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ABSTRACT

This report, as the seventh in a series of Vocational Development Study monographs providing data for investigating the vocational development of 780 vocational and non-vocational ninth graders over a 10 year period, will prove useful for teachers, counselors, administrators, and other school personnel interested in the dropout problem at the secondary level. Of 11 significant discriminators among the 20 independent variables considered, statistical analysis identified "grade point average" and "absenteeism" as unique significant predictors of the tendency to drop out of the vocational curriculum. Only "absenteeism" was a unique significant predictor of the dropout status of those in the non-vocational curriculum. The non-vocational dropouts and the vocational retainers revealed similar characteristics on cognitive variables. In contrast, the vocational dropouts and the non-vocational retainers show similar characteristics on socio-affective variables. Since both cultural factors and a negative overt response to the school envrionment are related to dropout proneness, a coordinated community effort is needed to resolve this problem. Because the dropout predictability for the non-vocational sample was half that of the vocational sample, vocational dropouts should be identified and prevented earlier in their programs. Numerous tables present the data. (AG)

THE
PENNSYLVANIA
STATE
UNIVERSITY
DEPARTMENT
OF
VOCATIONAL
EDUCATION

A COMPARISON OF VOCATIONAL AND NON-VOCATIONAL HIGH SCHOOL DROPOUTS AND RETAINERS

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Pennsylvania Department of Education
Bureau of Vocational, Technical and Continuing Education
Research Coordinating Unit
(Project No. 19-1013)

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PREFACE

This report is the seventh in a series of Vocational Development Study (VDS) monographs which have been published by the Department of Vocational Education at The Pennsylvania State University in cooperation with the Pennsylvania Vocational Education Research Coordinating Unit (RCU). The VDS project was begun in 1968 with the intended purpose of providing the data base necessary to investigate the vocational development of ninth graders over a ten year period. The project is particularly concerned with providing evaluative information for comparing curriculums, validating vocational guidance instruments, and exploring applications of vocational development theory.

In this study conducted by Brantner and Enderlein, an attempt was made to add to the body of available knowledge concerning the dropout problem in our secondary schools. Of particular concern was the comparison of dropouts in vocational vs. non-vocational programs using data generally available in the schools. The results of this study seem to strengthen the notion that cultural factors outweigh genetic factors in determining dropout proneness. Also, vocational and non-vocational dropouts were found to be fairly dissimilar. Findings from this study have implications for all school personnel and some, but not all of these findings and implications, are capsulized in the blue pages which appear at the beginning of this monograph.

The completion of this report represents the combined efforts of numerous individuals in addition to the authors. As current project director, I would like to pay tribute to the late Dr. Joseph T. Impellitteri who was responsible for beginning and directing the VDS project during its first four years and who provided the initial

stimulation to the authors of this study. Others who have played a significant role in this research effort include the Altoona school personnel who cooperated unselfishly in data collection for the study, the entire project staff who collected and processed much of the data, and Dr. Furman B. Moody, Pennsylvania RCU Director who is mainly responsible for providing the financial support and cooperative atmosphere necessary for the continuation of the project.

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VDS CAPSULE OF FINDINGS AND IMPLICATIONS

A succinct review is presented here to provide, teachers, counselors and administrators as well as other school personnel with practical interpretations of this study. What is provided in this section is an attempt by the authors to point out the major implication of the report to this problem of national scope. The findings are followed by the corresponding implications which have been formulated.

Findings

1. Of the 20 independent variables chosen for this study, 11 were found to discriminate significantly between the dropouts and retainers in the vocational curriculum. An analysis of these 11 independent variables identified two variables; Grade Point Average and Absenteeism to be unique significant predictors of the tendency to dropout.
2. A comparable analysis of the 20 independent variables identified 11 that significantly discriminate between the dropouts and retainers of the non-vocational curriculum. The analysis of these 11 variables indicated that the variable Absenteeism was the only variable that was a unique significant predictor of dropout status. Nine of these eleven variables were common to both groups; vocational and non-vocational. The two that were different for the non-vocational group were of the cognitive domain, GATB-P and F. Whereas, the two different variables for the vocational group were of the affective domain, OVI Value Prestige and the VDI.
3. An analysis of the 20 independent variables revealed that 18 of

these variables significantly differentiated among the four groups. The two variables that did not differentiate were GATB-M and Father's Education.

The analysis of these 18 variables resulted in identifying two significant discriminating functions that separate these four groups. These functions were named Cognitive and Socio-Affective, indicative of the types of variables of which they were composed. The non-vocational dropouts and the vocational retainers revealed similar characteristics on the cognitive function. In contrast the vocational dropouts and the non-vocational retainers show similar characteristics on the Socio-Affective function.

Implications

1. The best predictors of dropping out were found to be Grade Point Average and Absenteeism for the Vocational sample. The inter-relatedness of these two variables is difficult to separate; school personnel, teachers, counselors and administrators should be aware of both.
    a. Since the vocational dropouts valued those things that were not satisfied in the school environment, perhaps the school should attempt to provide more information about the world of work during the formation period of work values.
    b. Simulated work environment or cooperative education programs are two possible solutions to the dropout problem, since both provide the reinforcement of the

world of work and necessary inschool activities.

2. The similarity between the student characteristics of both groups; vocational and non-vocational indicate that it is possible to predict dropout proneness using similar traits as predictors.

    a. Since Absenteeism was the best predictor of dropping out for the non-vocational group, excessive absenteeism should be of interest to school personnel.

    b. Since Grade Point Average is not a significant predictor for this group perhaps more emphasis should be placed on other variables in making curriculum entry decisions.

    c. Since the amount of predictiveness of dropout status for the non-vocational sample (.09) is half that of the vocational sample (.19) it seems possible to identify vocational dropouts earlier in their program while preventive measures are still possible.

3. Although dropping out appears to be a negative overt response to the school environment, it was found that the socio-affective variables of the home and community contributed to this behavior. This indicates that cooperation is necessary among the community, social agencies, and the school since dropping out appears to be symptomatic of other underlying problems.

    a. Since the non-vocational dropouts and the vocational retainers were the most alike on the cognitive function, it seems likely then that non-vocational dropouts would have been successful in a vocational program. Conversely,

it seems unlikely that the vocational dropouts would succeed in the non-vocational curriculum.

b. Since the Socio-Affective function showed the least separation between the non-vocational retainers and the vocational dropouts this indicates that cognitive measures used alone are not sufficient indicators of dropping out. These measures combined with socio-affective measures provide a more realistic profile of a dropout since it has been shown that this behavior is somewhat predictable.

I

INTRODUCTION

Background of the Problem

The accepted purpose of a public supported school system, in any society, is the perpetuation of that society. The preparation of the youth for full membership in a society, by the time they are old enough to assume this responsibility, requires a formal program. The formal program is the school system.

Criticism is frequently and regularly directed to the components of the school. Inquiries are leveled at the cost of the system, questions are asked about the varied activities, and investigations are made of the content of courses. Nevertheless, the school remains the instrument of society to continue the existance of that society.

The graduates of the school system vary in accordance with their individuality. Some graduates are better readers, others are better writers, or typists, or musicians, or artists; the school system is a variety of activities for different individuals who complete the twelve years of education. Any attempt to specifically identify the multitude of resultants of education is an almost impossible task.

Recognition of the truism that school is many things to many people does not detract from the value and benefits of it. The one universal opinion is that those who are not a part of the system--the dropouts--are not experiencing any of the benefits. They are not a part of the system that is the preparatory route to effective citizenship.

The Office of Education (1971) reported that 77.1% of eighteen year olds graduated from high school in 1969 and estimated that 88.8%

will graduate in 1979. This affirms the trend of reduction in the numbers of students who do not complete high school. However, even at the maximum predicted retention rate in 1979, there will still be eleven eighteen year olds out of every hundred who will not graduate from high school.

The dropout rate varies with each grade level. Understandably, this rate is low for the elementary grades because of attendance laws; it increases in the junior high school years, and accelerates in the senior high school. The attendance laws of many states permit avoidance of attendance, under specified circumstances, as early as fourteen years of age. Most permit it under less stringent conditions starting at age sixteen. Thus the majority of students, who sever their school ties before graduation, separate during the ninth to twelfth grade.

It is of no importance to judge whether the school system failed, whether the student failed, or whether society failed when a student becomes a dropout. The resultants of this separation are what mandate concern over the problem. One vital limitation to the dropout is curtailment of sources of employment. The Manpower Report of the President (1972) stated:

> Job finding difficulties are compounded for those out-of-school youth who failed to complete high school. In October, 1971, the unemployment rate for school dropouts aged 16 to 19 was 23.3 percent, while for graduates it was 14.4 percent. Whereas 90.4 percent of male high school graduates were in the labor force, this was true of only 80.3 percent of the boys who had dropped out. And of the young men aged 16 to 21 employed in October, 1969, only half of those without high school diplomas were earning $2 or more an hour, compared with 7 out of 10 of those with a high school education (and no college).
>
> The importance of high school graduation is also reflected in the occupational status of youth aged 16 to 21. The proportion of young people who find their way into clerical

> and, to a lesser extent, other white-collar occupations is much higher among high school graduates than among dropouts (p. 82).

A second limitation is the lowering of the financial potential for a lifetime of employment. A study of the education and lifetime earnings for men by Miller (1965) revealed a potential of $247,000 for a high school graduate, $212,000 for a man completing no more than eleventh grade, and $184,000 for a man who completed no more than eighth grade. A national news release by Professor Levin of Stanford on May 28, 1972 stated that 3,200,000 men will lose a total of 237 billion dollars in lifetime income because they did not graduate from high school.

A third limitation is curtailment of ability to function as a contributing citizen. Evidence of this is available in today's statistics as it was predicted by Governor Scranton (1964) who related more crime, more unemployment, more broken families, and more drug addiction to noncompletion of high school.

Numerous very obvious attempts to convince youth of the value of a high school education can be seen daily throughout the media of public communications. However, it is arbitrary to adopt the point-of-view that only the student failed, when high school was not successfully completed. It is possible that the student saw little relevance between the inschool activities and his community. The school may have failed to motivate the student. The Pennsylvania Department of Public Instruction (1964) inferred that restricted program of studies in high school may not have interested the student, in spite of the fact that the student had the necessary ability to successfully meet the requirements of some form of high school education.

The expansion of inschool activities to include a variety of curriculums, subjects, co-curricular, and extra-curricular offerings is an effort to make school interesting to all students. A noteworthy example of this attempt to offer varied curriculums is present in Pennsylvania. Seventy-three approved attendance areas for vocational-technical schools will make a vocational-technical curriculum available to all but 26,160 secondary students in the Commonwealth according to The Pennsylvania Department of Education (1971).

A record number of varied instructional programs are now operational for the disadvantaged, underaged, overaged, and delinquent students. These represent a diversification and expansion of the school program with the intention of encouraging students to graduate from high school. It was theorized by The Pennsylvania Department of Public Instruction (1964) that:

> Even with a highly accurate system of identification the school must devise a program which results in the student remaining in school until he has developed skills which will meet the demands of adult life. Many projects to improve school holding power begin after the youngster has become frustrated and has decided to leave school at the earliest opportunity. It would be wise to start on this problem at the preschool level and to follow through at the elementary level as well as in secondary school (p. 3).

