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ABSTRACT

This study was undertaken to determine whether differences in characteristics exist between public school dropouts and graduates. The need for such a study is indicated by the fact that dropouts are finding it more difficult to achieve success in most life ventures. A random sampling from 304 school systems in Indiana produced twenty school systems that volunteered to provide data for the study. Each system completed a twenty-item biographical questionnaire from cumulative record information of a random sample of fifty graduates and fifty dropouts. Four elements in a grade-school child's life seem to offer the best clue to whether one can predict him to finish his education through high school or to drop out. These factors are (1) the child's scholastic record; (2) the degree to which his classmates accept him; (3) his tested mental ability; and (4) the educational level his mother achieved in school. The upgraded primary, skill development in social relations, peer tutoring, and parental involvement were suggested as partial solutions. (BW/Author)

INDIANA STATE SUPERINTENDENT
OF PUBLIC INSTRUCTION

Report of Indiana Public School Dropout-Graduate Prediction Study

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OCTOBER, 1971

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Report of Indiana Public School Dropout-Graduate Prediction Study

By

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OCTOBER, 1971

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SUPERINTENDENT'S MESSAGE

The third in a series of studies sponsored by the Indiana Department of Public Instruction, this report and interpretation of information about school dropouts in Indiana, gathered by Dr. Gerald Dudley and his associates, will provide valuable data for the future work of the Department and other concerned agencies in planning programs in the areas of curriculum, vocational-technical education, guidance and counseling, social work, school psychology, school attendance, and the prevention and treatment of delinquency. I commend this publication to you for your thoughtful examination and use.

JOHN J. LOUGHLIN
State Superintendent of
Public Instruction

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Section I

INTRODUCTION

STUDENT DROPOUTS: A FRAMEWORK FOR THE PROBLEM

The role and goals of education in a nation as advanced as ours leaves little opportunity for the individual who decides to terminate formal schooling prior to high school graduation. There always have been those who decided on this course of action, but the consequences have become more severe in recent years. The recognition of the dropout problem is noted in the writings and speeches of national leaders in the field of government service as well as education. The late John F. Kennedy, in his 1963 message on the state of the nation, remarked that

> "The future of any country which is dependent on the will and wisdom of its children is damaged, and irreparably damaged, whenever any of its children is not educated to the fullest extent of his capacity . . . and that is a waste we cannot afford."

Two years later Lyndon B. Johnson stated to Congress,

> "Almost a million young people each year will continue to quit school — if our schools fail to stimulate their desire to learn. The cost of this neglect runs high both for the youth and the nation."

During that same year the Dropout Prevention Program, funded under Title VIII of the Elementary and Secondary Education Act of 1965 underlined the seriousness of the

problem. Underlined also was the determination of this nation to foster exemplary educational programs to reduce the number of children who do not complete their education through elementary and secondary schooling. This effort to halt future dropouts is woven throughout the pages of every recent major federal legislative mandate dealing with eduction.

It would take an educational historian to trace the influences of growth and change in our educational system, but any working member of society can describe the importance of education to the value of upward mobility. At the turn of the century, the dropout phenomenon was much more severe than today, but in that era the dropouts became the working class and there was always room for them. As the decades passed, children stayed in school longer and the holding power of the schools improved considerably.

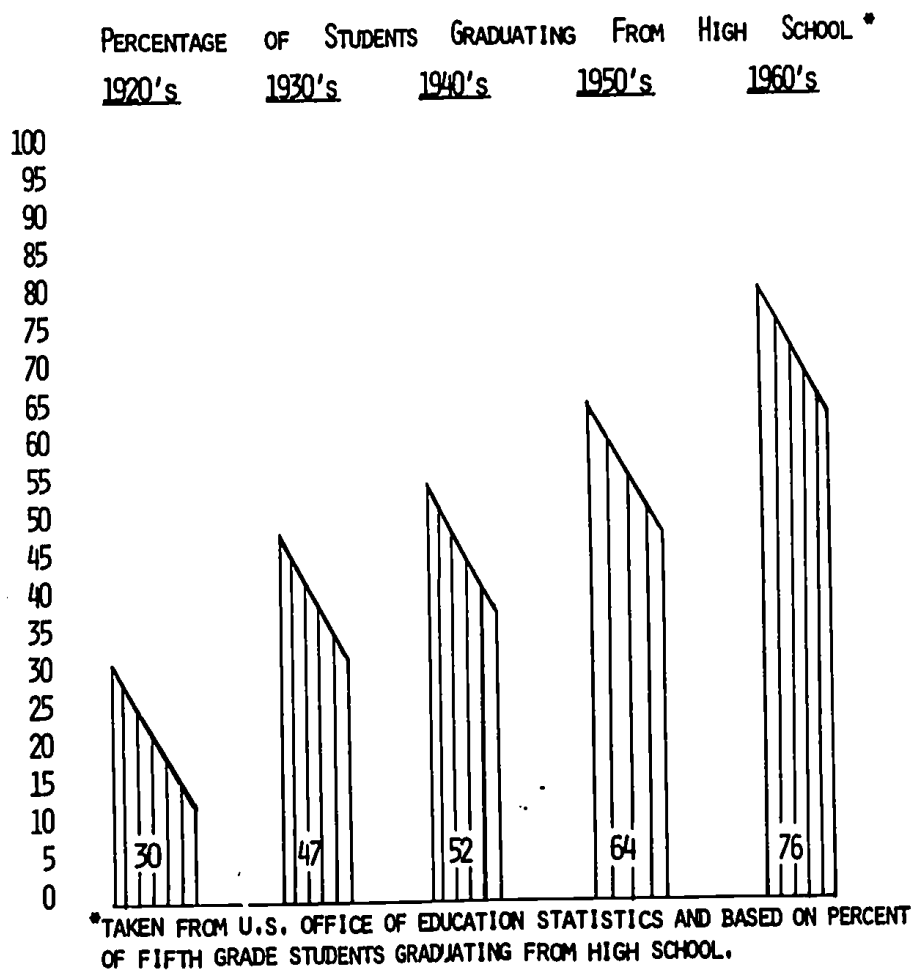


Figure 1

Figure 1 shows the changes in holding power of U.S. schools from the 1920's until the present. These school leavers are definitely becoming a smaller and smaller minority group, but more and more of a problem because today's dropout is embarking upon a labor market with high school graduation as a standard for entrance. Even though progress is more than three-fourths of the way to a goal of graduation for all, the dropout is faced with the frustrating reality of having little capability for entrance into the labor market. Whenever the dropout does find a job his potential for advancement is limited. The advances in technology that have been made by our nation require a working force that continues to learn. If the skills and desire to learn are not present, the individual's potential for earning is limited. Table 1 illustrates this reasoning by showing the lifetime earning potential at several levels of educational attainment.

Table 1

INCOME POTENTIAL FOR YEARS OF SCHOOL COMPLETED

Years of School Completed	1966 Income (Age 18 to Death)
Average	321,000
Less than 8 years	189,000
High School: 4 years	341,000
College: 1 to 3 years	394,000
4 years	508,000

SOURCE: Current Population Reports, Consumer Income, Series P-60, No. 56, August 14, 1968, Bureau of the Census.

In addition to economic concerns, another part of the national concern for the dropout relates to the effects this problem has on both education and society. Educational institutions stand at a period in history when they are being asked to be accountable for the results of their effort. Even though the holding power of our schools has more than doubled since earlier in the century, the goal of a high school diploma for all has not been attained. Perhaps the demand of youth to make education more "relevant" will bring about the changes and come closer to that 100 percent goal.

Societal costs related to the dropout are difficult to present in dollar and cents figures but could be classified under such categories as delinquency, job retraining, welfare, unemployment compensation, and "agency" assistance.

