests Vocabulary, Reading Comprehension, English Usage, Mathematical Concepts, and Mathematical Problem Solving; school achievement in the form of grade average and overageness variables; the two mental ability variables of verbal and non-verbal IQ from the Canadian Lorge-Thorndike Group Intelligence Test; father's occupational level; mother's level of education and father's level of education; number of natural parents in the home; two dwelling area variables community 1 and community 2; percent of time absent; and the nine variables involving teacher ratings of student self-control, courtesy, leadership, co-operation, attitude toward criticism, concentration, attention, tenacity and self-reliance.

Twenty-three of these initial twenty-five variables were found to statistically discriminate between the two groups from the analysis of variance. The two exceptions, number of natural parents and community variable 1, were eliminated from further consideration. The school achievement variables of grade average and overage were also eliminated from the discriminant analysis because a new promotion policy in the district was eliminating the strength of these variables for future studies.

The remaining twenty-one variables provided the model that discriminated between the two groups. The most important variables were verbal IQ, absence, self-reliance, co-operation, vocabulary, and mother's level of education. These 6 variables accounted for 79 percent of the between groups variance between the dropouts and non-dropouts. This model would correctly classify 87.3 percent of the sample.

CONCLUSIONS

On the basis of the analysis of variance all the selected variables discriminated between the two groups, except for the number of natural parents and community variable 1.

The failure of number of natural parents to discriminate was not in accordance with the expectations of school personnel who believed that foster children, in particular, were more disposed toward dropping out. There was no apparent disposition of dropouts to come from one parent or foster homes. Only 7.6 percent of the total sample came from foster homes, 5.4 percent being dropouts and 2.2 percent being non-dropouts. Therefore, while it cannot be concluded that dropouts tend to be foster children, it might be true that foster

children tend to be dropouts. This matter requires further study.

The extreme differences between the verbal and non-verbal IQ scores of the two groups should also be noted. The two groups possessed quite different levels of academic ability. Further to this, if, as earlier reported, non-verbal IQ is qualitatively different from verbal IQ only on its independence of verbal skills learned by the subject, one can conclude that level of reading ability is not a factor contributing to the low IQ scores. In other words, even though the reading achievement of dropouts is demonstrably low, this inability to read has not affected the validity of the IQ scores.

In connection with this, it was determined that reading, itself, did not contribute significantly to the discrimination. In that reading comprehension is quite highly related to intelligence, this is not surprising. Indeed, some authorities believe that reading comprehension is actually a measure of intelligence (Strang, 1969). Table 1 indicates that dropouts were reading at about the twelfth percentile. An IQ of 85 corresponds to about the sixteenth percentile of ability. This suggests that dropouts were reading fairly close to their ability and that remedial programs in reading would be of little use to them. There was the further suggestion that an inability to cope with school subjects was associated with dropping out. There was a possibility that this had nothing to do with mastery of basic skills.

It cannot be concluded, however, that lack of ability is a root cause of dropping out. Social and emotional variables associated with incompetence may be causes and programs designed to eliminate these would then eliminate the ability of intelligence to discriminate between the two groups.

The reading achievement of the non-dropout group was around the twenty-fifth percentile although the IQ was around the forty-seventh percentile. Relative to their ability, the non-dropout group did not achieve in reading nearly as well as the dropout group.

Discriminant Analysis

The model presented in Table 9 shows that the first six variables accounted for nearly 79 percent of the variance between the dropout and non-dropout groups. This full model of 21 variables would misclassify only 12.7 percent of the subjects. Reducing the number of variables to six would increase the rate of misclassification somewhat.

The model tells us that, relative to the non-dropout, the dropout tended to score lower on verbal intelligence, teacher ratings of student co-operation and mother's level of education. He tended to score higher on teacher ratings of self-reliance, vocabulary, and absence.

All the other variables studied contributed only small proportions of the between groups variance even though all but two did discriminate between the two samples. In general, these variables can be considered to have measured much the same factors as were measured by the six most important variables.

Low verbal intelligence test scores were by far the most important contributing scores in the discrimination. Verbal IQ contributed two and one half times as much to the between groups variance as did the next most important variable, absence. In general, achievement factors did not discriminate importantly except as they were related to the verbal intelligence score. This

finding casts doubt on the underachievement factor being a root cause of dropping out. Rather, other factors associated with low intelligence may be very important. Social, emotional and attitudinal factors, or expectancy factors, may all be linked with the intellectual ability of a dropout. Considering the effect of intelligence in discriminating dropouts and non-dropouts in the samples studied, these factors may be very important.

If underachievement is not a factor, and dropouts tend not to be under-achievers, remedial programs in basic academic skills will have only a marginal effect on dropping out. Programs to minimize the effect of failure, for example social promotion, as well may have no effect if concomitant programs to develop competency of some sort are not initiated.