This diversity and expansion of inschool activities is commendable. Undoubtedly a portion of the reduction in dropouts, which was as high as sixteen of every 100 in 1959, can be attributed to these measures. It can also be assumed that the media messages are a factor in the reduction. However, the dropout rate demands that more efforts be made for further reduction.

Researchers have established that potential dropouts can be

identified. It is evident that the over-age in grade, retarded readers, and irregular attenders are more prone to dropping out of school. The influence of the home life that is typified by low parental educational attainment, indifference to the value of school, and little family participation in community activities may raise the probability of withdrawal from school to the dangerous level. The individual student and attention to him then becomes another facet of the dropout problem. Identification of traits, aptitudes, and abilities at an early age will facilitate a concentration of effort on the high-risk students. These efforts as stated by The Pennsylvania Department of Public Instruction (1964) typically are:

> Early and regular evaluation of achievement and attitudes with necessary remedial action by classroom teachers, reading specialists, guidance personnel, school psychologists, and other pupil-personnel staff members should increase school holding power (p. 12).

The importance of early identification of potential dropouts should not be underestimated. Countless reasons for continuing schooling and wide variation inschool activities may be for naught if it is not directed at the proper students. There is no assurance that the students needing the special provisions will be receiving these benefits if these students are not identified.

A basic rubric of public vocational education, since introduction, has been the voluntary choice by a student to enroll in the vocational curriculum. Vocational education is traditionally included in the senior high school program of studies. Thus vocational education is unique since enrollment in it is on the basis of student choice and because it is taught during the school years experiencing the highest dropout rate.

The student chooses, while at the ninth grade level, a curriculum that he will pursue for the remainder of his time in public school. The advisability of forcing this choice at this age has been debated, but the majority of our school systems do require this decision. It is on the basis of this choice of curriculum that individualization of education is founded. It is assumed that exercising this prerogative of choice results in placement of a student in a favorable educational atmosphere. Educators know that the ninth grade student population contains some who will dropout as well as those who will remain through graduation. If it would be possible to identify those who will dropout, then special techniques and procedures could be directed at these students. Special attention could be devoted to their problems to encourage continuation in school. Inschool activities could be made available to make the separation from school and transition to the non-school activities as beneficial to the student as is possible.

The Problem

The problem investigated in this study was: Can the potential dropout be identified prior to entry into a curriculum?

The purpose of the study was to identify those traits of mental maturity, scholastic achievement, aptitude, occupational interests, and occupational aspirations in ninth grade students that indicate dropout proneness. The indicators of dropout proneness now recognized are of the socio-educational type. They are affected by the calibre of the students' inschool performance, but cannot be objectively measured by educational instruments. It was the intent of this study to investigate and identify instruments, of this type, that infer predictability

toward early termination of school attendance.

A second purpose was to compare the effectiveness of these measures with vocational education students and non-vocational students. It was considered as probable that the conditions of choice and relevancy of vocational education would be reflected in different student traits.

This study attempted to answer the following three specific questions. These questions refer to the student characteristics selected for inclusion in this study because of their potential usefulness in discriminating between retainers and dropouts.

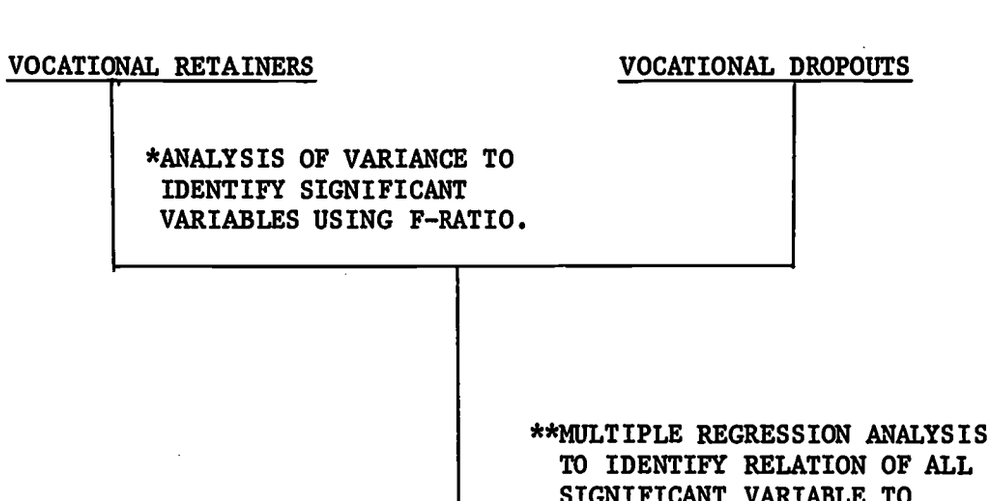
1. Which of the grade nine student characteristics discriminate significantly between retainers and dropouts in the vocational curriculum, and what is the relationship of the combination of these characteristics to dropout status?

2. Which of the grade nine student characteristics discriminate significantly between retainers and dropouts in the non-vocational curriculums, and what is the relationship of the combination of these characteristics to dropout status?

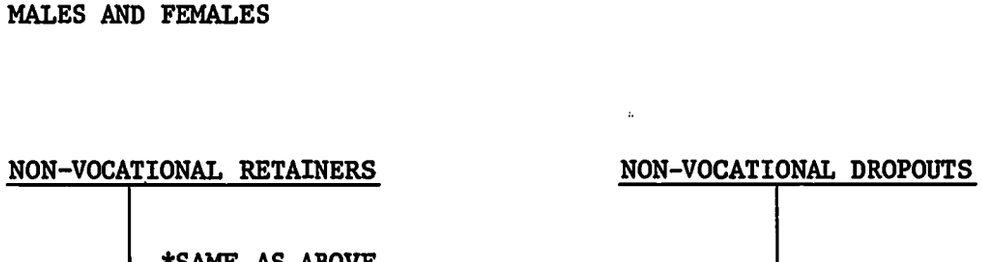
3. Which of the grade nine student characteristics discriminate significantly between retainers and dropouts in the following four groups: (1) non-vocational retainers, (2) vocational retainers, (3) non-vocational dropouts, and (4) vocational dropouts; how does the combination of these characteristics discriminate among these four groups?

A graphic representation of this study is presented in Figure 1.

1. MALES AND FEMALES



2. MALES AND FEMALES



3. MALES AND FEMALES

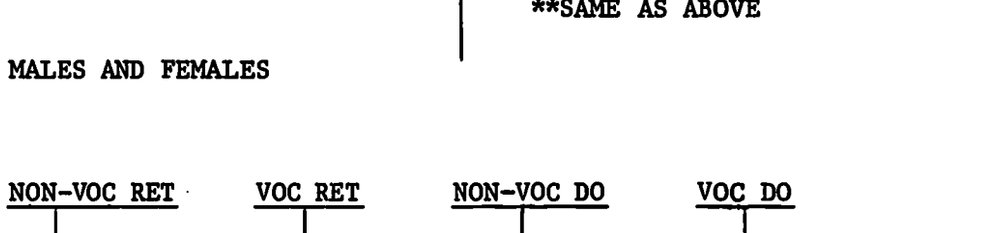


FIGURE 1. A GRAPHIC REPRESENTATION OF THE ANALYSES.

II

REVIEW OF RELATED LITERATURE

Introduction

The primary objective of this investigation was to investigate descriptive student characteristics in an attempt to identify those characteristics that would be useful in identifying potential dropouts from secondary programs.

A review of the related literature was conducted to identify printed material that contained relevant information for this study.

Literature chosen to be reviewed was restricted to those studies that were concerned with identifying student characteristics that distinguish the dropouts from their retainer counterparts.

Literature on Student Characteristics of Dropouts

A dropout is defined as meaning an individual who leaves school before completing the graduation requirements of the institution. This pupil may not be one that transfers to another school or another area since it is assumed that the educational experience will be continued.

A review of the literature on school dropouts conducted by Tesseneer (1958) revealed the following general characteristics to be representative of school dropouts. The dropout seemed to be:

1. 16 to 17 years of age.
2. from a low income family.
3. failing or discouraged with school work.
4. dissatisfied with current teaching methods.
5. burdened with a feeling of not belonging.

6. willing to leave school for the alternative of a job.

7. from a weak or broken home.

Although the results of previous studies indicate these characteristics to be common to most dropouts, it does not, however, interpret these results as either the cause or effect of dropping out of school.

The above characteristics indicate that dropouts are students of low ability and family resources. By comparison, Woollatt (1961) conducted a study in an attempt to uncover reasons why capable students dropout of high school. Woollatt found that males with I.Q.'s of 110 and above cited marriage and dislike of school as the dominant reasons for dropping out. The need for supplemented family income was less for this group. A rather significant characteristic was parental attitude, that is, if the family situation was such that the students were needed to work at home and/or help support the family, they were prone to dropping out.

Vogel (1961) points out that approximately one third of our nation's youth are entering the adult world without the benefit of a high school diploma. He lists the major factors why students become early school leavers as those that have:

1. academic difficulties.
   a. The dropouts exhibit two year retardation in reading and math skills.
   b. While only 10 percent of dropouts have I.Q.'s of 110 or above, the majority have a mean I.Q. of 90.
2. poor family economic status and family attitude about school.
3. lost interest in school and are not accepted by their

teachers.

4. frequent absenteeism and come from a transient family.

5. experienced early marriages.

Schreiber (1962) following a symposium on school dropouts concludes that the rate for dropouts is the same for rural as it is for urban areas. Students dropout because they foresee their education as not preparing them for entrance into the world of work, and some cannot resist the illusory independence that is often symbolized by the second-hand automobile. He further points out that the average dropout is at least two years retarded in reading skills and that about 90 percent of the dropouts had repeated at least one school grade. The rate of unemployment for the dropouts was found to be 20 to 30 percent as compared to 14 percent for the graduates.

Multiple discriminant analysis was utilized by Kelly, Veldman and McGuire (1964) in an attempt to predict delinquency and school dropouts among students. The predictor variables included psychomotor performance measures, listening tests, California Test of Mental Maturity language scores and sociometric data. The results were reported as inconclusive; however, the investigators recommend continued and additional use of multivariate designs, and a combination of predictors in future attempts to identify variables that would distinguish groups.

Bonfield (1968) conducted an investigation to develop and validate an identification scale for high ability dropouts based on the Minnesota Vocational Interest Inventory. The key indicates that dropouts show a high interest in nonprofessional vocations. The author suggests that a high score on the dropout scale can possibly be countered by a curriculum change and/or counseling.

A study by Droege (1968) was conducted to compare the occupational aptitudes of dropouts and graduates in the same school using the General Aptitude Test Battery. The term dropout refers to individuals tested in grade nine and who dropped out of school prior to graduation. The dropout group was found to be older and more variable in age than the graduates. The mean scores for the nine aptitudes were the highest for the grade eleven sample and lowest for the grade nine sample, which is an indication of the effects of maturation on these aptitude scores. The cognitive aptitudes, Intelligence (G), Verbal (V) and Numerical (N) showed the greatest difference between the two groups, dropouts and graduates. The spatial-perceptual aptitudes, Spatial (S), Form Perception (P) and Clerical Perception (Q) showed the next highest difference while the dexterity aptitudes, Motor Coordination (K), Finger Dexterity (F) and Manual Dexterity (M) showed the smallest difference between dropouts and graduates.