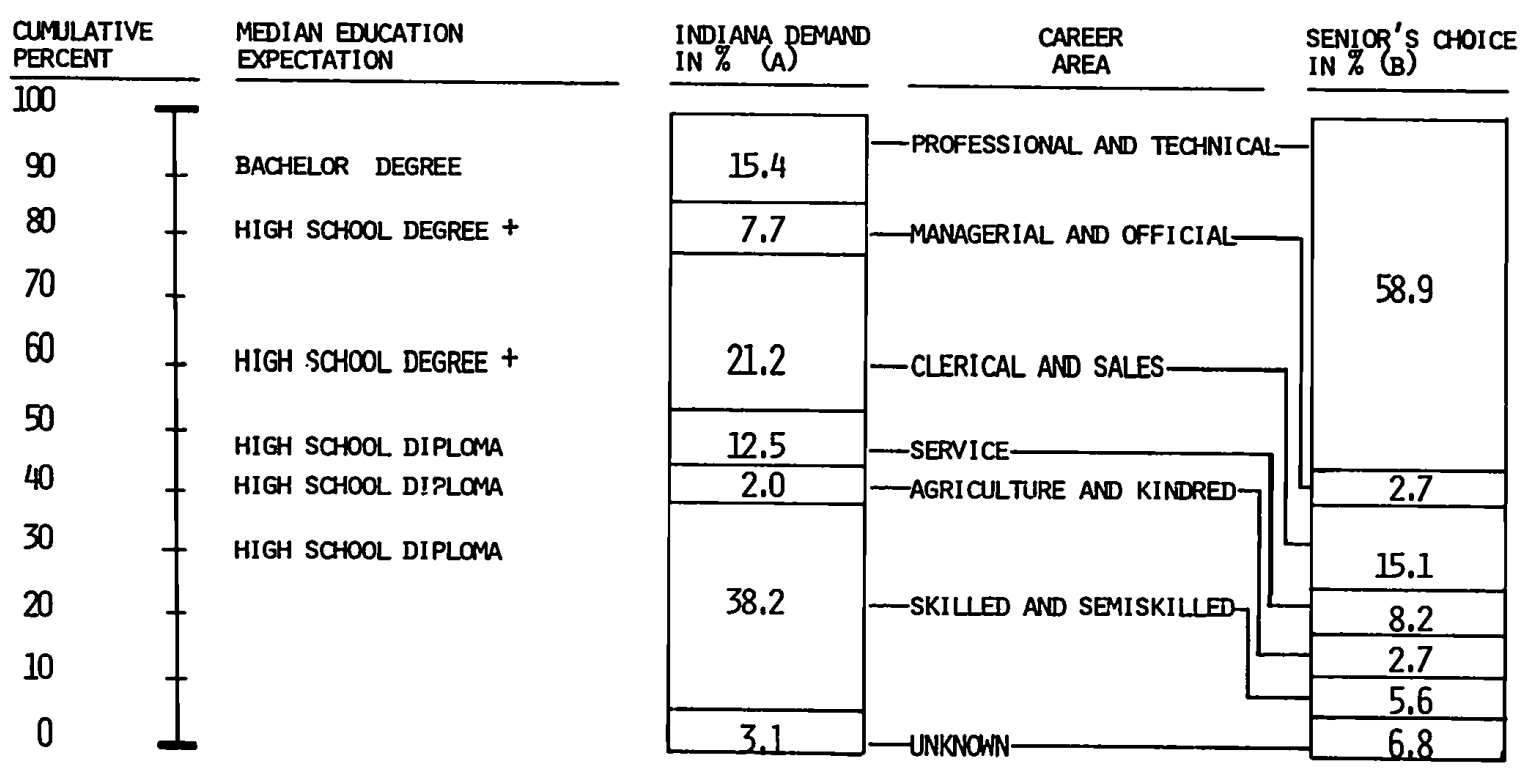
FUTURE EFFORT

Although their number is in a relative state of decrease, the dropout may be the greatest challenge facing education, society and humanity. A resolution of the problem should be a major concern for this generation. The waste of human potential must be averted and the conservation and development of our human resources must become a by-word for all.

It is obvious that the full burden for alleviating dropouts cannot be borne by the schools. The home and community must also be informed and involved. However, we can begin in education by seeing to it that students are informed and involved with a realistic preparation for future careers. Early, and in a continuous manner, we must also see to it that students gain a feeling of acceptance and achieve success. One recent study of Indiana graduating seniors hints at the present state of unrealistic preparation for careers of the future and emphasizes the social stigma attached to the lock step educational movement from high school to college.

Figure 2 shows the results of a survey of seniors graduating from Indiana high schools with the class of 1969. Nearly 60 percent of these students (58.9%) indicated they had plans to enter the professional and technical career area. Future projections beyond the time these seniors will enter the job market indicate room for about sixteen percent in that area. In all other areas of career plans the future demand exceeds the expected worker supply. It appears that the educational institution needs to re-examine the idea and dispel the fantasy that higher education attainment is now the minimum credential for almost any type of work. In addition, each student must be given the opportunity and help to take inventory of himself, to be aware of his own interests and aptitudes and the way in which these unique talents could be developed toward possible future careers.

1969 Indiana Senior's Career Choice, Related Demand, and Required Median Education Level



(A) Taken from Indiana Manpower Trends to 1975, Indiana Employment Security Division, Research & Statistics Section, Indianapolis, January, 1967.

(B) Taken from 75,000 High School Seniors, Manpower Report 70 - 1, Purdue University, Office of Manpower Studies, Lafayette, April, 1970.

Figure 2

Early assurance of success is as much a role of the school as of the home. An attitude of success may begin or be extinguished in the home and kindled further or smothered completely during the early years a child is in school. One of the basic needs of every child, or for that matter, every adult — is affection.

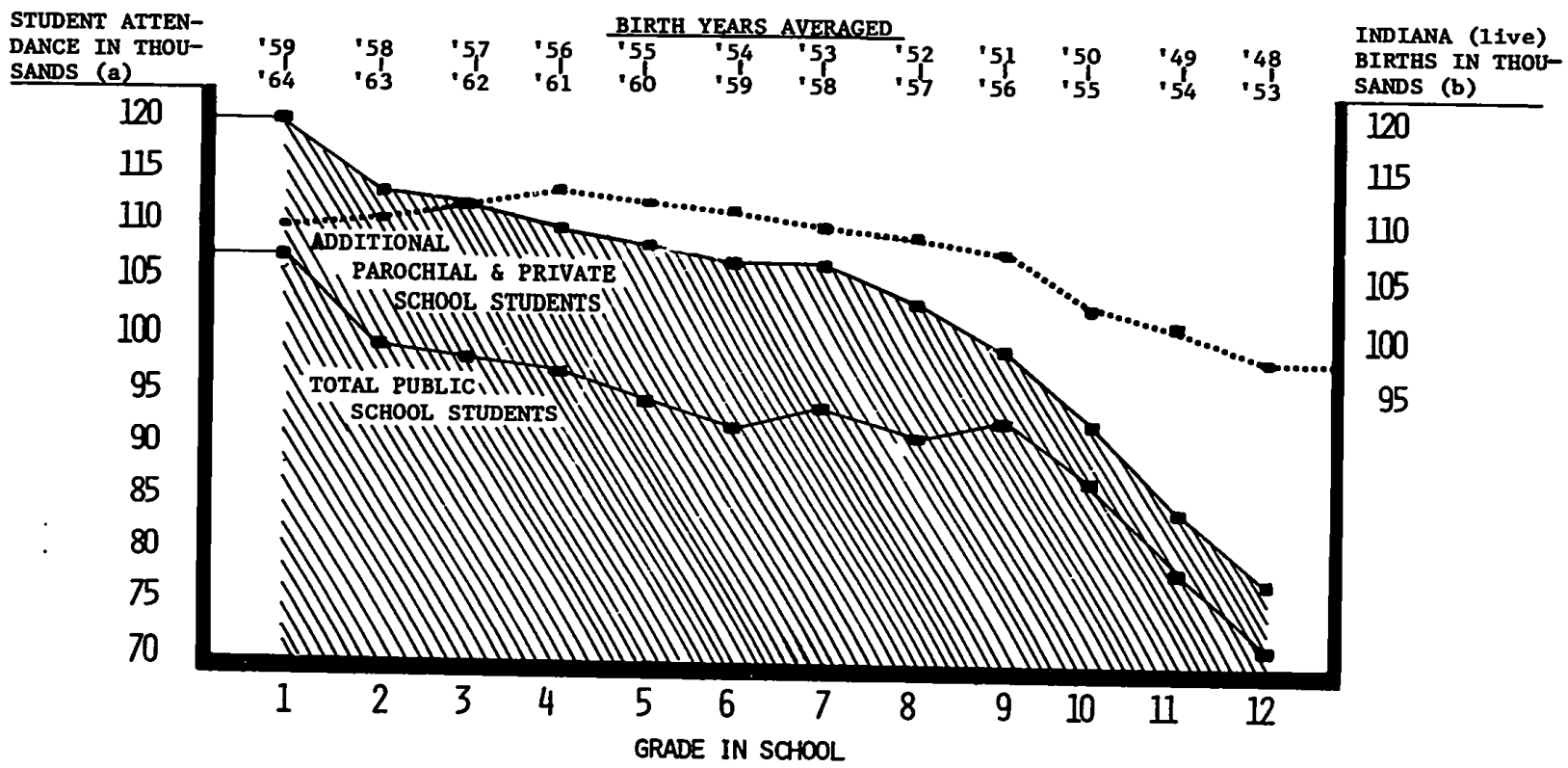
Every person has a need to be wanted whether he is six or sixty years of age. Every teacher in any elementary school classroom in the nation has experienced a child's need for affection. But a child must not only receive affection, he must also be involved in the mutual process of sharing it. If every child could have an opportunity to experience the giving and receiving of affection with some measure of consistency throughout life, he would probably consider himself successful.

A second basic human need — feeling worthwhile — is met in varying degrees with children by the school as it presently operates. As children gain in knowledge and thinking ability, they incur a positive feeling about their own self-worth. Motivation, enthusiasm, and the learning habit are fostered by this feeling of positive self-worth. This psychological basis for education sustains a student through high school graduation, because his outlook toward life is one of optimism for future success.

On the other hand, should this child fail to receive and be unable to share affection at home or through early school experiences, his outlook may tend to be pessimistic. This negative view of self-worth could result in an identity search by experimenting with delinquent behavior or withdrawal and loneliness. This act of self-appointed failure could cement an outlook toward education, and life itself, as inevitable failure.

In Indiana, one measure of *not* providing success experiences for children may be evident in data relating to retention patterns among primary grade teachers. Figure 3 presents graphically (a) the number of students (each grade level an average over six years) in attendance in public school classes, (b) the potential number of students in each of the twelve grades, based on a six year average of live

INDIANA PATTERNS OF SCHOOL ATTENDANCE RELATED TO POTENTIAL FOR ATTENDANCE



(a) TOTAL STUDENT ATTENDANCE indicated by:

(b) POPULATION PROJECTION indicated by:

These data were taken from the Indiana Office of State Superintendent of Public Instruction, Division of Educational Information and Research Statistics, Indianapolis, 1970.

Figure 3

births in Indiana, and (c) the total number of students (each grade level an average over six years) in school attendance, including those in private and parochial schools. Through failure, there appears to be an 8.8 percent first grade holdover from the previous first grade indicating approximately 8.8 percent of the first grade students experience failure early in their school life. If these failures had not occurred those students would be included with their second grade age-mates, and the results would show approximately 11.8 percent more students in second-grade attendance than could be predicted from the birth data. Continuing, if these failing students were included with their age-mate third grade attenders, there would be approximately 2.8 percent more third graders than population projections, based on birth records, would aniticipate. From there on, each succeeding school year has progressively less students in attendance than would be expected from birth data.

Surprisingly, the percentage figures of 8.8, 11.8, and 2.8 add up to 23.4 which, when subtracted from 100, yields a figure similar to the cumulative holding power in Indiana schools. The cumulative holding power of Indiana schools stands at 77.2% for the median year 1968, for which summary attendance data are available. This cumulative holding power is computed using formulas derived by Dr. John Putnam for the U. S. Office of Education (1963). Cumulative holding power for Indiana public schools is defined as the proportion of students who do *not* drop out between the start of fifth grade and twelfth grade graduation. The computational formula and attendance figures for Indiana are included in Appendix A.