IMPLICATIONS

The school district where this study was carried out is concerned about students who drop out of school. This model may now be used to help predict which students will tend to be future dropouts. This will help identify for the schools those students on whom they should focus programs aimed at reducing the number of dropouts.

Future evaluations should show discrimination between dropouts and non-dropouts which is based on new variables. Programs which are to be successful in reducing the number of dropouts should be directed at the causes which are related to the differences in the variables which discriminate the two groups.

In terms of the largest contribution to the total discrimination, the tested intelligence of the students should be an important consideration in the rationalization of new programs. Dropouts tended to score considerably lower

on both portions of the Canadian Lorge-Thorndike with the suggestion that verbal factors were not influential in causing the low scores. In that low scores on the intelligence test are predictive of low academic achievement, it is possible that psychological and social pressures related to feelings of incompetence and/lack of relevance of academic work are causes of dropping out. The fact that underachievement, while not ruled out, seemed to be a less important consideration, makes it important to investigate new curricula which are not highly related to present academically oriented curricula as possible solutions to dropping out. Present programs which focus on remedial work for academic deficiencies would not appear to have much chance of success with the present dropout. Likewise, programs which focus on social and psychological factors but neglect the problem of achievement would seem headed for failure.

RECOMMENDATIONS

The following are recommendations for further study:

1. Study the relationship between being a foster child and disposition toward dropping out.
2. Test the hypothesis that the dropout tends to have low academic ability (intelligence) rather than being retarded in learning basic skills.
3. Investigate social, emotional, and attitudinal factors which might be related to dropping out and possibly linked to the intellectual ability of the dropouts.
4. Investigate the effects of teacher and parent expectancy and a possible link with intellectual ability.
5. The causes or reasons for absence should be found.

6. A factor analytic study should be conducted on the teacher ratings of student behaviors to help discover the true nature of student characteristics which are being rated by the teachers.

7. Verbal IQ and vocabulary should be studied further in view of the unexpected variation between these variables.

8. This study should be replicated to estimate the effects of sampling error on the model which was developed.

9. The study should be repeated in other areas to determine to what extent the findings of this study are supported, and to see what differences may be attributed to local conditions.

SELECTED REFERENCES

- Amble, Bruce R. 1967. Teacher Evaluation of Student Behavior and School Dropouts. Journal of Educational Research 60:408-410.
- Bledose, Joseph C. 1959. An Investigation of Six Correlates of Student Withdrawal from High School. Journal of Educational Research 53:3-6.
- Cervantes, Lucius F. 1965. The Dropout: Causes and Cures. Ann Arbor: University of Michigan Press.
- Childers, Robert D. 1965. The Identification of Potential School Dropouts by Discriminant Analysis. Unpublished Doctor's dissertation, University of Georgia.
- Clegg, Alec. 1973. Violence of Vengeance. Education Canada 13:42-46.
- Cook Edward S. 1956. An Analysis of Factors Related to Withdrawal from High School Prior to Graduation. Journal of Educational Research 50:191-196.
- Cooley, William W. 1963. Career Development of Scientists, Co-operative Research Project 436. Washington, D.C. Department of Health, Education and Welfare.
- _____ and Paul R. Lohnes. 1962. Multivariate Procedures for the Behavioral Sciences. New York: John Wiley and Sons, Inc.
- Davis, Donald A. 1962. An Experimental Study of Potential Dropouts. The Personnel and Guidance Journal 40: 799-802.
- Douglass, Harl R. and Kate Wind. 1937. Factors Related to Withdrawal from Junior High Schools in Minneapolis. Elementary School Journal 37:375-380.
- Drummie, Mary A. 1964. A Research Report on New Brunswick School Dropouts in the Academic Year 1962-63. New Brunswick Department of Youth and Welfare.
- Dufresne, R.A. 1965. Perspectives on the Dropout Problem - The Stay-Ins. Journal of Secondary Education 40:23-24.
- Frerichs, Allen H. 1967. Identifying the Dropout Prone in the Primary Grades. Childhood Education 43:532-534.
- Grant, W. Vance. 1973. Statistic of the Month: United States Graduation Statistics For 1972. American Education 9:33.
- Greene, Bert I. 1966. Preventing School Dropouts. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