Using Project Talent data, a longitudinal study was conducted by Coombs and Cooley (1968) in an attempt to identify characteristics of dropouts, in high school and after school. The data was gathered from one of the grades participating in the original testing for Project Talent in 1960 and from a follow-up in 1964. The males and females who dropped out of school after grade nine were the topic of this study, with the non-college bound graduates used as controls. The nature of Project Talent data makes this sample a probability sample of the national ninth-grade population. Therefore, it is possible to generalize to the dropout population and estimate their parameters.

The essential data consisted of the Project Talent test battery that covers a broad spectrum of attributes. The results indicated that

the control males scored higher on the ability tests than the dropouts, with similar findings for females. The interest inventory scales indicated that the male controls preferred sports, physical science, engineering and math and the dropouts preferred labor, skilled trades and music. Female controls had similar interests as did the male controls and the female dropouts looked like the male dropouts. The Student Activities Inventory showed the male dropouts to have high means on the leadership and impulsiveness scales. The female controls had higher means on all scales except leadership and impulsiveness on which they did not differ from the males. The female controls ranked in the upper socioeconomic level whereas there is no difference among the males. The marriage rate for the dropouts was found to be almost twice that for controls. The employment pattern was similar for both groups, in that both groups were employed. The percentage of dropouts, both male and female, were found to be greatest in the general curriculum. The career plans for all groups both male and female were more realistic in 1964 than they were in 1960 indicating an increase in vocational maturity. The controls, however, planned for higher level jobs than did the dropouts.

Multiple correlation analysis was used by Lloyd (1968) to differentiate or predict dropouts and graduates from sixth grade student characteristics. Male dropouts and graduates were best differentiated by a combination of age, arithmetic and language test scores, number of siblings, and occupational level of the father. The variables that differentiated female dropouts and graduates were grade point average, number of absences, age, number of siblings, and marital status of parents. When sex was included as an independent variable in the analysis of the

combined samples, it was found that it did not account for any independent variance in the criterion over and above the accounted for by the language usage score.

For contrast, a study conducted by Corbett (1969) in England was reviewed. This study was conducted in an attempt to identify the characteristics of early school leavers. In England the dropouts were younger (15 1/2 years) than their counterparts in countries with compulsive secondary schooling such as the United States, Sweden, Japan, and parts of Norway and Switzerland. Approximately 85 percent of the early school leavers had early leaver parents, 81 percent had fathers who were manual workers, while less than 10 percent had fathers who were professionals. The majority of the early school leavers came from large families with an average of 3.8 children. The early school leavers were bored with school, lacked home support and were concerned with the lack of vocational transfer of the subjects they were taking. Corbett concludes that raising the school leaving age will not solve the problem, and suggests instead that what is needed is more relevant education.

French (1969) in a study that examined the characteristics of high ability dropouts reported that in the state of Pennsylvania for the school year 1964-65, approximately 16 percent of all students entering the ninth grade failed to graduate from high school. An additional interesting finding showed that for some males reaching the legal age for withdrawing were asked by the school to leave. It was also reported that eleven percent of these dropouts possess I.Q.'s of 110 or more, while approximately 25 percent of the total population have I.Q.'s of that magnitude. Using the Minnesota Vocational Interest Inventory, High School Personality Questionnaire, Student Information Blank and the

Attitude Inventory for Youth's as data collection instruments, French developed a profile for male dropouts of high ability. The dropouts were characterized as:

1. happy-go-lucky.
2. interested in people.
3. deliberate in their actions.
4. frank in their speech.
5. disliking the school's pressure to conform.
6. fairly sound individuals.

The profile of female dropouts was similar to that of the males with the exception of those that dropout to marry. The girls that withdrew for marriage or pregnancy were less socially oriented and less prone to seek social recognition. With regard to parental attitudes, persisters felt that their parents forced them to stay in school and those that dropped out felt that their parents wanted them to stay, but did not force them to do so. In a study reported by Walters and Krauyler (1970), the authors used discriminant analysis in a two group design to analyze data for early identification of the dropout.

The study revealed that using data available on cumulative record cards, predictions of potential dropouts can be made as early as the beginning of grade nine. It was found that variables used in combination were more effective in predicting dropouts than the same variables used alone. The authors conclude that no combination of variables can be used as predictive variables to any efficient degree unless some measure of socioeconomic status is included and that I.Q. did not prove to be a strong predictor. Reading ability seemed to be overrated and age was underrated as a predictive variable in this study. The best combination

of variables for prediction seemed to be; age, I.Q., arithmetic achievement and father's occupation. Using these four variables it was possible to identify dropouts with 91 percent accuracy. The authors concluded that potential dropouts could be identified in or before grade nine.

Bachman and Green (1971) in their book, Dropping Out--Problem or Symptom, conclude that dropping out is primarily a symptom rather than a basic problem. That symptom is of other problems which have their origin earlier in life. More specifically, dropping out seems to be symptomatic of certain background and ability characteristics, school experiences, and traits of personality and behavior.

Cottle (1972) analyzed items of the School Interest Inventory used in an attempt to identify potential delinquents in junior high school. As a result of this analysis, Cottle summarized that it is possible to use a standardized inventory to identify and work with both potential male and female delinquents to prevent delinquency. This can be accomplished by either helping students fit more adequately into their environment or by helping them modify their goals, attitudes and beliefs.

Cottle (1972) states that:

> It certainly indicates movement toward an educational or vocational program where attitudes and beliefs characteristic of low-income groups can be modified to help these individuals live more effective lives in terms of long range goals. (p. 276)

Since it was found that limited overlap (33 percent) existed between dropout and delinquency scales for both males and females, it was suggested that these scales used together could be helpful in identifying dropouts and delinquents. Once identified, these students can be given counseling in an attempt to supply guiding alternatives, one of which is the vocational curriculum.

Summary

This review has revealed the following:

1. Multivariate designs are appropriate in studies attempting to identify dropout and retainer characteristics.
2. Independent variables used in combination provide more efficient prediction of dropouts than do independent variables used alone.
3. Parental attitude is a factor in determining dropout proneness.
4. Dropouts have a higher rate of absenteeism than do retainers.
5. Dropouts possess a two year retardation level in reading and math skills.
6. The socioeconomic level of the dropout is usually low.
7. Age is a strong predictor for dropping out, however, increasing the legal age for withdrawal does little to decrease the number of dropouts.
8. It is possible to use standardized measures to predict potential dropouts as early as grade nine.
9. Sex, as an independent variable seems to make little difference in predicting dropouts.
10. Dropping out appears to be a symptom of underlying problems rather than the basic problem.
11. Vocational relevant courses provide an alternative to potential dropouts who may feel uneasy in an academic setting.

III

PROCEDURE

Population and Sample

The population from which the sample was obtained consisted of the total ninth grade enrollment of the city of Altoona, Pennsylvania during the 1968-69 school year. This population represented a wide variation in ethnic backgrounds. The variety of occupations associated with railroading had attracted families of German, Italian, Polish, and Jewish origin. These four discernible ethnic groups, with the addition of a minority of Blacks, provided for a sample selection that is representative of a typical American community. The Altoona Area School District was classified as a second class district on the basis of serving a population of approximately 70,000 people. It was a jointure of the city and surrounding Logan township. The total student population estimated to be 15,000 included the 1100 boys and girls of particular importance to this study. The six-three-three plan of school organization utilized numerous elementary schools, three junior high schools, and one central senior high school. The vocational curriculum was housed in the senior high school until the 1970-71 school year. At that time the facilities of a new vocational-technical school were occupied. The amount expended for instructional costs per student in the 1968-69 school year was $622.01; the state average was $681.76 per student.

The economy of the city of Altoona was based on the activities of the Pennsylvania Railroad until 1950. The decline of this industry fostered a very active community group that successfully attracted diversified industries into the community. The economic base has become

more stable and the variation in size of these industries guaranteed a population from the total socio-economic range.

Initial data were collected during the spring of 1969 when an attempt was made to include all ninth graders in the Altoona public schools. The total sample was intended to be used for the purpose of a longitudinal study of vocational development to be conducted by the Department of Vocational Education at The Pennsylvania State University in cooperation with the Pennsylvania Research Coordinating Unit (RCU).

The sample used in this study consisted of 780 vocational and non-vocational high school boys and girls. This sample of 780 was selected from the total population of 1100 on the basis of data available. Complete data on the variables used in this study was obtainable for this group. The data for the independent variables were collected when the total sample was in grade nine during the 1968-69 school year. The retainers portion of the sample consisted of 714 boys and girls who were in grade twelve as of December 31, 1971. The dropouts consisted of 66 students who withdrew from school in either their tenth, eleventh, or twelfth year up to December 31, 1971.

The following presents the composition of the total sample.

Group	MALES	FEMALES
1. Non-Vocational Retainers	185	338
2. Vocational Retainers	181	10
3. Non-Vocational Dropouts	3	27
4. Vocational Dropouts	29	7
TOTAL	398	382

Data

Independent Variables. Previous studies and analyses of high school dropouts were reviewed to establish a rationale for the use of certain student characteristics. This process established that those characteristics selected have a relationship to either or both of the criteria of this study. Below is a description of the variables used and how a measurement was obtained.

1. Ability Measures--The majority of studies involving students recognize the concept of abilities and/or aptitudes. Those of particular concern to the educator are related to the construct of intelligence. The identification and measurement of intelligence or the indicators of it has progressed through a distinct evolution since being established by Binet. The choice of a commercial battery for this study was affected by the sample. The inclusion of both vocational and non-vocational students made this choice critical. On the basis of a previous study, Impellitteri and Kapes (1969), the General Aptitude Test Battery (GATB) was selected because it contained manipulative as well as cognitive abilities. The manipulative ability scores were shown to be related to vocational students' shop grades.

   The GATB was developed by the United States Employment Service (USES) in 1947 for use in employment counseling with adults and was later extended for use at the ninth and tenth grade level. The battery takes approximately two and one quarter hours to administer and is composed of 12 subtests which yield the following aptitude scores.

   G - Intelligence--General learning ability. The ability

to "catch on" or understand instructions and underlying principles; the ability to reason and make judgments. Closely related to doing well in school.

V - Verbal Aptitude--The ability to understand meaning of words and to use them effectively. The ability to comprehend language, to understand relationships between words and to understand meanings of whole sentences and paragraphs.

N - Numerical Aptitude--Ability to perform arithmetic operations quickly and accurately.

S - Spatial Aptitude--Ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space.

P - Form Perception--Ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and discriminations and see slight differences in shapes and shadings of figures and widths and lengths of lines.

Q - Clerical Perception--Ability to perceive pertinent detail in verbal and tabular material. Ability to observe differences in copy, to proof read words and numbers, and to avoid perceptual errors in arithmetic computation.

K - Motor Coordination--Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and swiftly.

F - Finger Dexterity--Ability to move the fingers and manipulate small objects with the fingers, rapidly and accurately.