Since the problem of dropouts may have multiple interacting causes accompanying early school experiences, the identification or alleviation of contributing circumstances should be an appropriate educational endeavor. Pruett, Shertzer, and Clardy (1967) suggest —

> "It would be valuable to compare a sample of data from people who did leave school before graduation with those who did not. If this were done, it might be possible to draw inferences . . . lead to more conclusive characteristics of dropouts."

Hundreds of research articles have been written about dropouts, their incidence and characteristics, but the majority do not provide empirical information relating to early dropout identification. The significant studies that do provide information regarding prediction base their formulas on data available in late elementary school, rather than in early elementary grades. The Illinois Dropout Study (1962) developed prediction formulas to detect dropouts as early as the Junior High School level. Cervantes (1969) presented twenty characteristics that may predict dropouts. These characteristics were obtained through interviews and relate to school, family, peers, and psychological orientation factors. Walters and Kranzler (1970) studied cumulative record files of students and determined that accurate prediction of dropouts is possible even in the ninth grade. Hickman (1967) over a three year dropout prevention period was able to find characteristics that differentiated graduates from dropouts.

Social scientists have also been able to predict delinquent behavior early by focusing on parent-child relationships. Several studies using the Glueck Social Prediction Table have shown high predictive success.

Now appears to be the moment when identification and change for potential dropouts must be attempted. This study was designed to find factors that identify dropouts early in their school life so that remediation and prevention programs can be initiated to assure success and graduation for every child.

SUMMARY

The dropout, although relatively fewer in number than in past decades, presents a problem to education, society, and humanity because of the many technological advances we, as a nation, have made. With the minimum entrance level for most jobs being a high school diploma, the dropout is hard pressed to compete.

School holding power has increased more than twofold since the early twenties, but the American dream of a high school education for all is not on the near horizon. With

dropout earning potential limited, the need for a diploma increases. This pressure is being felt in the new theme of "accountability" in American Education.

It is hypothesized that the dropout may have the inimical assistance of both the home and school as the pattern of failure develops. Affection, involvement and relevance at home and at school help to cement a success outlook in the life of a child. Anything less may lead to a lifetime assurance of failure.

If changes are to take place in the school potential dropouts need to be identified early and be provided with a specialized educational program that will assure success in school and later life.

The following report provides the results of a study to identify and quantify the factors that successfully differentiate dropouts from graduates early in their school experience.

Section II

PROCESS

MANAGING THE INDIANA DROPOUT-GRADUATE PREDICTION STUDY

There appears to be a plethora of dropout studies and articles reported in educational literature. Each has had its impact by keeping the problem before the public, but few provide ways of identifying school dropouts in primary grades *before* they drop out of school. If educators are going to have any impact on the future of children who are potential dropouts, they will have to reach them in their formative years. C. G. Wrenn writes, "The environment of the elementary school is more favorable for treatment of the symptoms of dropouts than is the high school". For this reason, this study was designed to gain data from information which is usually collected by schools while the student is still in the primary grades.

As a beginning point in the search, a review of the literature yielded a vast number of characteristics that appeared related to students' early departure from school. Those that are presented first are from studies employing methods that gathered empirically derived information before the dropout left school. Following that is a summary of characteristics considered related to early dropouts, but gathered after the dropping out act had been consummated.

In the Illinois Dropout Study (1962), the following characteristics of high school students were included in the final

dropout prediction form: grade retention, curriculum desired or selected, days absent, aptitude test score, achievement or reading test score, scholastic rank, number of extra-curricular activities, disciplinary record, school course thought most profitable, hours of work per week, use of family car, number of older children, father's education, and father's occupation.

At the junior high school level, the final dropout prediction form included fewer and different predictors. The characteristics found to differentiate dropouts and graduates at this level were: group I. Q. test scores, scholastic average, grade retardation, reading gain from fourth to sixth grade, extra-curricular activity participation, days absent from school, emotional adjustment, peer status, and father's occupation.

Hickman (1967) reporting on a three-year summer school program for potential and actual dropouts concluded the dropout can be observed as the following:

(1) The dropout needs an opportunity to succeed.

(2) His great resentment is against authority.

(3) His great interest is in himself.

(4) His most serious handicap is his inability to communicate effectively.

(5) His past is usually a history of poor and varied grades, of numerous absences from school, of feelings of rejection, unreasonable treatment, and resentment.

(6) He is basically sincere and honest and very blunt — not much concerned with diplomacy.

(7) He usually appears to be lonely, attempts loyalty to peer groups, would like a close friend, but has difficulty in being one, and is often resistant to kindness which he wants very much.

(8) He is concerned with the present as it relates to him; *now* is the keynote in his time consciousness.

(9) In intelligence, he may be below average or very high; no pattern is observable, however, he is often retarded in reading.

(10) He does not necessarily come from a broken home.

(11) He wants an education, money, and fame; he needs perseverance and an opportunity to express himself freely.

(12) He needs most of all, security.

Cervantes (1969) interviewed dropouts and graduates to determine why some had dropped out while others in an identical situation had stayed on to graduate. He found that certain central and characteristic tendencies of the dropouts emerged from the study. The following twenty characteristics are commonly found among youth who are potential or actual dropouts:

School

1. Two years behind in reading or arithmetic at 7th grade level. Majority of grades are below average.
2. Failure in one or more school years.
3. Irregular attendance and frequent tardiness, ill-defined sickness given as reason.
4. Performance consistently below potential.
5. No part in extra curricular activities.
6. Frequent changes of schools.
7. Behavior problems requiring disciplinary measures.
8. Feeling of not belonging.

Family

9. More children than parents can readily control.
10. Parents inconsistent in affection and discipline.
11. Unhappy family situation.
12. Father figure weak or absent.

13. Education of parents at eighth grade level.
14. Few family friends.

Peers

15. Friends not approved by parents.
16. Friends not school oriented.
17. Friends much older or much younger.

Psychological Orientation

18. Resentful of all authority (home, school, police, job, church).
19. Deferred gratification pattern weak.
20. Weak self-image.

Dudley (1968) found seven characteristics that were useful in determining early dropout identification. These characteristics were: father's primary occupation, mother's educational attainment, student acceptance by other students (peers), rank in class, number of grade retentions, number of transfers to different schools, and number of siblings.

Walters and Kranzler (1970) reported the results of a study to apply dropout characteristics to the prediction of students who depart prematurely from school. Cumulative file data were used in identifying and cross-validating predictors of both dropouts and graduates. Prediction was achieved by using various combinations of the following variables gathered in the junior high school years: age, I.Q., retention, reading achievement, arithmetic achievement, socioeconomic level, participation in extra curricular activities, grade point average, and total days absent. They suggest,

> "Further research, using only variables made available during elementary school years, may indicate the possibility of identifying dropouts as early as the primary grades . . . the need is to find variables that can differentiate predicted dropouts and actual dropouts".

Miller, Saleem, and Herrington (1964) had compiled the most compete annotated bibliography regarding school dropouts available in the literature. Several of the factors common to dropouts in the preceding studies are here investigated independently to determine whether they were significant characteristics in these related studies.

Father's occupation did not appear to be a significant factor in studies by Adams (1958), Boggen (1955) and Livingston (1958). However, the results of eight studies showed that, among dropouts, there was a tendency for fathers' occupations to cluster in semi-skilled and unskilled employment groups. The studies supporting these findings were reported by Bledsoe (1959), Dillon (1949), Livingston (1959) Moore (1954), Murk (1960), Thomas (1954), Van Dyke and Hoyt (1958), and Young (1954).

Only one study reported in the Miller et. al. bibliography did not detect as important the educational attainment level of parents of dropouts. Boggen (1955) compared graduate and dropout characteristics and found no significant differences in the grade level completed by parents. Among other research, the level of completed education was significant in studies by Baldwin (1962), Bertrand (1962), Bledsoe (1959), Clements and Oelke 1967), Davie 1953), Hollingshead 1949), Moore (1954), Research Division, Syracuse, New York (1959) and Van Dyke and Hoyt (1958).

Class rank differences were not significant characteristics of dropouts in studies reported by Gregg (1949), and Thomas (1954). However, differences were noted in studies by Allen (1952-53 and 1956), Bowman and Matthews (1960), Chaloupka (1958), Dillon (1949), Dresher (1953-54), Hollingshead (1949), New York Division of Youth (1962), and Van Dyke and Hoyt (1958).

The *Bibliography* was replete with studies indicating the repeating of a school grade may be an important characteristic of school dropouts. This phenomenon was shown in studies by Allen (1952-53), Berston (1960), Bowman and Matthews (1960), Chaloupka (1958), Cook (1956), Dillon (1949), Gregg (1949), Hollingshead (1949), Livingston (1958), New York Divison of Youth (1962), Snepp (1951),

United States Department of Labor (1960), and Wolfbein (1959).

One study [Boggen (1955)] reported the characteristic of number of siblings as not important among dropouts, while the results of studies by several others indicate that dropouts are found more often among large families. These results wee reported by Bowman and Matthews (1960), Chaloupka (1958), Dillon (1949), Liddle (1962), and Young (1954).

Livingston (1958) found reading achievement to be a characteristic differentiating graduates and dropouts, but studies by Brook (1959), Lanier (1949), Penty (1959), Snepp (1956) and Thomas (1954) found no reason to believe significant differences in reading achievement could be found that detect dropouts.

Most studies reported in the *Bibliography* indicated dropouts usually reside with their natural parents and are not the products of broken homes. While the studies by Brook (1959) and New York State Division for Youth (1962) do show differences in broken homes among dropouts, the studies showing no difference between graduates and dropouts are reported by Chaloupka (1958), Dillon (1959), Lanier (1949), Livingston (1959), Van Dyke and Hoyt (1958), and Young (1954).

Research Questions

Although this published literature reports various and sometimes conflicting characteristics of dropouts, the ones most often mentioned were considered as variables for this statewide study of dropouts and graduates. The Office of State Superintendent of Public Instruction recognizes a need for local school boards, administrators and teachers to have the answers to several important questions concerning students who leave without obtaining a high school diploma.

(1) Do dropouts and graduates in Indiana differ in any characteristic manner?