- Hamreus, Dale G. 1963. An Analysis of Certain School Related Variables Associated with Dropouts at the Junior High School Level. Unpublished Doctor's dissertation, Washington State University.
- Hopkins, Charles E. 1964. The Derivation of a Prediction Equation to Identify Potential School Dropouts. Unpublished Doctor's dissertation, University of Georgia.
- Howard, William. 1972. Dropouts: Prevention and Rehabilitation. Washington: National School Public Relations Association.
- Hoyt, Kenneth. 1962. The Counselor and the Dropout. The Clearing House 36:513-518.
- Kelly, Francis J., Donald J. Veldman and Carson McGuire. 1964. Multiple Discrimination Prediction of Delinquency and School Dropouts. Educational and Psychological Measurement 24: 535-544.
- Kennedy, Mary Perpetua. 1966. A Critical Analysis of the Dropout Problem in the Province of Newfoundland over the Ten Year Period 1954-1964. Unpublished Master's thesis, Catholic University of America.
- King, Ethel M. (ed). 1967. Canadian Test of Basic Skills. Don Mills, Ontario: Thomas Nelson & Sons (Canada) Limited.
- _____. 1968. Canadian Test of Basic Skills, Teachers Manual, Don Mills, Ontario: Thomas Nelson & Sons (Canada) Limited.
- Livingston, A. Hugh. 1958. High School Graduates and Dropouts: A New Look at a Persistent Problem. School Review 66: 195-203.
- Lloyd, Dee Norman. 1968. Antecedent Relationships to High School Dropout or Graduation. Education 89: 161-169.
- Markus, Franklin W. 1964. Construction and Utilization of a Model to Identify and Predict High School Dropouts. Unpublished Doctor's dissertation, Northwestern University.
- Martin, Geroge E. 1962. A Survey of Factors Related to Dropouts in Grade IX in Newfoundland Central High Schools in 1961-1962. Unpublished Master's thesis, University of Alberta.
- Mink, Oscar G. and Lawrence W. Barker. 1968. Dropout Proneness in Appalachie. Morgantown: Center for Appalachian Studies and Development.
- Moore, Walter. 1966. The Forgotten. NTA Journal 58:37.

- Nachman, Leonard R., Russell F. Gelson and John G. Odgers. 1964. Ohio Study of High School Dropouts, 1962-1963. Columbus: Ohio State Department of Education.
- Rowe, William G. 1968. The Forgotten Ones. NTA Journal 59:17-21.
- Schreiber, Daniel (ed). 1964. Guidance and the School Dropout. Washington, D.C.: National Education Association.
- _____. 1967. Profile of the School Dropout. New York: Random House.
- _____. 1968. 700,000 Dropouts. American Education 4:5-7.
- Silberman, C.E. 1970. Crisis in the Classroom. New York: Random House.
- Smith, John E., M.S. Tseng and Oscar G. Mink. 1971. Prediction of School Dropouts in Appalachia: Validation of a Dropout Scale. Measurement and Evaluation in Guidance 4:31-37.
- Spain, William H. 1970. Investigation of the Effect of Non-Normality on the Discriminant Weight of the Linear Discriminant Function. Unpublished Doctor's dissertation, Ohio State University.
- Stack, Terence and Brian Wilbur. 1971. The Dropout Problem in Conception Bay South. Unpublished paper, Memorial University of Newfoundland.
- Strang, Ruth. 1969. Diagnostic Teaching of Reading. Toronto: McGraw, Hill.
- Stroup, Atlee L. and Lee N. Robins. 1972. Elementary School Predictors of High School Dropouts among Black Males. Sociology of Education 45:212-222.
- Tuel, John K. 1966. Dropout Dynamics. California Journal of Educational Research 17:5-11.
- Van Dyke, L.A. and K.B. Hoyt. 1958. The Dropout Problem in Ohio High Schools. Ohio: State University of Iowa.
- Varner, Sherrell E. 1967. School Dropouts: Research Summary 1967-51. Washington, D.C.: National Education Association.
- Voss, Harwin L., Aubrey Wendling and Delbert S. Elliott. 1966. Some Types of High School Dropouts. Journal of Educational Research 59: 363-368.
- Walker, William E. 1973. The Slow Progress Student in Graded and Nongraded Programs. Peabody Journal of Education 50:191-210.
- Walters, Harvey E. and Gerald D. Kranzler. 1970. Early Identification of the School Dropout. The School Counselor 18:97-104.

Warner, W. Lloyd. 1960. Social Class in America - A Manual of Procedure for the Measurement of Social Status. New York: Harper & Roe, Publishers.

Warren, Philip J. (Chairman). 1967) Report of the Royal Commission on Education and Youth. Province of Newfoundland and Labrador.

Whitty, Paul A. (ed). 1967. The Educationally Retarded and Disadvantaged: National Society for the Study of Education Yearbook LXVI. Chicago: University of Chicago Press.

Wright, Edgar N. (ed.). 1967. Canadian Lorge-Thorndike Intelligence Test. Don Mills, Ontario. Thomas Nelson & Sons (Canada) Limited.

1968. Technical Supplement to Canadian Lorge-Thorndike Intelligence Test. Don Mills, Ontario: Thomas Nelson & Sons (Canada) Limited.

Zeller, Robert. 1966. Lowering the Odds on Student Dropouts. Englewood Cliffs: Prentice-Hall, Inc.

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