M - Manual Dexterity--Ability to move the hands easily and skillfully. Ability to work with the hands in placing and turning motions.

Eight of the nine GATB aptitudes will be used in this study. Aptitude G, Intelligence (composed of weighted combinations of subtests also used in aptitudes V, N, and S) will be omitted because this complex variable would effect the interpretations of the statistical analysis of the data.

The inclusion of both vocational and non-vocational students also influenced the decision to utilize a measure of only cognitive ability. The Academic Promise Test (APT) is comprised of four individual tests which are: Verbal, Numerical, Abstract Reasoning and Language Usage.

The Verbal test items are of the analogies type. From the days of the Army Alpha in World War I to the modern Differential Aptitude Test, the analogies form has consistently been demonstrated to be an effective, flexible and efficient type of item. The analogy process per se is a kind of reasoning: the content to which the reasoning is applied may be as varied as desired. The use of simple words does not prevent posing of complex concepts or drawing on diverse areas of information.

The Numerical test is composed of a variety of item types, in order to sample several quantitative abilities. For the most part, the items require an understanding of concepts rather than extensive figuring. Arithmetic computation is involved in solving the problems, but reasoning rather than computation is the intended focus of the test. Few words are used; reading is at a minimum.

The Abstract Reasoning items may be described as figure classification problems. The test requires the student to seek out the principle which provides a common characteristic for a set of three figures, and to recognize which of several other figures shares that characteristic. The individual diagrams are so prepared as to make visual perception of differences easy; items are easy or hard according to the

complexity of the principle or principles which must be deduced. The process is similar to that employed in some measures of concept formation.

The Language Usage test contains a combination of grammar, spelling, and punctuation items. The examinee's task is to identify as errors, expressions which both traditional and modern authorities in English usuage regard as incorrect. Those usages which would be considered unacceptable by traditional norms, but are tolerated or accepted as part of "living language" standards have been excluded from this test. The APT Language Usage test has no more than one error per sentence; some sentences are entirely correct. Thus, the student who fails to recognize an error which is present may record "no error" as his response; he cannot assume that every sentence has an error and guess accordingly.

The California Test of Mental Maturity (CTMM) is recognized as an excellent measure of general intelligence and for comparison of verbal and non-verbal abilities. It produces seven scores: logical reasoning, numerical reasoning, verbal concepts, memory, language total, and total. These ability measures were important to this study because of the interest in student adjustment to the total inschool activities. However, in the interests of avoidance of unnecessary duplication of variables, the decision was made to use only the total or total intelligence quotient from this instrument as it acts as a replacement for the G factor which was dropped from the GATB.

2. Occupational Values--Students terminate their association with

school before graduation for a variety of reasons. The next interest after termination is for an activity of comparable time parameters; invariably this is some type of employment. Thus an indicator associated with occupations and the values which they fulfill was considered important. In recent years, occupational values have received much attention and studies of the occupational values of adolescents have probably outnumbered those concerned with occupational interest. This is probably due to the concept of values as predecessors to interests as indicated by Katz (1963). Studies concerning the occupational values of adolescents have been undertaken by Singer and Stefflre (1954), Dipboye and Anderson (1959), Super (1962), Gribbons and Lohnes (1965) and (1967), Thompson (1966), and many others. Cooley and Lohnes (1968) state in the case of their study, "Some aspects of the values of adolescents are quantified by the MAP motives, but much is missing. We wish we had something like the Allport-Vernon-Lindzey 'Study of Values' among our MAP indicators, for example."

Although a number of instruments for the measurement of occupational values have been developed the instrument selected for this study is the Occupational Values Inventory (OVI) which has been under development for the past several years. A monograph by Impellitteri and Kapes (1971) describes the development of this instrument and reports preliminary validation studies. The unique contribution of this instrument is that it contains actual "valuing tasks" in an ipsative format phrased in a language easily understood by ninth graders. The

following four of the seven occupational values assessed by the OVI were used:

a. Interest and Satisfaction--One likes the work; enjoys it; is happy at it; fulfills oneself by doing it.

b. Salary--One perceives the financial return resulting from the work; can make a good living at it; sees it as an opportunity for a good income.

c. Prestige--One is impressed by the respectability attached to the work; can earn recognition from it.

d. Security--One can obtain employment in this work; perceives that workers are needed in it; there will always be openings in it.

3. Vocational Maturity--One of the first constructs to evolve from research undertaken by Super in his Career Pattern Study (CPS) was that of "vocational maturity." Super (1957) states that "the concept of vocational development leads logically to that of vocational maturity" (p. 185). The following definition of vocational maturity is provided by Super (1957):

> Vocational Maturity is used to denote the degree of development, the place reached on the continuum of vocational development from exploration to decline. Vocational maturity may be thought of as vocational age, conceptually similar to mental age in early adolescence, but practically different in late adolescence and early adulthood because more distinctions can be made in the developmental curve at those stages (p. 186).

Super and Overstreet (1960) report the results of a study of the vocational maturity of ninth grade boys from which they conclude that many ninth grade boys are not yet ready to make specific occupational choices.

A measure of vocational maturity was an essential consideration to this study of dropouts. Crites (1965), (1969) has developed an instrument to measure vocational maturity called the Vocational Development Inventory (VDI). The VDI which consists of 50 items, is easily administered and yields a single score, has been selected for inclusion in this study. In addition to studies undertaken by Crites to validate the VDI, Impellitteri and others (1969) and Pucel and others (1970) have shown the usefulness of this instrument in studies involving vocational and technical students.

4. Family background measures--Previous studies of student dropouts revealed that the family background influences students' behavior. One of the earliest studies to explore the relationship between family background and occupational choice was undertaken by Hollingshead (1949) in a small mid-western community. Super and Overstreet (1960) have included a number of family background variables in their study of the vocational maturity of ninth grade boys. Among the variables they used were parental occupational level, house rating, parents' educational level and cultural stimulation. Gribbons and Lohnes (1968) in a study similar to Super's included a socio-economic status variable computed using Hamburger's revision of Warner's scale, and father's educational level as a second variable. Blau and Duncan (1967) discuss both the measure and selection of family background variables in studying their relationship to the American occupational structure and occupational mobility.

For the purpose of this study it was decided to use two

distinct family background variables--father's educational level and number of siblings. Information about the family dwelling was not included because it was too difficult to obtain. Mother's occupational level was not used because of the predominance of non-working mothers in the sample, and mother's educational level was excluded because of its high correlation with father's educational level as shown in the previous studies cited. Father's education was recorded according to the following seven categories which appeared to be the most meaningful: 1) one year through five years; 2) six years through eight years; 3) nine years through eleven years; 4) high school graduate--twelve years; 5) one year through three years of college; 6) college graduate; 7) college graduate plus additional graduate studies.

Family size, or the number of siblings was the second family background variable used. The relationship between family size and home environment is obvious. A relationship between it and school environment was a part of this study. The information on family size was coded as a continuous variable according to the total number of siblings of each individual in the sample.

5. School performance--Realistically this should be termed school performance before the tenth grade. The two measures of school performance used were both indicators of performance in seventh, eighth, and ninth grades. These two variables are grade point average and attendance.

The grade point average was computed by simple arithmetic

averaging. It was recognized that an option on choice of electives was exercised by the students. Each such elective was deemed to be of equal educational value for that particular student; the variable is an average of the sum of all grades in major subjects completed in the junior high school.

Attendance at school or the converse of it, the record of absenteeism, is the second school performance variable. The number of absences were utilized regardless of the reason for the absence. An unlawful absence was not differentiated from a legal absence. The prevalent practice in Pennsylvania is to record absences by half days rather than whole days. The number of absences were rounded to whole numbers in those few mixed number records.

Dependent Variables. Two separate dependent or criterion variables were utilized in this study. These were 1) dropout or retainer in grades ten through eleven and one-half, and 2) high school curriculum choice.

The sample of 780 ninth grade students, in the 1968-1969 school year, was reviewed at the end of 1971. This was the sample chosen from the total population because of the completeness of data on the selected variables. A total of sixty-six students had terminated their attendance in the public schools during this interval. A careful analysis was completed to identify only those students who became dropouts. Students who transferred to other schools either public or private were not included in the dropout total. No attempt was made to determine the cause of terminating from school. Specific reasons are a part of the school records, but a dropout for any reason was included in the total of sixty-six.

The Altoona school system provided four curriculum choices in high school: academic, business, vocational-technical, home economics. The vocational-technical curriculum is defined as the particular systematic arrangement of subjects and activities designed to prepare students for immediate employment after high school. It includes particular occupations taught regardless of whether or not the students are actually expected to be employed in that area after graduation. This curriculum is further restricted to those instructional activities which operated under the Federal-State Vocational Plan for the Commonwealth of Pennsylvania as preparatory programs. The subjects included: Appliance Repair, Automotive Body and Fender, Automotive Mechanics, Carpentry, Construction and Maintenance Trades, Drafting, Electricity, Electronics, Machine Shop, Millwork, Plumbing, Printing, Scientific Data Processing, Sheetmetal, Masonry, and Welding. The occupancy of a new vocational-technical building in the Fall of 1970 resulted in an expansion of subjects, but those listed above were available to the tenth grade class in 1969. The other curriculum choices are considered as non-vocational for this study. Several of the non-vocational curriculums did aim at preparation for employment after graduation. However, these instructional activities were not offered under the special provisions of the Federal-State Plan for Vocational-Technical Education; they are classified as non-vocational in this study.

Analysis

The statistical methodology used in this study included analysis of variance (ANOV), Pearson Product-Moment Correlations, Multiple Regression Analysis (MRA) and Multiple Discriminate Function Analysis

(MDFA).

The variables used for the MRA and MDFA were chosen on the strength of previous studies and by an analysis of variance using the Bartlett's Test to test the validity of the underlying assumption that all groups have equal variance. When the hypothesis of equal variance was rejected at the .05 level, using unequal sample sizes, a more conservative extimate was used utilizing the smallest N to test the significance of the F-ratio. If this was then found to be significant, the variable was retained for further analysis. This procedure was followed for all three research questions.

The Pearson Product Moment Correlation was used to test the relationship between each of the independent variables and the dependent variables.

DuBois (1955, p. 157) offers the following applicable comments:

> Although correlations vary from .00 to 1.00 (and negatively from .00 to -1.00), they cannot be considered as proportions (or percentages). Basically, an "r" is merely the slope of the best-fitting, least squares line, after the variance of the two variables have been equalized. Somewhat indirectly, "r" becomes a measure of relationship by indicating (when squared) the proportions of the variance in one variable predictable through knowledge of the values in the other.

A Zero-Order Correlation matrix was developed among the independent variables that were identified from the original 20 variables using the ANOV technique. A matrix was also developed between the independent variables and the criterion, dropout status. It is necessary to develop this matrix since it is the basic input that is used in the multiple regression analysis (MRA). MRA was conducted for questions one and two with the full model only, since with the two case design this is identical to multiple discriminate function analysis (MDFA) with more than two cases. The full model identifies those variables that provide a unique

contribution to the criterion along with providing an estimate of the total amount of variance accounted for by all of the independent variables taken together. The F test is utilized to establish the significance of the full model analysis.