(2) Is it possible to find these characteristics in the cumulative records of students in the primary grades?

(3) Is there any single characteristic or combination of characteristics that best differentiate dropouts from persisters?

(4) Are these characteristics different in school systems with small, medium and large size student populations?

(5) Are these characteristics different in school systems with low, medium and high assessed valuation (potential for educational resources)?

(6) Can a screening table be developed to help local school officials predict at an early age which of their children may become dropouts?

(7) Are there types of programs or procedures that might help schools be more successful in meeting the needs of these children, once identified?

Procedures

This reported study was supported by the Office of State Superintendent of Public Instruction through assistance from Title I, Elementary-Secondary Education Act, Title V-A, National Defense Education Act, and Vocational Education Act in an attempt to secure information that might provide answers to the research questions posed.

A major emphasis in the study was to determine if dropouts differed from graduates of Indiana high schools on the characteristics included in the questionnaire found in Appendix B. The items included in the final form were based in part on a study conducted by Dudley (1968) in the South Bend (Indiana) Community Schools and in part on other questionnaires purporting to differentiate dropouts from graduates.

An initial step was to include all students in Indiana schools in a stratified population from which random samples could be drawn and on which information would be requested. In the spring of 1969 the public schools of In-

diana were populated by somewhat more than one million two hundred thousand students. These students were reported in attendance in three hundred and four geographically defined school systems covering the State. These systems ranged in size from under one hundred to over one hundred thousand students. Although there are potentially an infinite number of ways these systems could have been classified, this survey used school system student population as one factor. This was agreed on because it was thought that the resources available to the school would depend in part on the size of the school system. This was also thought to be an effective way of separating rural and urban school systems.

A second classification factor in the stratification scheme which is usually considered important in differentiating Indiana school systems is one of wealth. The ability of the people in a local area to support their education is based in large part on the assessed valuation of the property in that region. The range of wealth within the public school systems in Indiana is from a low of less than two thousand five hundred dollars assessed valuation per student to a high of over one hundred thirty thousand dollars per student. This factor of wealth was also selected in part because of its assumed relationship to resources available to students.

The school systems were assigned by the factors of population and wealth as shown in Table 2. This division into levels resulted in approximately equal numbers of school systems represented in each of the twenty sections of the matrix. It was assumed that a random sampling of systems from these twenty categories would insure that the samples studied should adequately represent school systems in Indiana on these two classification factors. In addition, it was anticipated that characteristics which differentiate dropouts from graduates could be discovered within each school system category.

Since it would have been unwieldly and impossible to gather information about students in every school, information about students was requested from a selected segment of Indiana school systems. It was pre-determined that the segment was to be of sufficient size and quality to give a

true representation of the total population. Operationally, the decision was made to involve between five and ten percent of the school systems and, at the same time, assure that these systems enrolled between five and ten percent of the student population in Indiana public schools.

Table 2

PERCENTAGE OF 304 INDIANA SCHOOL SYSTEMS GROUPED IN CATEGORIES BY SIZE AND WEALTH

Assessed Valuation Per Pupil	Number of Pupils (Kindergarten through Grade 12) 1-999	1000-1999	2000-3999	4000+
$ 5,999 or less	2.9%	4.8%	4.5%	2.6%
6,000 - 7,999	2.6	11.9	7.7	6.5
8,000 - 9,499	3.9	8.1	7.7	5.5
9,500 - 11,499	1.9	5.8	6.1	3.9
11,500 or more	3.5	4.5	3.2	2.9

A total of thirty-one systems was selected by random sampling from each of the twenty groupings. Five of these systems declined to participate and six were unable to return their data in the time specified for the end of data collection. From the returns, it was determined the lack of response could be accounted for from schools with the smallest student population and from areas of least assessed valuation per pupil. For purposes of analysis the stratification matrix was collapsed by combining the first column (Table 2) under number of pupils (1-999) with those schools in the second column (1000-1999). Likewise, the first row of schools under assessed valuation ($5999 or less) was combined with the second row ($6000-7999). The final matrix of schools developed prior to data analysis now contained twelve cells with three levels of student populations and four levels of assessed valuation per pupil.

The sample of participating schools now represented the twelve cells in the stratification matrix. The original thirty-one randomly selected school systems (9.7% of the population) had contained a student population of 110,500 pupils (9.2% of the population). Because adjustments had to be made in the sampling matrix the dimensions of the participating sample were reviewed to determine if they met the

original selection criteria. Completed and usable returns that were received from the twenty school systems (6.6% of the population) had 90,293 students enrolled (7.5% of the population). The final returns thus appeared to fall within the limits posed for the sample at the start of the study.

Each participating school system was requested to select at random the records of fifty graduates and fifty dropouts and complete the twenty item biographical questionnaire on each subject from the information contained in early school records. The specific instructions for completing the form and selecting the sample are reproduced in Appendix B.

Final returns showed the cumulative records of 987 dropouts and 1003 graduates had been identified. The information used in the study was obtained from these subjects' cumulative records. The following categorical variables were requested on each subject and recorded on machine scorable IBM cards:

1. Student Classification. Either graduate or dropout.
2. Sex.
3. Age at last birthday.
4. Father's present primary occupation. Ten categories were offered that were ranked in order of socio-economic levels.
5. Father's highest education level. Seven categories were offered in educational attainment.
6. Mother's present primary occupation. Ten categories were offered that were ranked in order of socio-economic levels.
7. Mother's highest education level. Seven categories were offered in educational attainment.
8. Acceptance by other students. Four categories: sought out, accepted, tolerated and avoided were used.
9. Student's overall scholastic record. School mark averages were used with a letter grade for each level of the rating.

10. Number of retentions in elementary school from grade kindergarten through six.
11. Transfers. The number of transfers to different schools from elementary to junior high school.
12. Siblings. The number of brothers and sisters.
13. Reading. The grade equivalent score earned on a reading achievement test in the 4th, 5th, or 6th grade.
14. Arithmetic. The grade equivalent score earned on an arithmetic achievement test in the 4th, 5th, or 6th grade.
15. Residence. The adults with whom the student resides.
16. I.Q. The I.Q. score earned on the most recent mental ability test.
17. Pupil personnel contact. The approximate number of known interviews with counselors, psychologists, psychometrists, social workers, and therapists during grades seven through ten.

Prior to any data analysis the returns were inspected and the following was accomplished: (a) the arithmetic and reading achievement score variables were interpreted into a new scale denoting the relative number of years above or below grade level at the time of testing. This provided a comparable measuring device that accounted in part for differences in the grade level at time of testing. (b) The I.Q. score variable was interpreted into a new scale with each level representing one standard deviation of scores. This provided a comparable measuring device that accounted for differences in I.Q. due to differences in ability tests used. (c) Any variable was discarded if more than twenty-five percent of the subjects had no response to the item (interpreted as not recorded in the cumulative record). Through the inspection process, several of the categorical variables were eliminated because sufficient numbers of the subjects did not have information recorded about the item. The variables eliminated in this manner were: (6.) Mother's occupation, (10.) elementary school retentions, (11.) school transfers, (15.) residence, and (17.) pupil personnel con-

tact. The nine remaining variables were considered as having potential for further analysis seeking possible differentiation between dropouts and graduates. (d) The total sample was alternately divided into two equal groups so that a holdout could be used for cross-validation of the results.

Data Analysis

Two types of data analysis were planned and conducted. The first analysis technique employed was the, "Stepwise Multiple Discriminant Analysis," developed by the Health Sciences Computing Facility of the University of California at Los Angeles (September, 1965 version). The initial and holdout groups of the data were further subdivided for the analysis and cross-validation phases of the study. The initial group was divided into original classification levels according to assessed valuations per student and the holdout group was divided according to the original classification levels of school system population. The discriminant analysis was conducted and discriminant function coefficients determined for the best combination of variables in each sub-grouping. Once these were determined, the initial and holdout groups were regrouped using the alternate classification levels and a cross-validation was conducted using the discriminant function coefficients obtained through analyses. A classification matrix was produced that interpreted accuracy of prediction for both dropouts and graduates. The multiple discriminant function coefficients and constants that differentiate the dropouts and graduates are shown in the Results section along with the classification matrix and accuracy of prediction results produced through the cross-validation step of analysis.

The second analysis technique was employed as a means of producing a two dimensional screening table that could be entered and used without a complicated statistical formula.

Since discriminate analysis as a data analysis procedure has been primarily used with continuous or dichotomous data it may have less value where categorical variables are employed in the research. Introducing categorical variables

into any analysis must consider the question: is it meaningful to order this set of categories in this particular manner and consider it a single dependent variable? An analysis procedure was therefore introduced that produced weights corresponding to the relevant relationship between and among the dependent variables.

The procedure entailed first determining the chi square value for each of the nine variables. The variable with the smallest significant chi square value was then assigned the value of one and all other larger (in chi square values) variables were assigned a weight denoting a ratio relationship to the smallest variable. As an example: If the three variables of father's occupation, father's education, and I.Q. had respective significant chi squares of 121.6, 62.9, and 254.4, the assigned weights denoting their ratio relationships would 2, 1, and 4 respectively. This procedure resulted in establishing inter-variable relationships.

Precedence for this procedure is set forth in writings by Gross and others (1958) and more recently by Mayer (1963). In dealing with a similar problem he wrote: "Particular attention was given to the use of chi square as an index of divergence in accordance with the principle that the higher the value of chi square, the greater is the possibility of a significant difference."

Next, an intra-variable ratio relationship was established for each variable. The ratio of frequencies between dropouts and graduates at each level for each variable was computed. If the extreme levels of any variable for either the dropout or graduate category contained less than ten responses, the frequencies were combined with those in the next level before computing the ratio between dropout and graduate frequencies. The direction of the ratio was recorded as (—) if more dropouts than graduates were present and (+) if more graduates than dropouts were shown at that level of the variable. As an example the variable of peer acceptance had the following frequencies recorded at each level for both graduates and dropouts in Table 3.

Table 3

PEER ACCEPTANCE

Level	Graduate	Dropout	Ratio
Sought out	92	18	+5
Accepted	795	590	+1
Tolerated	98	292	—3
Avoided	20	93	—5

The intra-variable ratio relationships are shown corresponding to each level of the peer acceptance variable used in the example.

The next step was to multiply the inter-variable weights for each variable by the ratios at each level of that variable. The effect of this procedure was to establish a weighted relationship between all variable levels represented in the survey.

Analysis of the data followed and utilized the application of the derived weights to all subjects in the study. A score was computed for each subject by adding the weights appropriate to that subject. For this analysis the subjects were assigned to initial and holdout groups with each group further subdivided into the original assessed valuation and school system population subgroups respectively. Any subject whose computed score was zero or any negative score was considered a predicted dropout while those with a positive score were considered predicted graduates. Of those subjects who were predicted either dropout or graduate, a check was made to determine which ones were predicted correctly. A classification matrix was produced for each subgrouping in order to interpret the accuracy of prediction of both dropouts and graduates.

Up to this point in the analysis, all nine variables were used. A stepwise removal of one variable at a time from the computation followed. The variable with the smallest chi square value was successively eliminated from the computation at each step. A new series of classification matrices was produced and compared with the previous one for that subgroup. If the accuracy of prediction was not reduced appreciably, efficiency was considered gained by not having to utilize that variable. This stepwise elimination proceeded

for each subgrouping until predictive efficiency would have been reduced appreciably if one more variable had been removed.

The Results section contains the two-dimensional screening table for each sub-group in the study. This table represents the most efficient prediction scheme for that sub-group with regard to the above method of computation. Along with each table is the classification matrix showing accuracy of prediction for both dropouts and graduates.

Concurrent Reliability Study

Because the questionnaire and sampling procedure used in the study were developed specifically for this research, a separate reliability study was conducted to determine the statistical reliability of independent raters as they used the questionnaire and recording procedures. Three separate school systems agreed to participate in this reliability study. Five different raters in each of these three school systems independently rated (using the questionnaire and machine scorable IBM card) the school records of one high school graduate and one dropout from the records maintained in that school system. Consistency of response was analyzed to determine the inter-rater reliability of these independent raters. An analysis of variance procedure was used (Winer, 1962, pp. 125-131). The resulting reliability coefficients ranged from $r = .95$ to $r = .99$. One would interpret these results to mean that whatever was found in the cumulative records and recorded on the machine scorable IBM card would not be expected to vary as a result of interpretations from different raters.

CAUTION!!

The following pages present methods by which children as young as primary school age may be correctly or erroneously classified. It is the author's contention that the practice of classification of children along any dimension (bright, dull, fast, slow, etc.) historically results in educational deprivation and embarrassment to the needy.

If the application of the following identifiers is accompanied by programs of a compensatory nature, they are serving the purpose for which they were intended.

If they are only used for curious identification without thought of remediation the danger of inimical effects by peer, adult, and parental information mishandling may result.

(Please — childrens' lives are precious.)

Section III

RESULTS

PORTRAIT OF THE POTENTIAL DROPOUT

The purpose of this section is to expose the results of the study of a sample of students, half of whom graduated from high school while the other half terminated the pursuit of a high school diploma. Several questions were formulated and presented in Section I. The results presented in this section are attempts to answer each of the specific questions. These results are presented in tabular as well as descriptive form. The data were analyzed using two different statistical techniques. Therefore, the results of the analyses will be presented separately in the manner in which they relate to the original research questions.

The first question under study was whether dropouts and graduates in Indiana differ in any characteristic manner. *The answer to this question based upon the random sample that was studied, must be an unqualified yes.* There are characteristics of students presented in the literature and on the following pages showing that dropouts and graduates do indeed differ.

The second question for which an answer was searched was whether it is possible to locate these characteristics in the school records of children in the primary grades. *Again the answer must be yes.* Although some of the characteristics considered useful prior to gathering the data were not found with sufficient frequency in the records of this sample of

subjects, the characteristics that were located appeared to be efficient in differentiating the dropout from the graduate.

The third question was whether any single characteristic or combination of characteristics best differentiates dropouts from persisters. *No single characteristic appeared to differentiate completely, however, combinations of certain characteristics were shown to be valid predictors of potential dropouts.* The specific characteristics and their unique combinations are presented through the following answers to questions four and five. (See Table 4.)

The results relating to questions four and five are presented in Tables 4 through 12. Question four asked whether the unique combination of differentiating variables was the same for students in school systems with low, medium and high assessed valuation per student. *The results in tables 4 and 8 show that different combinations of variables appear to be important in the statistical computation of a score that most completely and efficiently separates the dropout from the graduate.* The computed constant and discriminant function coefficients are presented. (See Tables 5 through 7.)

Tables 5 through 7 and 9 through 12 show the classification matrices and accuracy of prediction results. It may be noted that the variables most often present in the prediction equation were Scholastic Record, Mental Ability I.Q. and Peer Acceptance. By applying the discriminant function coefficients to the holdout group through cross-validation, a dropout predictive accuracy of not less than 70% was achieved. (See Tables 8 through 12.)

Table 4

COMBINATION OF VARIABLES; CONSTANTS AND DISCRIMINANT FUNCTION COEFFICIENTS MOST EFFICIENT IN DISCRIMINATING DROPOUTS FROM GRADUATES AMONG THE SCHOOL SYSTEM STUDENT POPULATION SUB-SAMPLES

Sub-Sample	Subjects	Constant	Father's Occupation	Father's Education	Mother's Education	Peer Acceptance	Scholastic Record	Number of Siblings	Reading Achievement	Arithmetic Achievement	Mental Abilities I. Q.
School System Student Populations											
1-1999	Graduates	20.43	—	—	—	6.72	2.00	.74	—	—	5.07
	Dropouts	19.57	—	—	—	7.62	2.27	.54	—	—	4.45
2000-3999	Graduates	18.16	—	—	.05	3.50	4.07	.20	—	.16	4.40
	Dropouts	21.60	—	—	.26	4.25	5.01	.34	—	.07	3.82
4000 and larger	Graduates	15.24	.43	—	—	4.46	1.81	.95	1.51	.11	—
	Dropouts	19.83	.55	—	—	4.84	2.94	1.15	1.40	.00	—

Table 5

CLASSIFICATION MATRIX AND ACCURACY OF PREDICTION RESULTS USING THE VARIABLES: PEER ACCEPTANCE, SCHOLASTIC RECORD, NUMBER OF SIBLINGS, AND MENTAL ABILITY I.Q. WITH THE 1-1999 STUDENT POPULATION SUB-SAMPLE

	PREDICTED	
KNOWN	Graduates	Dropouts
Graduates	A = 147	C = 59
Dropouts	B = 50	D = 142

Total Predictive Accuracy = 73% $\left[\frac{A+D}{A+B+C+D}\right]$

Dropout Predictive Accuracy = 75% $\left[\frac{D}{B+D}\right]$

Table 6

CLASSIFICATION MATRIX AND ACCURACY OF PREDICTION RESULTS USING THE VARIABLES: MOTHER'S EDUCATION, PEER ACCEPTANCE, SCHOLASTIC RECORD, NUMBER OF SIBLINGS, ARITHMETIC ACHIEVEMENT, AND MENTAL ABILITY I.Q. WITH THE 2000-3999 STUDENT POPULATION SUB-SAMPLE

	PREDICTED	
KNOWN	Graduates	Dropouts
Graduates	A = 136	C = 33
Dropouts	B = 32	D = 138

Total Predictive Accuracy = 81% $\left[\frac{A+D}{A+B+C+D}\right]$

Dropout Predictive Accuracy = 81% $\left[\frac{D}{B+D}\right]$

Table 7

CLASSIFICATION MATRIX AND ACCURACY OF PREDICTION RESULTS USING THE VARIABLES: FATHER'S OCCUPATION, PEER ACCEPTANCE, SCHOLASTIC RECORD, NUMBER OF SIBLINGS, READING ACHIEVEMENT AND ARITHMETIC ACHIEVEMENT WITH THE 4000 AND LARGER STUDENT POPULATION SUB-SAMPLE

	PREDICTED	
KNOWN	Graduates	Dropouts
Graduates	A = 94	C = 26
Dropouts	B = 28	D = 116

Total Predictive Accuracy = 79% $\left[\frac{A+D}{A+B+C+D}\right]$

Dropout Predictive Accuracy = 80% $\left[\frac{D}{B+D}\right]$

Table 8

COMBINATION OF VARIABLES; CONSTANTS AND DISCRIMINANT FUNCTION COEFFICIENTS MOST EFFICIENT IN DISCRIMINATING DROPOUTS FROM GRADUATES AMONG THE ASSESSED VALUATION PER PUPIL SUB-SAMPLES

Sub-Sample	Subjects	Constant	Father's Occupation	Father's Education	Mother's Education	Peer Accept-ance	Scho-lastic Record	Number of Siblings	Reading Achievement	Arithmetic Achievement	Mental Abilities I. Q.
Assessed Valuation Per Pupil											
$7,999 or less	Graduates	15.20	.65	—	—	5.40	1.11	—	—	—	3.89
	Dropouts	18.30	.84	—	—	6 61	1.57	—	—	—	3.35
$8,000-$9,499	Graduate	16.90	—	—	—	—	4.77	—	—	—	5.05
	Dropouts	17.28	—	—	—	—	5.61	—	—	—	4.28
$9,500-$11,499	Graduates	24.79	.43	—	—	3.43	4.65	.92	—	—	6.22
	Dropouts	25.37	.62	—	—	4.25	5.22	.72	—	—	5.31
$11,500 and over	Graduates	17.10	—	3.36	—	4.91	—	—	—	—	3.27
	Dropouts	20.24	—	4.05	—	6.09	—	—	—	—	2.57

Table 9

CLASSIFICATION MATRIX AND ACCURACY OF PREDICTION RESULTS USING THE VARIABLES: FATHER'S OCCUPATION, PEER ACCEPTANCE, SCHOLASTIC RECORD, AND MENTAL ABILITY I.Q. WITH THE $7,999 OR LESS ASSESSED VALUATION SUB-SAMPLE