The assumptions required for the use of MRA are that (Li, 1967 p. 65):

1. Each array of Y of the population follows the normal distribution.
2. The regression of Y on X_1, X_2 . . . X_K is linear.
3. The variances of all arrays of Y of the population are equal.
4. The samples are drawn at random.
5. The X values remain constant for all samples.

The programs used for MRA and ANOV are available in package form at the Computation Center of The Pennsylvania State University.

The computer program selected for the MRA was written by Hallberg (1969) and is available under the name of QSASE. It also provides for a test of the statistical significance of each partial regression coefficient as well as the overall F test.

Question 3 utilized a four group design and compared these groups in an attempt to extract up to K-1 discriminate functions. ANOV was again used to select variables for inclusion in the analysis. The multiple discriminate function analysis is an extension of discriminatory analysis and is used when more than two groups are compared. The purpose of MDFA is to maximize the discriminable information when more than two groups are compared. When using this technique, it is possible to extract K-1 discriminate functions although two functions are usually sufficient to account for most of the explainable variance. MDFA is

similar to the MRA which is based on minimizing the sum of squares within any one group; however, MDFA is based on maximizing the ratio of sum of squares between groups to sum of squares within groups.

The computer program used to conduct the MDFA is presented in Veldman (1967) and subsequently modified by Hallberg (1971). This modified version by Hallberg provided all information necessary in answering question number 3.

IV

FINDINGS

Introduction

The results of this investigation are reported in the following chapter. The data are presented in terms of the research questions presented in the statement of the problem in Chapter one. The results are thus presented sequentially in the same order as they appear in the statement of the problem. Tables and figures are used to present the statistical information relevant to each question and this information is discussed only to sufficiently explain and interpret its meaning. Conclusions that may be inferred or supported by this data are reported in Chapter five.

Question #1

> Which of the grade nine student characteristics discriminate significantly between retainers and dropouts in the vocational program, and what is the relationship of the combination of these characteristics to dropout status?

The descriptive statistics necessary to provide data for the analysis of question one are presented in Tables 1 and 2. Table 1 lists the means and standard deviations for each of the 20 variables, for both the vocational dropout and vocational retainer sample. From Table 1 it can be seen that the means and standard deviations for the GATB variables are approximately normal for a ninth grade sample. The expected values for an adult population for the GATB are 100 units for the means and 20

Table 1. Means and Standard Deviations for the 20 Independent Variables for the Vocational Total Sample

Variables No.	Name	Vocational Retainers (N = 191) $\bar{X}$	SD	Vocational Dropouts (N = 36) $\bar{X}$	SD	F-Ratio
1.	GATB-Verbal	91.99	9.42	85.27	7.54	16.280*
2.	GATB-Numerical	95.34	11.76	88.19	10.01	11.699*
3.	GATB-Spatial	101.65	15.80	97.31	15.60	2.297
4.	GATB-Form Perception	98.98	16.92	95.94	14.88	1.013
5.	GATB-Clerical Perception	100.04	10.88	94.97	9.47	6.833*
6.	GATB-Motor Coordination	88.02	18.56	86.17	15.37	0.321
7.	GATB-Finger Dexterity	92.28	21.97	90.86	16.07	0.136
8.	GATB-Manual Dexterity	89.26	21.90	84.56	13.16	1.553
9.	Value Interest and Satisfaction	18.16	5.01	17.39	4.76	0.723
10.	Value Salary	14.93	7.01	14.33	4.83	0.245
11.	Value Prestige	10.89	4.97	12.64	4.38	3.863*
12.	Value Security	12.45	5.27	13.47	4.76	1.173
13.	Father's Education[a]	3.93	1.39	4.17	2.31	0.674
14.	Total Number of Siblings	2.87	2.07	4.39	3.45	12.653*
15.	APT-Non Verbal	49.16	27.36	35.81	24.01	7.482*
16.	APT-Verbal	37.53	22.19	23.19	14.89	13.826*
17.	CTMM-Total	106.84	13.46	97.06	10.44	17.071*
18.	GPA Grades 7,8,9	3.18	0.54	2.55	0.45	43.709*
19.	Absenteeism Total 7,8,9	19.11	16.71	38.94	25.95	35.003*
20.	VDI-Grade Nine	34.29	5.32	32.17	5.58	4.763*

[a]This variable is coded according to the 7 categories described on page 27

* significant at .05 level

Table 2. Zero-Order Correlations Among 12 Variables (11 Independent Variables and the Dependent Variable, Dropout Status[a]) for the Vocational Sample (N = 227)[b].

Variable	1	2	3	4	5	6	7	8	9	10	11
1. GATB-V											
2. GATB-N	.513										
3. GATB-Q	.411	.476									
4. Value Prestige	-.116	-.120	-.067								
5. Total Siblings	-.257	-.189	-.121	.154							
6. APT-Non Verbal	.440	.571	.257	-.134	-.214						
7. APT-Verbal	.719	.588	.434	-.161	-.227	.656					
8. CTMM-Total	.626	.607	.433	-.165	-.260	.696	.796				
9. GPA	.584	.622	.443	-.173	-.260	.596	.691	.657			
10. Absenteeism	-.205	-.247	-.080	.099	.297	-.202	-.212	-.209	-.410		
11. VDI-Grade Nine	.339	.330	.147	-.314	-.211	.359	.389	.360	.419	-.109	
12. Dropout Status	.259	.222	.171	-.129	-.231	.179	.241	.265	.403	-.367	.144

Note: a. Dropout status indicates the subject to be either in the dropout or retainer group.

b. $r \geq .138$ Significant at .05 level

units for the standard deviations. The ninth grade population is expected to have smaller means and standard deviations. It can be seen that the vocational retainers scored higher than the vocational dropouts on all GATB variables. On two of the Occupational Values, Interest-Satisfaction and Salary, the vocational retainers scored higher while the vocational dropouts scored higher on the values Prestige and Security.

The vocational dropouts had a higher mean number of years reported on the variable, father's education, and the standard deviation was also higher indicating a larger variance for this group. The variable, total number of siblings, indicated that the vocational dropouts cause from families that were almost twice as large as the families of the vocational retainers. On the three independent cognitive measures, APT-Non Verbal, APT-Verbal and CTMM-Total Intelligence Quotient, the vocational retainers obtained higher mean scores on all three measures than did the dropouts. Using grade point average for grades 7, 8 and 9 as an indication of past school success, the vocational retainers had a higher mean for the three grades. On the variable, past school attendance, the total number of absenteeisms for grades 7, 8 and 9, the vocational dropouts had a mean of more than double the amount of days missed than the vocational retainers. An indicator of vocational maturity, Crites' Vocational Development Inventory was used and it can be seen that the vocational retainers scored higher with near equal variances. This seems to be consistent with the other cognitive variables, in that the VDI seems to be loaded in favor of high cognitive abilities and the vocational retainers scored higher on all of the cognitive measures used in this investigation.

Table 2 presents the zero-order correlations among the 11 independent

variables selected on the strength of the analysis of variance as well as between these variables and the dependent variable, dropout status. These 11 independent variables were chosen from the original 20 on the strength of an analysis of variance using the Bartlett's Test to test the validity of the underlying assumption that all groups have equal variance. This analysis of variance was computed for each of the three questions using the appropriate sample for each question. If the hypothesis of equal variance--that is each variable has equal variance for all groups--was rejected at the .05 level a more conservative approach was used to test the significance of the F-ratio for the overall ANOV. In this case, a more stringent interpretation if the F-ratio of the analysis of variance was made using the smallest degrees of freedom. If the F-ratio was then found to be significant, the variable was included in the MRA or the MDFA. The dependent variable dropout status was dichotomized into two group membership, that is the retainers received a 1 and the dropouts were assigned an 0. Thus the range of the criterion of the MRA represent a position on this 0 to 1 continuum. The intercorrelations among the independent variables in Table 2 range from -.410 to .796. A large number of the intercorrelations are statistically significant and the greatest amount of shared variance is equal to .63. The correlations between the dependent variable, dropout status and the independent variables range from -.367 to .403 and most are significant at .05 level.

Tables 1 and 2 provided information about the variables that were used in the MRA to ascertain the total amount of useful and unique information available to answer the second part of question one.

Table 2 reveals that all but the independent variable OVI Value

Prestige are related significantly at the .05 level to the dependent variable, dropout status.

MRA was conducted in order to examine the total amount of unique predictive information available from the eleven independent variables. The results of this full model analysis are presented in Table 3. The unadjusted coefficient of determination (R^2) is equal to .23, with the total multiple correlation (r) equal to .48. Adjusting the coefficient of determination for degrees of freedom accounts for shrinkage. The coefficient of determination adjusted for degrees of freedom ($\bar{R}^2$) is approximately equal to .19.

The overall multiple R was tested for significance by using the F-ratio with k and N-k-1 degrees of freedom. This is a test of the null hypothesis that all partial regression coefficients are equal to zero. The F-ratio is obtained by dividing the mean squares regression (MSR) by the mean squares error (MSE). The overall F-ratio for this model is 5.9513 and is significant beyond the .01 level.

The partial regression coefficient represents that portion of the kth independent variable, in units of that variable, which is uniquely associated with a one unit change in the criterion, dropout status, excluding the effects of the remaining k-1 independent variables.

A "t" value is obtained by dividing the partial regression coefficient by the standard error of the partial regression coefficient. This "t" value is then compared to a tabled value of "t" with 1 and N-k-1 degrees of freedom. This test was conducted to ascertain the significance of the partial regression coefficient.

Using this procedure the variables GPA and Absenteeism are significant at the .01 level. The remaining nine variables did not possess

Table 3. Regression Analysis Between the 11 Independent Variables in the Full Model and the Dependent Variable, Dropout Status for the Vocational Sample (N = 227).

Variables No.	Name	Partial Regression Coefficient	Standard Error	Student "t"
1.	GATB--V	.0027	.0034	0.784
2.	GATB--N	-.0013	.0026	0.497
3.	GATB--Q	.0004	.0024	0.167
4.	Value Prestige	-.0041	.0047	0.872
5.	Total Siblings	-.0123	.0099	1.249
6.	APT-Non Verbal	-.0012	.0012	0.993
7.	APT-Verbal	-.0018	.0020	0.926
8.	CTMM-Total	.0029	.0030	0.967
9.	GPA	.2140	.0640	3.343**
10.	Absenteeism	-.0040	.0012	3.167**
11.	VDI-Nine	-.0020	.0047	0.420
	Intercept	.0744	.4149	

Standard Error of Estimate = .3286

Multiple Correlation = .4831

Coefficient of Determination $(\bar{R}^2)^a$ = .1942

Overall F-Ratio $\frac{MSR}{MSE}$ =5.9513**

Note: a Adjusted for Degrees of Freedom
**Significant at .01 level

enough of a unique contribution to the criterion to be significant.

Question #2

Which of the grade nine student characteristics discriminate significantly between retainers and dropouts, in the non-vocational program, and what is the relationship of the combination of these characteristics to dropout status?

The means and standard deviations for each of the 20 variables for the non-vocational dropout and retainer sample are presented in Table 4.

The non-vocational retainers obtained higher mean scores on all of the GATB variables and these mean and standard deviations are higher than those for the non-vocational dropout sample. Once again the OVI Values, Interest-Satisfaction and Salary indicate higher means for the retainers and on the OVI Values Prestige and Security the Dropout sample scored higher. The means for the variable, Father's Education was almost equal with the non-vocational retainers scoring .02 points higher. The dropouts came from larger families as indicated by the variable total siblings on which their mean was higher. Again, as with the vocational comparison, the non-vocational retainers scored higher on the three independent cognitive measures, APT Non-Verbal, APT Verbal, and CTMM-Total. They also scored higher on the cumulative grade point average for grade 7, 8 and 9. Similar to the vocational sample the non-vocational dropouts were absent twice as often as the retainers during their junior high school experience, grade 7, 8 and 9. As an indication of vocational maturity, the mean for the ninth grade VDI is higher for the retainers than for the dropouts, which is consistent with the scores they obtained

Table 4. Means and Standard Deviations for the 20 Independent Variables for the Non-Vocational Total Sample

Variables No.	Name	Non-Vocational Retainers (N = 523) $\bar{X}$	SD	Non-Vocational Dropouts (N = 30) $\bar{X}$	SD	F-Ratio
1.	GATB-Verbal	95.33	10.72	88.23	8.29	12.692*
2.	GATB-Numerical	99.23	12.79	94.17	12.11	4.470*
3.	GATB-Spatial	99.01	15.95	94.03	14.54	2.785
4.	GATB-Form Perception	103.83	15.87	93.67	14.15	11.756*
5.	GATB-Clerical Perception	106.44	12.38	101.37	12.37	4.760*
6.	GATB-Motor Coordination	95.08	18.77	91.07	12.25	1.336
7.	GATB-Finger Dexterity	96.80	21.64	88.53	20.38	4.163*
8.	GATB-Manual Dexterity	87.36	20.79	80.10	16.78	3.521
9.	Value-Interest and Satisfaction	20.08	4.92	18.80	4.16	1.946
10.	Value-Salary	11.57	7.12	10.93	6.69	0.228
11.	Value-Prestige	11.95	5.34	13.87	4.38	3.703
12.	Value-Security	11.45	5.54	12.27	5.84	0.602
13.	Father's Education[a]	4.28	1.59	4.26	1.85	0.001
14.	Total Number of Siblings	2.76	1.91	3.67	2.44	6.208*
15.	APT-Non Verbal	54.83	27.67	34.43	23.70	15.640*
16.	APT-Verbal	48.05	24.18	32.67	22.69	11.548*
17.	CTMM-Total	109.37	13.88	102.10	13.05	7.817*
18.	GPA Grades 7,8,9	3.45	0.59	2.93	0.57	22.635*
19.	Absenteeism Total 7,8,9	20.04	15.76	41.07	31.26	43.774*
20.	VDI-Grade Nine	35.13	5.86	34.13	3.61	0.856

Note: a This variable is coded according to the 7 categories described on page 27

*Significant at .05 level

on the cognitive measures, all of which were higher than the dropouts.

The Zero-Order Correlations, among the 11 independent variables and the dependent variable, dropout status for the total non-vocational sample is presented in Table 5. These 11 variables were selected from the set of 20 used to assess the student characteristics originally selected for the study. They were selected on the strength of the analysis of variance using the same method previously explained. The intercorrelations among the 11 independent variables range from -.332 to .776. The intercorrelations between the independent variables and the dependent variable, dropout status range from -.271 to .198. The variable, GATB-F was the only variable that did not significantly correlate with the criterion, dropout status. Many of the intercorrelations among the independent variables were significant at the .05 level.

The information necessary to assess the relationship of the combination of these variables to dropout status was presented in Tables 4 and 5.

A MRA was computed in an effort to examine the amount of unique information available from the eleven independent variables in predicting, dropout status. The results of this full model analysis are presented in Table 6. The unadjusted coefficient of determination (R^2) is equal to .108, and the total multiple correlation (R) is equal to .33. The adjusted coefficient of determination ($\bar{R}^2$) is equal to .09. The F-ratio computed to test the significance of the overall model is equal to 5.9689, significant at the .01 level.

The variable absenteeism was the only independent variable significant in predicting dropout status in the MRA full model.

Table 5. Zero-Order Correlations Among 12 Variables (11 Independent Variables and the Dependent Variable, Dropout Status[a]) for the Non Vocational Sample (N = 553)[b].

Variable	1	2	3	4	5	6	7	8	9	10	11
1. GATB-V											
2. GATB-N	.554										
3. GATB-P	.281	.379									
4. GATB-Q	.360	.542	.550								
5. GATB-F	.205	.279	.326	.289							
6. Total Siblings	-.182	-.111	-.132	-.109	-.077						
7. APT-Non Verbal	.607	.629	.272	.292	.192	-.126					
8. APT-Verbal	.776	.590	.175	.319	.179	-.180	.723				
9. CTMM-Total	.685	.632	.271	.338	.168	-.215	.736	.738			
10. GPA	.644	.633	.306	.429	.167	-.188	.658	.687	.632		
11. Absenteeism	-.144	-.187	-.159	-.153	-.129	.140	-.164	-.131	-.157	-.332	
12. Dropout Status	.150	.089	.145	.092	.087	-.106	.166	.143	.118	.198	-.271

Note: a. Dropout status indicates the subject to be either in the dropout or retainer group.

b. $r \geq .088$ Significant at .05 level

Table 6. Regression Analysis Between the 11 Independent Variables in the Full Model and the Dependent Variable Dropout Status for the Non-Vocational Sample (N = 553)

Variables No.	Name	Partial Regression Coefficient	Standard Error	Student "t"
1.	GATB-V	.0010	.0014	0.735
2.	GATB-N	-.0021	.0011	1.820
3.	GATB-P	.0012	.0007	1.754
4.	GATB-Q	-.0001	.0010	0.183
5.	GATB-F	.0002	.0004	0.450
6.	Total Siblings	-.0053	.0049	1.081
7.	APT-Non Verbal	.0009	.0005	1.743
8.	APT-Verbal	.0003	.0007	0.455
9.	CTMM-Total	-.0011	.0011	1.032
10.	GPA	.0266	.0255	1.041
11.	Absenteeism	-.0029	.0006	5.180**
	Intercept	.9621	.1514	

Standard Error of Estimate = .2163

Multiple Correlation = .3289

Coefficient of Determination $(\bar{R}^2)^a$ = .0901

Overall F-Ratio $\frac{MSR}{MSE}$ = 5.9689**

Note: a Adjusted for Degrees of Freedom
**Significant at .01 level

Question #3

Which of the grade nine student characteristics discriminate significantly between retainers and dropouts, in the following four groups: (1) Non-Vocational Retainers, (2) Vocational Retainers, (3) Non-Vocational Dropouts, and (4) Vocational Dropouts, and how does the combination of these characteristics discriminate among these four groups?

The criterion for question number three differs from the other two questions in that it is composed of four mutually exclusive groups which are:

1. Non-Vocational Retainers
2. Vocational Retainers
3. Non-Vocational Dropouts
4. Vocational Dropouts

This method is utilized to determine the overall predictive strength of the independent variables when used to differentiate among the four groups simultaneously considering dropout and retainer status in both curriculum. In order to identify those of the original 20 variables that discriminate significantly among the four groups, the means for each variable were computed and tested using the F-ratio with k-1 and N-1 degrees of freedom. Table 7 presents the means and the F-ratios for those variables chosen as a result of this analysis. An examination of Table 7 reveals that of the 18 variables selected all but three, GATB-S, GATB-F, and OVI Value Security were significant at the .01 level and these three were significant at the .05 level. The only variables that

Table 7. Group Means and Overall F-Ratios for the 20 Independent Variables Among the Four Groups: Non-Vocational Retainers, Non-Vocational Dropouts, Vocational Retainers, and Vocational Dropouts.

Variables No.	Name	(N = 523) Non-Vocational Retainers	(N = 191) Vocational Retainers	(N = 30) Non-Vocational Dropouts	(N = 36) Vocational Dropouts	F-Ratio
1.	GATB-V	95.33	91.99	88.23	85.27	17.22**
2.	GATB-N	99.22	95.34	94.16	88.19	12.76**
3.	GATB-S	99.01	101.65	94.03	97.31	2.74*
4.	GATB-P	103.83	98.98	93.66	95.94	8.91**
5.	GATB-Q	106.44	100.04	101.36	94.97	21.67**
6.	GATB-K	95.07	88.02	91.06	86.16	8.63**
7.	GATB-F	96.79	92.27	88.53	90.86	3.59*
8.	GATB-M	87.36	89.26	80.10	84.56	1.99
9.	Value Interest and Satisfaction	20.07	18.15	18.80	17.39	9.57**
10.	Value Salary	11.57	14.93	10.93	14.33	12.16**
11.	Value Prestige	11.95	10.89	13.86	12.63	4.01**
12.	Value Security	11.45	12.45	12.26	13.47	2.79*
13.	Father's Education[a]	4.28	3.93	4.27	4.17	2.19
14.	Total Siblings	2.76	2.87	3.66	4.38	8.44**
15.	APT-Non Verbal	54.83	49.15	34.43	35.80	10.91**
16.	APT-Verbal	48.05	37.52	32.66	23.19	22.06**
17.	CTMM-Total	109.36	106.84	102.10	97.05	11.83**
18.	GPA	3.45	3.18	2.92	2.55	39.50**
19.	Absenteeism	20.04	19.11	41.06	38.94	27.18**
20.	VDI-Nine	35.13	34.29	34.13	32.16	3.85**

Note: a This variable is coded according to the 7 categories described on page 27

*Significant at .05 level
**Significant at .01 level

were not significant over the four group means were GATB-M and Father's Education.

MDFA was undertaken to arrive at the combined discriminant strength of the 18 independent variables by maximizing the total difference among the four groups. In order to answer the question as to whether or not the information contained in the 18 independent variables is sufficient to produce significant discrimination, the Wilks' Lambda statistic was computed and tested using the F-ratio. From Table 8 it can be seen that the overall F-ratio was equal to 5.501 which is significant at the .0001 level.

The Chi Square distribution was used to test the significance of the three possible discriminant functions (DF). From an examination of Table 8 it can be seen that DF I and DF II are significant at the .001 level, while DF III is not significant at a level high enough to be considered. DF I extracts 62.34 percent of the explainable variance, while DF II extracts 31.75 percent and DF III extracts only 5.90 percent. Summing over the three possible DF's it can be seen that they extract 99.99 percent of the explainable variance.

Table 8 presents the zero-order correlations between each of the functions and each variable. An examination of these correlations provides the necessary information to give meaning and select a name for each DF. In naming DF I it was observed that GATB aptitude V and Q, APT Verbal, and GPA possessed positive correlations of .55 or higher. The only high negative correlation observed was absenteeism (-.447). Since most of the variables identified in DF I were cognitive it was decided to name DF I, Cognitive. Since most of the explainable variance is accounted for by DF I most of the correlations in DF II are low. In

Table 8. Zero-Order Correlations Between the Three Discriminant Functions Among the Four Groups and the 18 Independent Variables (N = 780).