	PREDICTED	
KNOWN	Graduates	Dropouts
Graduates	A = 127	C = 40
Dropouts	B = 42	D = 131

Total Predictive Accuracy = 76% $\left[\frac{A+D}{A+B+C+D}\right]$

Dropout Predictive Accuracy = 76% $\left[\frac{D}{B+D}\right]$

Table 10

CLASSIFICATION MATRIX AND ACCURACY OF PREDICTION RESULTS USING THE VARIABLES: SCHOLASTIC RECORD AND MENTAL ABILITY I.Q. WITH THE $8,000-9,499 ASSESSED VALUATION SUB-SAMPLE

	PREDICTED	
KNOWN	Graduates	Dropouts
Graduates	A = 58	C = 11
Dropouts	B = 23	D = 53

Total Predictive Accuracy = 77% $\left[\frac{A+D}{A+B+C+D}\right]$

Dropout Predictive Accuracy = 70% $\left[\frac{D}{B+D}\right]$

Table 11

CLASSIFICATION MATRIX AND ACCURACY OF PREDICTION RESULTS USING THE VARIABLES: FATHER'S OCCUPATION, PEER ACCEPTANCE, SCHOLASTIC RECORD, NUMBER OF SIBLINGS, AND MENTAL ABILITY I.Q. WITH THE $9,500-11,499 ASSESSED VALUATION SUB-SAMPLE

	PREDICTED	
KNOWN	Graduates	Dropouts
Graduates	A = 119	C = 31
Dropouts	B = 41	D = 107

Total Predictive Accuracy = 76% $\left[\frac{A+D}{A+B+C+D}\right]$

Dropout Predictive Accuracy = 73% $\left[\frac{D}{B+D}\right]$

Table 12

CLASSIFICATION MATRIX AND ACCURACY OF PREDICTION RESULTS USING THE VARIABLES: FATHER'S EDUCATION, PEER ACCEPTANCE AND MENTAL ABILITY I.Q. WITH THE $11,500 AND OVER ASSESSED VALUATION SUB-SAMPLE

	PREDICTED	
KNOWN	Graduates	Dropouts
Graduates	A = 83	C = 23
Dropouts	B = 24	D = 82

Total Predictive Accuracy = 78% $\left[\frac{A+D}{A+B+C+D}\right]$

Dropout Predictive Accuracy = 78% . $\left[\frac{D}{B+D}\right]$

The second statistical technique used with the data was developed to provide an answer to question six. That question was whether a screening table could be developed to help local school officials predict at an early age which children may become dropouts. *The results relating to question six are presented in tables 13 through 19.* The sub-samples of student population and assessed valuation per pupil were used in the preparation of the screening tables. One table relates to each sub-sample. Along with each screening table is presented a classification matrix and the accuracy of prediction results. Preceding the presentation of all the screening tables is a descriptive note of directions for using the tables. (See Tables 13 through 19.)

From this analysis it may be noted that the variables most often present in the screening table were Scholastic Record, Peer Acceptance, Mental Ability I.Q., and Mother's Education. Father's Education and Father's Occupation variables added to the prediction with somewhat less frequency and number of siblings was a predictive variable with one sub-sample.

Note On Using Dropout Screening Tables

The *Dropout Screening Tables* presented on the following pages have varying numbers of predictors, but the levels of each predictor correspond to a positive, neutral, or negative score located on the left margin of the *Table*. To determine a student's total score, one would first determine the score corresponding to each individual predictor variable and place it in the blank space below the predictor column. When a score (negative, neutral, or positive) has been determined for each predictor, the algebraic sum of the scores is computed and placed in the space labeled total. This total score is important as a predictor score. Should the algebraic sum be a negative number (—1 through —20) the student would be identified as a potential dropout. A positive algebraic sum (+1 through +24) would be characteristic of a potential graduate. Keep in mind that com-

pletely accurate prediction is not possible with this or any screening device. Based on the results of this research, one would expect to be inaccurate in the prediction of either dropouts or graduates nearly one time out of every five.

One example should suffice in demonstrating the use of a *Dropout Screening Table.* The following predictors and their corresponding levels constitute this hypothetical example of the records of an elementary school fourth grade student:

1. Grade average	= C	= +1
2. Peer acceptance	= tolerated	= —2
3. Mental Ability I.Q.	= +.5 standard deviation	= +1
4. Mother's education	= grade 9	= —1
5. Father's education	= grade 11	= 0
6. Father's occupation	= semi-skilled	= 0
	Algebraic Total	—1

The student in this example would be predicted as a dropout because of the negative algebraic score.

Table 13

SCREENING TABLE DEVELOPED FROM THE 1-1999 STUDENT POPULATION SUB-SAMPLE

SCORE	PREDICTOR VARIABLES Scholastic Record	Peer Acceptance	Mental Ability I.Q.	Mother's Education	Father's Education	Father's Occupation
+5	A & B	Sought Out				
+4				College	College	
+3			Above +1 Standard Deviation	Vocational or Business		Professional, Technical or Managerial
+2					Vocational or Business	
+1	C		$\bar{x}$ to +1 Standard Deviation	High School Graduate		Sales, Merchandising, Accounting, Clerical
0		Accepted			Grade 9 to High School Grad.	Skilled, Semi-Skilled, Service or Farming
−1			$\bar{x}$ to −1 Standard Deviation	Grade 9		
−2	D	Tolerated			Grade 8 or Below	Unskilled or Unemployed
−3				Grade 8 or Below		
−4		Avoided	Below −1 Standard Deviation			
−5	F					
↘		+	+	+	+	+ = TOTAL

KNOWN	PREDICTED Graduates	Dropouts
Graduates	A = 151	C = 55
Dropouts	B = 35	D = 157

Total Predictive Accuracy = 77% $\left[\frac{A+D}{A+B+C+D}\right]$

Dropout Predictive Accuracy = 82% $\left[\frac{D}{B+D}\right]$

Table 14

SCREENING TABLE DEVELOPED FROM THE 2000-3999 STUDENT POPULATION SUB-SAMPLE

SCORE	PREDICTOR VARIABLES: Scholastic Record	Peer Acceptance	Mental Ability I.Q.	Mother's Education	Father's Education	Father's Occupation
+5	A & B	Sought Out				
+4				College	College	
+3			Above +1 Standard Deviation	Vocational or Business		Professional, Technical or Managerial
+2					Vocational or Business	
+1	C		$\bar{x}$ to +1 Standard Deviation	High School Graduate		Sales, Merchandising, Accounting, Clerical
0		Accepted			Grade 9 to High School Grad.	Skilled, Semi-Skilled, Service or Farming
−1			$\bar{x}$ to −1 Standard Deviation	Grade 9		
−2	D	Tolerated			Grade 8 or Below	Unskilled or Unemployed
−3				Grade 8 or Below		
−4		Avolded	Below −1 Standard Deviation			
−5	F					
↘	+	+	+	+	+	= TOTAL

KNOWN	PREDICTED: Graduates	Dropouts
Graduates	A = 129	C = 42
Dropouts	B = 26	D = 142

Total Predictive Accuracy = 80% $\left[\frac{A+D}{A+B+C+D}\right]$

Dropout Predictive Accuracy = 84% $\left[\frac{D}{B+D}\right]$

Table 15

SCREENING TABLE DEVELOPED FROM THE 4000 AND LARGER STUDENT POPULATION SUB-SAMPLE

SCORE	PREDICTOR VARIABLES: Scholastic Record	Peer Acceptance	Mental Ability I.Q.	Mother's Education
+5	A & B	Sought Out		
+4				College
+3			Above +1 Standard Deviation	Vocational or Business
+2				
+1	C		$\bar{x}$ to +1 Standard Deviation	High School Graduate
0		Accepted		
−1			$\bar{x}$ to −1 Standard Deviation	Grade 9
−2	D	Tolerated		
−3				Grade 8 or Below
−4		Avoided	Below −1 Standard Deviation	
−5	F			
↪		+	+ +	= ____ TOTAL

KNOWN	PREDICTED: Graduates	Dropouts
Graduates	A = 98	C = 18
Dropouts	B = 23	D = 125

Total Predictive Accuracy = 85% $\left[\frac{A+D}{A+B+C+D}\right]$

Dropout Predictive Accuracy = 84% $\left[\frac{D}{B+D}\right]$

Table 16

SCREENING TABLE DEVELOPED FROM THE $7,999 OR LESS ASSESSED VALUATION SUB-SAMPLE

	PREDICTOR VARIABLES			
SCORE	Scholastic Record	Peer Acceptance	Mental Ability I.Q.	Mother's Education
+5	A & B	Sought Out		
+4				College
+3			Above +1 Standard Deviation	Vocational or Business
+2				
+1	C		$\bar{x}$ to +1 Standard Deviation	High School Graduate
0		Accepted		
−1			$\bar{x}$ to −1 Standard Deviation	Grade 9
−2	D	Tolerated		
−3				Grade 8 or Below
−4		Avoided	Below −1 Standard Deviation	
−5	F			
↪		+	+ +	= _____ TOTAL

KNOWN	PREDICTED Graduates	Dropouts
Graduates	A = 149	C = 20
Dropouts	B = 34	D = 137

Total Predictive Accuracy = 84% $\left[\frac{A+D}{A+B+C+D}\right]$

Dropout Predictive Accuracy = 81% $\left[\frac{D}{B+D}\right]$

Table 17

SCREENING TABLE DEVELOPED FROM THE $8,000 TO $9,499 ASSESSED VALUATION SUB-SAMPLE

SCORE	PREDICTOR VARIABLES Scholastic Record	Mental Ability I.Q.	Mother's Education
+5	A & B		
+4			College
+3		Above +1 Standard Deviation	Vocational or Business
+2			
+1	C	$\bar{x}$ to +1 Standard Deviation	High School Graduate
0			
−1		$\bar{x}$ to −1 Standard Deviation	Grade 9
−2	D		
−3			Grade 8 or Below
−4		Below −1 Standard Deviation	
−5	F		
→	+	+	= ____ TOTAL

KNOWN	PREDICTED Graduates	Dropouts
Graduates	A = 51	C = 19
Dropouts	B = 10	D = 65