Variable No.	Name	DF I	DF II	DF III
1.	GATB-V	.548	-.135	.015
2.	GATB-N	.481	-.027	-.161
3.	GATB-S	-.011	-.303	.029
4.	GATB-P	.385	-.035	.383
5.	GATB-Q	.608	.167	-.011
6.	GATB-K	.371	.196	.098
7.	GATB-F	.243	.009	.280
8.	Value Interest and Satisfaction	.399	.175	.085
9.	Value Salary	-.351	-.421	.004
10.	Value Prestige	.015	.366	-.022
11.	Value Security	-.227	-.048	.039
12.	Total Siblings	-.327	.271	.273
13.	APT-Non Verbal	.413	-.211	.213
14.	APT-Verbal	.625	-.019	.023
15.	CTMM-Total	.438	-.200	-.178
16.	GPA	.797	-.193	-.185
17.	Absenteeism	-.447	.696	-.035
18.	VDI-Nine	.262	-.028	-.186
Chi Square		172.145*	92.477*	18.056
Percent Extracted Variance		62.34	31.75	5.90
Wilks' Lambda		0.692	Overall F-Ratio	5.501*

*Significant at .0001 level

naming DF II the variables OVI Prestige, Absenteeism, and Total Number of Siblings, with positive correlations above .27 and OVI Value Salary with a negative correlation of -.42 were combined to form the discriptor Socio-Affective. Since DF III was not found to be statistically significant it will not be named.

The percent of each group which would be correctly classified into its own group compared to those incorrectly classified into one of the other groups was presented in order to examine the efficiency of the discriminant function analysis was computed.

Table 9 presents the information concerning classification with the diagonal elements of the matrix representing correct classification. From Table 9 it can be seen that 92.74 percent of the non-vocational retainers were correctly classified while the percentage for the other three groups correctly classified was nearly equal at an average of 23 percent. It is interesting to observe that for these three groups, those incorrectly classified were likely to be classified in group 1 and this was due to the unequal sample sizes with group 1 containing the largest N of the four.

The centroids for each group are also presented in Table 9. Figure 2 graphically displays these centroids in the two dimensional space for the two significant DF's, Df I and II.

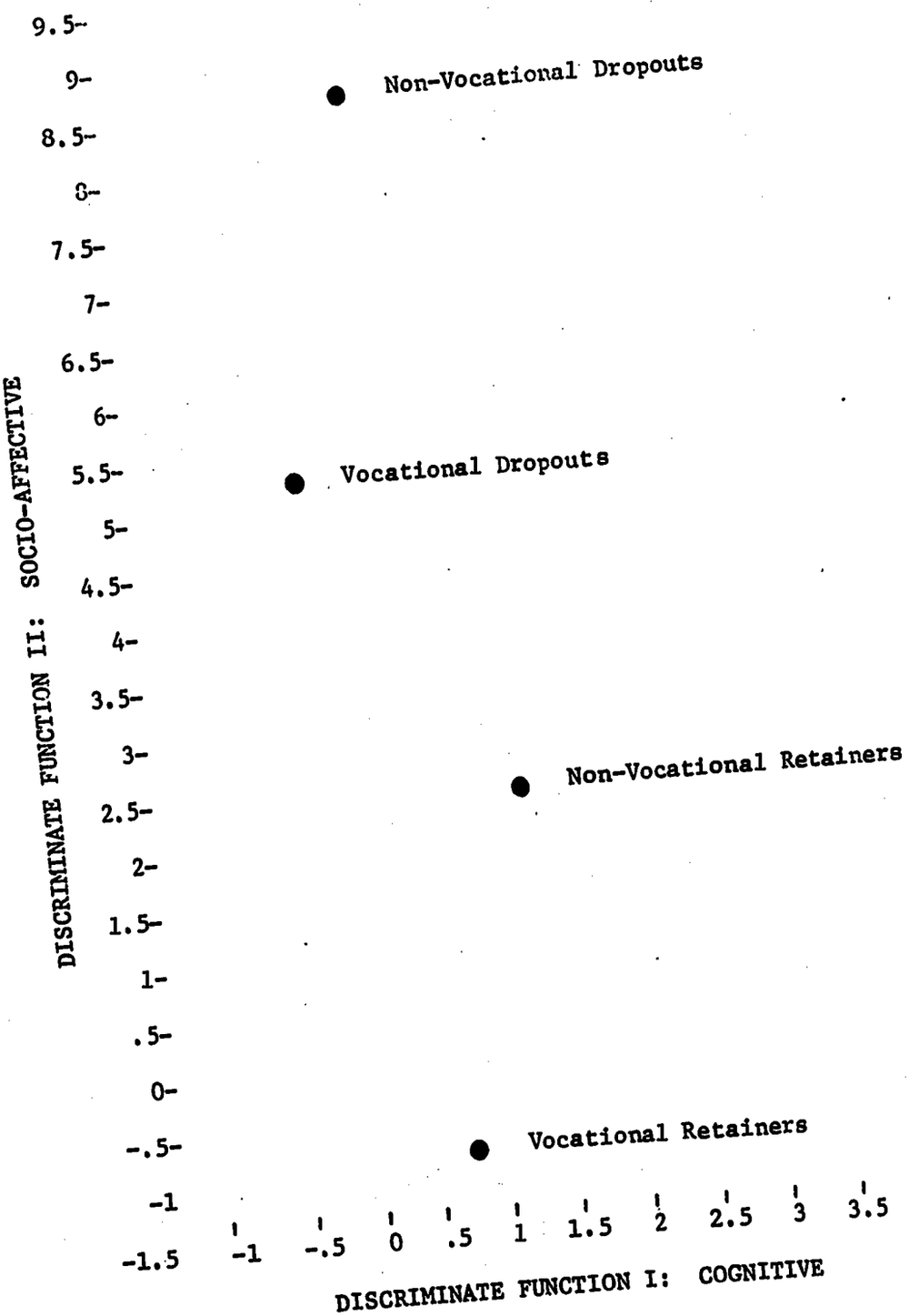
From Figure 2, it can be seen that on DF I the Non-Vocational Dropouts look similar to the Vocational Retainers and on DF II the Vocational Dropouts are similar to the Non-Vocational Retainers. DF II separates all four groups the greatest amount whereas on DF I the groups are closer together. Although each group is represented as a point on this figure, members of each group are located around the point. The

Table 9. Percent of Each Group Classified into the Four Possible Groups and Group Centroids for Each of the Three Discriminant Functions.

	Percent Classified in Each Group					Group Centroids		
	Group 1	Group 2	Group 3	Group 4	Group 5	DF I	DF II	DF III
Group 1 Non-Vocational Retainers	(92.74)	6.31	0.76	0.19	100%	1.32	2.48	-5.14
Group 2 Vocational Retainers	68.06	(26.71)	1.57	3.66	100%	0.58	-0.74	-5.26
Group 3 Non-Vocational Dropouts	66.66	6.66	(20.02)	6.66	100%	0.32	8.59	-5.74
Group 4 Vocational Dropouts	44.44	27.78	5.56	(22.22)	100%	-0.38	5.24	-4.67

( ) Diagonal Elements Represent Percent Correctly Classified

Figure 2. Centroids of Four Groups in Two Discriminant Space



density of each point can be visualized by the percentage of those in that group correctly classified. This percentage is presented in Table 9.

V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

Introduction

The many and varied limitations that are self-imposed when a student drops out of school are serious enough to demand our society's attention. The immaturity of the student conceals the full impact of these restrictions from him, at the time of his separation from school. Thus it becomes more pertinent that the educators, the other half of the school complex, attempt to identify those students showing these tendencies so that compensatory activities can be initiated.

Statement of the Problem

This study was an investigation of whether the potential dropout can be identified at ninth grade prior to entry into a high school curriculum. The purpose of the study was to identify traits of mental maturity, scholastic achievement, aptitude, occupational interests, and occupational aspirations that indicate this tendency to dropout.

The specific questions for which answers were pursued were:

1. Which of the grade nine student characteristics discriminate significantly between retainers and dropouts in the vocational curriculum, and what is the relationship of the combination of these characteristics to dropout status?
2. Which of the grade nine student characteristics discriminate significantly between retainers and dropouts in the non-vocational curriculums, and what is the relationship of the combination of these characteristics to dropout

status?

3. Which of the grade nine student characteristics discriminate significantly between retainers and dropouts in the following four groups: (1) non-vocational retainers, (2) vocational retainers, (3) non-vocational dropouts, and (4) vocational dropouts; how does the combination of these characteristics discriminate among these four groups?

Procedure

The sample utilized in the study consisted of 780 ninth grade male and female students who completed the ninth grade in the three public junior high schools in Altoona, Pennsylvania, and who were subsequently enrolled in one of the curriculums of the senior high school. Preliminary student characteristic data had been recorded when the students were enrolled in the ninth grade. Criterion information was collected starting with enrollment in the tenth grade and continued for the next two and one-half years. All the student characteristic data were gathered as a part of the longitudinal study of vocational development being conducted in the Department of Vocational Education at The Pennsylvania State University.

Twenty student characteristics variables were selected as the independent variables for this study. These variables were those of mental maturity, scholastic achievement, aptitude, occupational interests, occupational aspirations, and family background. The specific variables included the General Aptitude Test Battery (GATB) aptitudes of Verbal, Numerical, Spatial, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity; the Occupational Values Inventory (OVI) values of Interest and Satisfaction, Salary, Prestige,

and Security; the family background measures of father's education and number of siblings; the Academic Promise Test (APT) abilities both verbal and non-verbal; the California Test of Mental Maturity (CTMM) measurement of total intelligence quotient; the Crites Vocational Development Inventory (VDI) indicator of vocational maturity; the Grade Point Average (GPA) as an indicator of scholastic achievement in the junior high school, and Attendance in junior high school. The dependent variables used were enrollment in a vocational or non-vocational curriculum and the student's being either a retainer or dropout in the middle of the twelfth grade.

Analysis of the data utilized three different statistical methods. The Multiple Regression Analysis (MRA) was used for answers to questions 1 and 2. The Multiple Discriminate Function Analysis (MDFA) was used in comparing the four groups for the answer to question 3. One way Analysis of Variance (ANOV) was utilized to select variables to be in each analysis.

Findings

The dependent variable used in analyzing questions number 1 and 2 was the dropout status of students. The variables used in building the MRA in question one were chosen on the strength of an ANOV. The procedure previously discussed in Chapter four was used in selecting these variables. Of the original 20 variables, 11 were found to be significant and were therefore included in the MRA.

Zero-order correlations were calculated among the eleven independent variables and the dependent variable. Analysis of data applicable to question one showed the range of intercorrelations among the independent variables was from -.410 to .796. The range of intercorrelations between the independent variables and the dependent variable was -.367 to .403.

The F-ratio for MRA was found to be significant at .01 level. The independent variables, Grade Point Average and Absenteeism were found to be significant at the .01 level, in possessing a unique contribution to the criterion in the presence of the other 10 variables. In question two, 11 of the original 20 variables chosen were used in the MRA. These 11 variables were selected on the strength of their F-ratio in the ANOV, and by the method described in Chapter four.

The range of intercorrelations among the independent variables for students enrolled in the non-vocational curriculums was from -.332 to .776. The intercorrelations between the independent variables and the dependent variable, dropout status, had a range of -.271 to .198. The independent variable found to be of most significance in uniquely predicting the criterion was Absenteeism.

A comparison of the groups in question three showed that all but two of the 20 independent variables discriminated significantly among the four groups. The basis of this discrimination was established by again using a one way ANOV. MDFA was conducted and the overall Wilks' Lambda statistic was found to be significant at the .0001 level.

DF I and DF II were tested using the Chi Square distribution and found to be significant at the .0001 level. An examination of the correlations between the independent variables and the discriminate functions resulted in naming DF I - Cognitive and DF II - Socio-Affective. These two discriminate functions were found to extract 94.09% of the total variance.

A percent of 92.74 of the students in the non-vocational retainer group were properly classified in that group using the MDFA. Whereas 26.71 percent were correctly classified among the vocational retainers

grouping.

It was found for the non-vocational dropouts that 20.02 percent were correctly classified; while 22.22 percent of the vocational dropouts were correctly classified. Group centroids were computed and the groups were plotted in two discriminate space.

Conclusions

Question #1

This question was concerned with identifying the grade nine student characteristics which discriminate significantly between retainers and dropouts in the vocational program. The relationship of the combination of these characteristics to the criterion, dropout status, was also sought. Of the 20 independent variables, 11 were found to discriminate significantly between the two groups using a one way ANOV.

Table 1 presents the means and standard deviations of the 20 independent variables selected to represent the student characteristics. As can be seen the vocational retainers scored higher on the VDI in grade nine while at the same time the vocational dropouts scored higher on two of the OVI values used: Prestige and Security. This finding indicates a possible inconsistency in that vocational dropouts lack vocational maturity and value those things that are congruent with increased preparation and training. As expected the mean for the total number of siblings was less for the vocational retainers, however, the vocational dropouts had a higher mean on the variable of father's education. The finding on father's education is inconsistent with the literature in that it would be expected to find a lesser amount of father's education to be associated with dropping out. It must be noted that

father's education and total number of siblings are ascribed and not achieved characteristics.

MRA was conducted for the full model with the 11 significant independent variables and yielded a multiple (R) of .48. Of these 11 variables, Grade Point Average and Absenteeism possessed most of the unique information available. The adjusted coefficient of determination ($\bar{R}^2$) was equal to .19, for the vocational sample as compared to .09 for the non-vocational sample.

The combination of variables selected by the ANOV to predict drop-out status for the vocational sample differ by two variables from those that were used to predict the non-vocational sample. Using these combinations of variables it can be seen that the criterion for the vocational sample (.19) can be predicted with twice as much accuracy as the non-vocational sample (.09), although the variance accounted for in each case is less than 20 percent.

The criterion, dropout status was best predicted by two school generated measures of achievement: Grade Point Average, and Absenteeism.

Since these two variables seem to be directly related, it is not clear what effect either variable has upon the other; if attendance is low it seems reasonable to expect that grades will also be low, but it is possible that a lack of interest in school could also account for the low attendance and/or low grades.

Since the vocational dropouts scored higher on the OVI Values of Prestige and Security and lower on vocational maturity than the retainers it seems then that these dropouts may not have been successful in any curriculum since they valued those things that possibly could not be satisfied in the school environment. These students valued those things

that are most readily satisfied in the world of work, Prestige and Security, and lacked the vocational maturity that would point out to them the importance of the inschool experience necessary to satisfy these values in the future.

Therefore, the vocational curriculum may not be blamed for their failure to remain in school, however, their entrance into it was consistant with their immediate needs, in that the time they remained in school more closely simulated the world of work.

This conclusion supports the expanded use of cooperative education that gives students the opportunity to satify their immediate needs while at the same time providing them with necessary inschool experiences.

Question #2

Question number 2 was similar to question number 1 in that it seeks to identify those student characteristics that discriminate significantly between retainers and dropouts, in the non-vocational program. In addition, the relationship of the combination of these characteristics to dropout status was also sought. Using a one way ANOV, the 20 independent variables were tested to identify those variables that discriminate significantly between dropouts and retainer, and of these, 11 were found to do so.

Questions number 1 and 2 were stated so as to identify those student characteristics that significantly discriminate between dropouts and retainers in two different samples, vocational and non-vocational. For each question it was found that using the "F"-ratio, 11 variables could be so identified. Of these 11 variables, nine are the same for both groups. Table 3 shows that the vocational sample yielded two

different variables in the affective domain which discriminated between the retainers and dropouts. They were, OVI Value Prestige and the VDI. From Table 6 it can be seen that the two different variables that discriminated between the retainers and dropout for the non-vocational group are of the cognitive domain: GATB-P and F. The finding that the dropouts and retainers in both groups can be separated by an analysis of a slightly different set of variables indicates that while it is possible to predict dropout status, using cognitive and affective variables it is not reasonable to assume that these groups can be treated equally. The major difference between the characteristics which predict dropout status in the two curriculums appears to be the tendency for cognitive variables to be more important in the non-vocational curriculum and affective variables more important in the vocational curriculum. This finding is consistent with previous VDS project findings of Kapes (1971) in that success in the non-vocational curriculum is related more to cognitive variables while success in the vocational curriculum is more related to affective variables.

The means and standard deviations for the 20 independent variables are presented in Table 4. Once again it can be noted that the retainers had higher means on all variables except, OVI Values Prestige and Security, and the variable Absenteeism. This pattern is similar to that of the vocational sample in that the dropouts obtained lower scores on the grade nine VDI, an indicator of vocational maturity; they scored higher on values that require longer preparation in order to secure, which are OVI Values Prestige and Security. On the measures selected as indicators of socio-economic status, the retainers had a higher mean on father's education, and came from smaller families than did the dropouts. This

finding is as would be expected from a review of the literature, but differs from the vocational sample on father's education.

MRA was conducted for the full model with the 11 independent variables and yielded a multiple (R) of .33. The adjusted coefficient of determination ($\bar{R}^2$) was equal to .09. Of these 11 variables, Absenteeism possessed most of the unique information available in predicting the criterion, dropout status.

For the non-vocational sample it can be seen that dropout status was significantly predicted by Absenteeism and for the vocational sample it was best predicted by GPA and Absenteeism. Although these variables were the ones that were uniquely significant it must be pointed out that each of the 11 independent variables in the full model MRA contributed to the criterion. In comparing the two groups, vocational and non-vocational, it can be seen that the dropouts and retainers can be seperated using almost the same variables. In both cases Absenteeism is a significant unique predictor, while GPA is only unique in the vocational curriculum. The finding on Absenteeism and GPA is consistent with the literature; however, GPA does not appear to be as significant in the non-vocational sample. This finding may be explained by assuming that those students with a low GPA in the earlier grades may have transferred into the vocational curriculum before dropping out of school.

Question #3

Question number 3 asks what grade nine student characteristics discriminate significantly between retainers and dropouts, among the four groups: non-vocational retainers, vocational retainers, non-vocational dropouts and vocational dropouts. In addition it asked how

does the combination of these characteristics discriminate among these four groups.

One way ANOV was computed for each of the 20 variables and it was found that variables GATB-M and father's education did not differentiate among the four groups.

MDFA was computed using the 18 variables and two significant discriminate functions (DF) were found. An examination of the correlations between the DF's and each of the 18 variables was computed and DF I was named Cognitive and DF II Socio-Affective.

The correlations presented in Table 8 between the 18 variables and the DF reveal that, those variables that were significant in both MRA's full models (GPA and Absenteeism) were also the one's that possessed high correlation coefficients with the DF's; it may be noted that for DF I (Cognitive), the variable Absenteeism is negatively loaded while the cognitive and achievement variables, GPA, GATB-V, Q and APT Verbal are all positively loaded. DF II (Socio-Affective), which is the second significant DF, contains variables that are loaded on the Socio-Affective domain. From Table 8 it can be seen that those variables that are of the Socio-Affective category have higher correlation with DF II than do the cognitive and achievement variables.

When the DF's were used to classify students into one of the four groups it was found that non-vocational retainers were the most accurately classified (92.74%) while the non-vocational dropouts were the least accurately classified (20.02%). It must be noted that although the non-vocational retainers and vocational retainers were the most accurately classified, these groups contained the greatest number of subjects and they probably would be the most accurately classified by chance due to

the unequal N's among the four groups.

A plot of the group centroids, Figure 2, indicates that DF I, made up of cognitive variables, show the least separation between the non-vocational dropouts and the vocational retainers and the greatest separation between the non-vocational retainers and the vocational dropouts. DF II, which is made up of Socio-Affective variables separates the non-vocational dropouts and the vocational retainers the greatest amount whereas the separation between the vocational dropouts and the non-vocational retainers is the least.

Comparing the student characteristics across each of the four groups, it appears that the non-vocational retainers scored the highest on the cognitive and achievement variables, came from the smallest families and their fathers had the greatest amount of education. Their absenteeism over grades 7, 8 and 9 was the lowest, while their vocational maturity scores were the highest. All four groups valued OVI Values, Interest and Satisfaction, the greatest with the other three, Salary, Prestige and Security assuming different orderings for each group.

From this analysis it may be concluded that the vocational curriculum offers an alternative to the non-vocational dropouts. That is, on DF I - Cognitive - the separation between the vocational retainers and the non-vocational dropouts is the least, indicating that those that dropped out of the non-vocational curriculums may have been successful in the vocational curriculum. In addition, DF II - Socio-Affective - shows that the separation between the vocational dropouts and the non-vocational retainers is the least, whereas on DF I - Cognitive - these two groups are further apart. This finding indicates that the vocational dropouts lack the cognitive skills necessary to achieve at the same level as the

non-vocational retainers. This finding agree with Kapes (1971) in that the dropout and retainers in the two curriculums assume the same relative position as did the successful and non-successful groups in Kapes' work. In addition the same types of variables were useful in this discrimination for both studies.

This analysis indicates that these four groups can be significantly separated by two DF's, made up of cognitive, affective and socio-economic characteristics.

Recommendations

As a result of this study, the following recommendations are considered pertinent:

1. The attendance record in the cumulative folder for each grade nine student should be analyzed by administrative personnel to identify those with excessive absences. The variable absenteeism, appears to be a symptom of dropout proneness.
2. Achievement as measured by grade point average should be noted by administrative personnel to identify those ninth grade students with low averages. Low Grade Point Average seems to be symptomatic of dropping out.
3. The vocational maturity should be measured prior to junior high school and if found to be low, occupational exploration could be provided so that a more mature decision could be made by ninth grade students.
4. It is evident that the dropouts value to a greater extent the security and prestige factors of the occupational environment. It is recommended that junior high school instruction include

more emphasis on job interest and satisfaction.

5. It is recommended that school districts administer a multiple ability test to all grade nine students. Low ability scores seem to reflect dropout proneness when considered with other variables.
6. A study similar to this should be replicated with another sample from a different community. In this way the reliability and generalizability of this study will be determined.
7. Instruments to measure additional student characteristics should be developed, validated, and utilized to more precisely identify dropout proneness.

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