Total Predictive Accuracy = 80% $\left[\frac{A+D}{A+B+C+D}\right]$

Dropout Predictive Accuracy = 86% $\left[\frac{D}{B+D}\right]$

Table 18

SCREENING TABLE DEVELOPED FROM THE $9,500 TO $11,499 ASSESSED VALUATION SUB-SAMPLE

SCORE	PREDICTOR VARIABLES: Scholastic Record	Peer Acceptance	Mental Ability I.Q.	Mother's Education	Father's Education	Father's Occupation	No. of Siblings
+5	A & B	Sought Out					
+4				College	College		
+3			Above +1 Standard Deviation	Vocational or Business		Professional, Technical or Managerial	
+2					Vocational or Business		
+1	C		$\bar{x}$ to +1 Standard Deviation	High School Graduate		Sales, Merchandising, Accounting, Clerical	
0		Accepted			Grade 9 to H. S. Grad.	Skilled, Semi-Skilled, Service or Farming	0 - 5
−1			$\bar{x}$ to −1 Standard Deviation	Grade 9			7 or More
−2	D	Tolerated			Grade 8 or Below	Unskilled or Unemployed	
−3				Grade 8 or Below			6
−4		Avoided	Below −1 Standard Deviation				
−5	F						
↪	+	+	+	+	+	+	= ____ TOTAL

KNOWN	PREDICTED: Graduates	Dropouts
Graduates	A = 115	C = 34
Dropouts	B = 28	D = 121

Total Predictive Accuracy = 79% $\left[\frac{A+D}{A+B+C+D}\right]$

Dropout Predictive Accuracy = 81% $\left[\frac{D}{B+D}\right]$

Table 19

SCREENING TABLE DEVELOPED FROM THE $11,500 OR MORE ASSESSED VALUATION SUB-SAMPLE

SCORE	PREDICTOR VARIABLES: Scholastic Record	Peer Acceptance	Mental Ability I.Q.	Mother's Education	Father's Education
+5	A & B	Sought Out			
+4				College	College
+3			Above +1 Standard Deviation	Vocational or Business	
+2					Vocational or Business
+1	C		$\bar{x}$ to +1 Standard Deviation	High School Graduate	
0		Accepted			Grade 9 to High School Grad.
−1			$\bar{x}$ to −1 Standard Deviation	Grade 9	
−2	D	Tolerated			Grade 8 or Below
−3				Grade 8 or Below	
−4		Avoided	Below −1 Standard Deviation		
−5	F				
↪		+	+	+	+ = ____ TOTAL

KNOWN	PREDICTED: Graduates	Dropouts
Graduates	A = 76	C = 29
Dropouts	B = 14	D = 93

Total Predictive Accuracy = 80% $\left[\frac{A+D}{A+B+C+D}\right]$

Dropout Predictive Accuracy = 87% $\left[\frac{D}{B+D}\right]$

Section IV
CONCLUSIONS

PIECING THE DROPOUT PUZZLE TOGETHER

The purpose of the reported research was to locate indicators of potential school leavers from information available during the primary school grades. The preceding section reported the results of this research that may be highlighted as follows:

1. Dropouts and graduates in Indiana differ on several predictive variables.
2. The predictive variables appear to be sufficiently available in the cumulative records of primary grade level students.
3. The several variables used in combination predict more efficiently than do the variables used singly.
4. The combination of predictive variables differs among school system having small, medium, and large size student populations
5. The combination of predictive variables differs among school systems having low, medium, and high assessed valuation per student.
6. Screening tables are developed and reported that may be used to predict potential dropouts at an early grade.

7. The grades assigned by teachers to students work appear as one of the primary early identifiers of dropouts. This result seems consistent with published literature in the area.

8. Peer acceptance is another important predictive variable, although not often mentioned in the research.

9. The intelligence quotient appears as another primary predictor in this study and in other studies reported earlier.

10. The educational attainment of the parents, especially the mother, appears as a variable that adds to a predictability formula in some school systems.

11. Father's occupation and number of siblings, both mentioned often in the literature on dropout prediction, reduce predictive error in only a limited category of school systems.

The conclusions reached from these results may possibly suffer from limitations inherent in the study. First, only two-thirds of the random sample invited to participate in the study completed the data gathering instrument. Therefore, generalizing the results to the total population of Indiana schools may reach well beyond the results shown by the gathered data. Second, the Screening Tables were developed based upon a statistical procedure planned for this study and utilizing somewhat arbitrary operational definitions. However, the results of these statistical procedures appear to be as effective as with the use of multiple discriminant function analysis.

Classification procedures may be developed for the behavioral sciences, but the true test of any classification lies largely in being able to use it in subsequent research and practice, rather than in the practical approach for its construction.

Further Research and Programs Suggested

Two practical uses of the Screening Tables might be explored through further research.

1. Educators in Indiana may wish to identify in their own schools the cumulative records of a sample of dropouts and graduates and apply the appropriate Screening Table to the available data. If the results of these studies could be then sent to the author of this report (as well as identifying information related to school size, wealth, and number of subjects), a data base could be built and reported showing the predictive effectiveness of the instruments using fresh samples.

2. We might speculate in what magnitude the results of application of the Screening Tables would correlate with the results of other predictive instruments, i.e., *School Interest Inventory*, a scale for detecting potential school dropouts, Houghton-Mifflin Company; *Dropout Prediction Table*, Cervantes; Illinois Dropout Prediction Study *Instrument;* and others.

Several programs or educational approaches seem to be implied when one looks at the results of this research. While untried approaches may or may not be successful, the speculation about such approaches should be outlined for further investigation.

1. The dropout, while yet in early potential form, needs an opportunity for success experiences. It seems imperative that these be deliberately built into the early school grades for every child. The ungraded primary could provide a partial answer as an approach.

2. With peer relationships an important variable, perhaps the three R's of primary education could be supplemented by attending to skill development in social relationships. Rather than an incidental part of education it may have a place of equal importance with the 3 R's in the elementary school curriculum. This also means that in-service and training programs would have to be provided to prepare teachers to develop appropriate student social relationship skills.

3. Every teacher knows that an effective way to learn educational material is through preparation to teach

that particular topic. If students in intermediate grades were given the opportunity to be a peer-tutor to a younger age student, a motivation and condition for basic educational skills development might take place. This opportunity for service could also enhance skills in social relationships.

4. With the parental influence being an important factor in the lives of students, it would appear profitable to develop early joint home-school involvement activities that might provide an added buffer against dropping out of school. These activities should be on-going and assume that parents are educational partners rather then school visitors.

5. The relevance of education to later careers may have a vital place in the curriculum of elementary children. If children and parents alike can discover that persons who have a talent for arithmetic are found in certain career clusters and those with talent in science are apt to be found in certain other career clusters, then learning gains more significance.

6. The role of the elementary school counselor as a concultant to teachers and parents and a counselor of children could become the key factor to reducing the dropout rate for a school. The counselor's work could encompass the first five suggestions considered above.

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APPENDIX A

PROJECTED CUMULATIVE HOLDING POWER COMPUTATION

The holding power of Indiana schools is a measure of the proportion of its pupils who do not drop out over a given period of time. For computational purposes, this was the average attendance from 1964-70 for each grade level 5 through 12. The computational formula for Projected Cumulative Annual Grade Holding Power was:

$$PCAGHP_{5\text{-}12}^{1964\text{-}70} = GHP_{5}^{1964\text{-}70\ (avg)} \times GHP_{6}^{1964\text{-}70\ (avg.)} \times GHP_{7}^{1964\text{-}70\ (avg.)} \times GHP_{8}^{1964\text{-}70\ (avg.)} \times GHP_{9}^{1964\text{-}70\ (avg.)} \times GHP_{10}^{1964\text{-}70\ (avg.)} \times GHP_{11}^{1964\text{-}70\ (avg.)} \times GHP_{12}^{1964\text{-}70\ (avg.)}$$

Using this formula, each grade level holding power is computed by substracting, from the total number of different pupils entering each grade level at the beginning of the school year, the number of pupils who dropped out since the preceding year, dividing the remainder by the number of different pupils entering, and expressing the quotient as a percentage.

Grade	5	6	7	8	9	10	11	12	
GHP	98.6	x 98.6	x 100.0	x 98.4	x 100.0	x 94.7	x 91.9	x 92. 6	= 77.2%

APPENDIX B

STATE OF INDIANA
DEPARTMENT OF PUBLIC INSTRUCTION
JOHN J. LOUGHLIN, SUPERINTENDENT
INDIANAPOLIS 46204
ROOM 229 STATE HOUSE
AREA CODE 317 633 6610

Instructions for Completion of Dropout-Graduate Survey

It should be said from the outset that your cooperation in this most vital project is appreciated. It needs also to be stated that if the results of this study are to be meaningful, extreme care must be exercised by the person(s) having responsibilities for identifying the graduate and dropout samples, as well as for recording data about them. This point cannot be stressed enough! *The person who completes the enclosed questionnaires should be someone familiar with both the graduates and the dropouts about whom data is recorded.*

Should there be information the recorder is unsure of, it would seem better to contact teachers, counselors, peers, etc., who can give a more accurate response, than to guess.

Sampling

The sampling procedure should be conducted so that the complete cumulative records of 50 dropouts and 50 graduates are selected by chance occurrence from all the complete records available in the dropout and graduate population.

The search for records needs to be conducted in a systematic manner to assure that the 50 individuals used in each sample (graduate and dropout) are of approximately the same age.

Begin by selecting 50 dropouts. Identify all dropouts who were born in the same year(s) as most of your present (1968-69) senior class members. If that number of dropouts is 50 or more, select, at random, 50 complete records of dropouts. If this number of dropouts does not total 50, increase the size of the selection group by *adding to it* all dropouts who were born in the same year(s) as most members of your 1967-68 graduating class. Continue *adding* in this manner until 50 or more complete records are available for selecting a sample of 50 dropout records.

The sample of 50 graduate records should be made in a like manner. Select from only the records of those students who *are going to graduate* or have already graduated. The records of those students who graduated during the class years identified above (dropout selection) should *all* form the group from which you randomly select 50 graduate records.

Example:

ABC School Corporation has a 1968-69 senior class in which the 200 students' birth years ranged from 1950 to

1953. The school counselor finds that 35 complete cumulative records are available from dropouts born during 1950-1953. He next finds that the 1967-68 graduating class of 200 had a birth year range from 1948 to 1951. The counselor finds that 25 more complete cumulative records are available from this expanded (1948 and 1949 birth years) population of dropouts.

From this pool of 60 records (35 plus 25) he selects 50 at random. His selection of 50 graduate records is then made from the total records of the 1967-68 and 1968-69 graduating classes *together*.

The random selection method you use should be such that no pre-identification of students occurs and that all records in the age-groups have an equal chance of being selected.

Recording of Information

Now that the records of 50 graduates and 50 dropouts are positively identified the next step is to record certain information about these individuals, using the procedure described in the enclosed sheet of Directions.

To help you complete the responses easily a packet of special IBM cards is enclosed. You are to use *one* card for *each* individual in the survey. *You should have 100 completed IBM cards when you finish the study.* Extra cards are provided.

To answer the survey questions you will need a black lead pencil with a soft lead that makes a very glossy mark. If this type pencil is not used, the recording machine will not pick up your marks.

Return of Completed Information

Please plan the data-recording so that the completed IBM cards can be returned to the Division of Pupil Personnel Services, Room 401, State House no later than May 30, 1969. Should you have any questions, do not hesitate to write or call Thomas A. Smith at AC 317-633-4370.

TAS:fe

1969 INDIANA DROPOUT-GRADUATE SURVEY

Directions For Completion

To insure that your responses are useable it is very important that you follow these directions carefully. You will need a number 2 black lead pencil (or softer, such as No. 2 or HB). Special IBM cards are enclosed. You are to use *one* card for *each* individual in the survey.

To indicate a response to a question, blacken the proper oval space solidly and completely on the IBM card. Make all your marks look:

like this (■); *not* like this (×); and *not* like this (—).

Machines will pick up your answers only if the spaces are completely blackened in and the cards have not been damaged. To change your answer, first completely erase your old mark; then solidly blacken in the oval space of your new answer.

Considering your first cumulative record, look at the first survey question. For graduate, blacken the oval marked (3A) on the IBM card, or for dropout, blacken the oval marked (3B).

Respond to the other questions in the same manner, but make sure you answer *every* question for *every* individual. Do *not* leave any question blank, but give only *one* response to *each* question.

Handle the IBM cards carefully. Do not bend or damage them in any way.

1. *Student Classification*
   (3A) Graduate
   (3B) Dropout
   *Before continuing, re-check to see that you marked either (3A) or (3B)

2. *Sex*
   (4A) Male
   (4B) Female

3. *Age* (Year at last Birthday)
   (5A) 14 Years or under
   (5B) 15 Years
   (5C) 16 Years
   (5D) 17 Years
   (5E) 18 Years
   (5F) 19 Years
   (5G) 20 Years and over

4. *Father's Present Primary Occupation*
   (Complete for father even if father is deceased or parents are separated)

(Use the *Dictionary of Occupational Titles* for occupational breakdown)

(6A) Professional, Technical, and Managerial
(6B) Sales and Merchandising
(6C) Clerical, Accounting, and kindred
(6D) Farmers and Farm Managers, Fishery and Forestry
(6E) Skilled (Requiring apprenticeship or other special training or experience)
(6F) Semi-skilled (Requiring some training and experience, but less than the skilled area)
(6G) Service (Personal, Protective and Building)
(6H) Unskilled
(6I) Unemployed
(6J) Retired

5. *Father's Highest Education Level*

(Complete whether or not parents are living)

(7A) Attended or completed College
(7B) Attended or completed Vocational or Business Schools (Post High School)
(7C) Completed Grade 12 (Graduate)
(7D) Completed Grade 9
(7E) Completed Grade 8
(7F) Completed Grade 6
(7G) Completed Grade 3

6. *Mother's Present Primary Occupation*

(Complete for mother even if mother is deceased or parents are separated)

(Use *Dictionary of Occupational Titles* for occupational breakdown)

(8A) Professional, Technical and Managerial
(8B) Sales and Merchandising
(8C) Clerical, Accounting, and kindred
(8D) Agricultural
(8E) Skilled
(8F) Semi-skilled
(8G) Service
(8H) Unskilled
(8I) Unemployed
(8J) Housewife

7. *Mother's Highest Education Level*

(Complete whether or not parents are living)

(9A) Attended or completed College
(9B) Attended or completed Vocational or Business Schools (Post-High School)
(9C) Completed Grade 12 (Graduate)
(9D) Completed Grade 9

(9E) Completed Grade 8
(9F) Completed Grade 6
(9G) Completed Grade 3

8. *Acceptance by Other Students*
(Use socio-gram data, teacher or counselor opinion, or peer group opinion as a basis. *More than* one source of information should be used)
(10A) Sought out
(10B) Accepted
(10C) Tolerated
(10D) Avoided

9. *Student's Overall Scholastic Record*
(School Grades or Marks)
(11A) Excellent Grades — Approx. A-average
(11B) Above Average Grades — Approx. B-average
(11C) Average Grades — Approx. C-average
(11D) Below Average Grades — Approx. D-average
(11E) Very Low Grades — Approx. D- and F-average

10. *Number of Retentions in Elementary School*
(Kindergarten through sixth grade)
(12A) None
(12B) One
(12C) Two
(12D) Three
(12E) Four or more

11. *Number of Transfers to Different Schools*
(Do not include normal steps from elementary to junior high school)
(13A) None
(13B) One Transfer
(13C) Two Transfers
(13D) Three Transfers
(13E) Four Transfers
(13F) Five Transfers
(13G) Six or more Transfers

12. *Number of Siblings*
(14A) None
(14B) One
(14C) Two
(14D) Three
(14E) Four
(14F) Five

(14G) Six
(14H) Seven
(14I) Eight or more

The following four questions relate to performance on *standardized achievement* tests during the intermediate grades. Select the student results of achievement testing during this period and answer the following:

13. *Grade at time of Testing*
(15A) 4th Grade
(15B) 5th Grade
(15C) 6th Grade

14. *Age at time of Testing*
(16A) 9 Years
(16B) 10 Years
(16C) 11 Years
(16D) 12 Years
(16E) 13 Years
(16F) 14 Years

15. *General Achievement of Student in Reading Achievement*
(As measured at above grade and age)
Grade Equivalents
(17A) Below 1.0
(17B) 1.0 - 1.9
(17C) 2.0 - 2.9
(17D) 3.0 - 3.9
(17E) 4.0 - 4.9
(17F) 5.0 - 5.9
(17G) 6.0 - 6.9
(17H) 7.0 - 7.9
(17I) 8.0 - 8.9
(17J) 9.0 - and above

16. *General Achievement of Student in Arithmetic Achievement*
(As measured at above grade and age)
Grade Equivalents
(18A) Below 1.0
(18B) 1.0 - 1.9
(18C) 2.0 - 2.9
(18D) 3.0 - 3.9
(18E) 4.0 - 4.9
(18F) 5.0 - 5.9
(18G) 6.0 - 6.9

(18H) 7.0 - 7.9
(18I) 8.0 - 8.9
(18J) 9.0 - and above

17. *Student Resides with:*

(19A) Natural Parents
(19B) Mother Only (Divorced or Separated)
(19C) Mother Only (Father Deceased)
(19D) Mother and Step-Father
(19E) Father Only (Divorced or Separated)
(19F) Father Only (Mother Deceased)
(19G) Father and Step-Mother
(19H) Relatives (Not Grandparents)
(19I) Grandparents
(19J) Foster Parents

The following two questions relate to performance on *mental ability tests* (as measured by the most recent test)

18. *Name of Mental Ability Test Used*

(20A) Henmon-Nelson
(20B) Otis
(20C) SRA Test of Educ. Ability
(20D) Wechsler
(20E) California Test of Mental Maturity
(20F) SRA Primary Mental Abilities
(20G) Lorge-Thorndike
(20H) Kuhlman-Finch
(20I) Stanford-Binet
(20J) Other (Write test name on reverse side of answer card)

19. *General Mental Ability of Student*

(IQ score from test shown above)

(21A) Below 67
(21B) 68 or 69
(21C) 70 to 73
(21D) 74 to 83
(21E) 84 to 86
(21F) 87 to 99
(21G) 100 to 113
(21H) 114 to 116
(21I) 117 to 126
(21J) 127 to 130
(21K) 131 to 132
(21L) 133 and above

20. *Approximate number of known interviews with counselors, psychologists, psychometrists, social workers, and therapists.*
(During grades 7 through 10)
(22A) Unknown
(22B) None
(22C) 1 to 3
(22D) 4 to 6
(22E) 7 to 9
(22F) 10 or more

The following was computed from the foregoing data.

21. *Adjusted Reading Achievement*
(23A) —6 Years
(23B) —5 Years
(23C) —4 Years
(23D) —3 Years
(23E) —2 Years
(23F) —1 Year
(23G) Grade level
(23H) +1 Year
(23I) +2 Years
(23J) +3 Years
(23K) +4 Years
(23L) +5 Years

22. *Adjusted Arithmetic Achievement*
(24A) —6 Years
(24B) —5 Years
(24C) —4 Years
(24D) —3 Years
(24E) —2 Years
(24F) 1 Year
(24G) Grade level
(24H) +1 Year
(24I) +2 Years
(24J) +3 Years
(24K) +4 Years
(24L) +5 Years

23. *Adjusted Mental Ability I.Q.*
(Standard Score)
(25A) —2 standard deviation and below
(25B) —1 to —2 standard deviation

(25C) $\bar{x}$ to −1 standard deviation
(25D) $\bar{x}$ to +1 standard deviation
(25E) +1 to +2 standard deviation
(25F) +1 standard deviation and above

24. *Sectioning Code for Cross-Validation*

(27A) Graduate — Trial Group
(27B) Graduate — Holdout Group
(27C) Dropout — Trial Group
(27D) Dropout — Holdout Group

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