HOW THE PREDICTIVE CRITERIA OF APTITUDE, INTEREST AND COURSES TAKEN AT THE HOME HIGH SCHOOL RELATE TO STUDENT SUCCESS IN PROGRAMS AT THE INDIAN MERIDIAN AREA VOCATIONAL-TECHNICAL SCHOOL

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CHAPTER I

INTRODUCTION

An estimated 75% of all currently available information was developed during the past 20 years, and more than 70 billion new pieces of information are produced annually. That translates into one-half million pieces of information generated every minute of the work day (Sherman, 1986). Examining a 1981 Educational Testing Service study, Otto (1987) reported that "mountains" of this information are provided by career centers which, for the most part, offer young people no way to sort out what information is available to them, how to choose between alternatives, and how to make decisions regarding their career. Otto came to the conclusion that "young people don't just need information; they need guidance" (p. 37).

Students recognize this need for guidance. A 1981 Gallup study traced the careers of 7,000 young women and men from the time they left high school until they were 30 years old (Otto, 1984). Two thirds of the respondents cited difficulty in establishing careers and lack of career preparation among the biggest problems they faced after leaving high school. In an American College Testing survey, three fourths of the nation's 11th grade students said they wanted more help making career plans (Otto, 1984). A more recent study at the University of Michigan indicated that two thirds of the nation's high school

seniors wanted more counseling on career plans and job choices (Johnson, Bachman, & O'Malley, 1981).

Schools are looked to for providing that guidance for career preparation. In one Gallup poll, adults were asked to rate the importance of 25 goals of public education (Otto, 1984). Developing an understanding about different kinds of jobs and careers, including their requirements and rewards, ranked third in importance. Ranked sixth in importance among the same 25 goals was helping students make realistic plans for what they will do after high school graduation. In another Gallup poll, parents of children ages 13-20 identified "how to help my child choose a career" (Otto, 1984, p. 37) as one of the two biggest parenting concerns. Since Otto discovered that parents have primary influence on their children's career plans, parents must be prepared for that role. "Today's parents are poorly informed about the career options available to today's young people" (Otto, 1987, p. 38). This uncertainty is quite understandable, Otto concluded, since the average stay on a job in our society is less than five years. That suggests that today's young people will change jobs seven, eight, or nine times over their work histories. Thus, they need to be taught how to make career decisions (Otto, 1987). Brodhead (1984) reported that vocational education had increased the options for education in the career decision-making process. Nearly three fourths of high school seniors said that schools should place more emphasis on vocational programs, and two thirds reported that schools did not offer them enough practical experience (Peng, Fetters, & Kolstad, 1981).

To help provide more support for the determination of a vocational program which will best meet the needs of the student (or in which there exists the greatest likelihood of success), there is a need for data which can be used to predict student success in the chosen training program prior to enrollment. Selection of a career is an important decision and choosing the most appropriate training is essential to achieving success in that vocation. Therefore, any information which can be gleaned to support that decision and help ensure its accuracy will be invaluable to a student.

Significance of the Study

The business of counseling and placing students in vocational programs is extremely critical to the future of young people. It is imperative that counselors in the high schools and personnel who are given the responsibility of enrolling students in the vocational-technical schools be aware of the importance of this issue and devote some time and energy to developing an effective selection method. The authors who have studied this issue and whose research efforts have aided school districts across the nation in the placement of students have explored this matter thoroughly. The information contained in their research cannot, however, be accepted without question by any other school district in the country. Each district is different and criteria or methodologies must be developed which are effective for each school and the students who will attend that school.

This study, therefore, may be significant in providing additional measures by which counselors can assist students in selecting vocational programs in

which to enroll. By comparing the selection criteria with the student's interests and achievements, perhaps the results of this study can be used to guide students in program selection as specified for area vocational-technical schools in Oklahoma.

Purpose and Objectives of the Study

This study will compare predictive measures used to determine success in training programs with the actual performance of students in the program as evidenced by passing grades, program completion, and placement of the student in a job related to the field for which training was received. Results of this study may provide assistance to parents, to students, and to guidance counselors in selecting a program in which the student is most likely to find success.

The objective of this study is to determine the relationships between:

(a) a student's interest in the training program at the time of enrollment,

(b) grades in subjects taken at the home high school which are related to the program selected at the vocational-technical school, and

(c) scores on aptitude tests which have been correlated to areas of study within the vocational program,

and

(d) grades received in the training program,

(e) follow-through or completion of the program, and

(f) placement in an occupation related to the training.

Assumptions of the Study

The following assumptions were made in this study:

1. The Director of Student Services consistently ranks students on the interest survey instrument from school to school and individual to individual.
2. The students enrolling for the 1986-87 school year at Indian Meridian Area Vocational-Technical School are representative of students who will enroll in the future.
3. Student success can adequately be measured by passing grades, completion of the program, and placement in a job related to the training.

Limitations of the Study

The following limitations may have an influence on the study:

1. Information gathered for this study and analysis of the data are limited to Indian Meridian Area Vocational-Technical School students.
2. This study is limited to high school juniors and seniors, approximately 60% of the Indian Meridian school enrollment.
3. Threats to internal validity which might influence the study include:
   a. Experimental Mortality - Students may move from the district, causing them to be unable to complete the program when they might otherwise have been able to do so. Students may have to return to the high school to take courses required for graduation and be unable to complete the course. Family situations in the

students' lives may necessitate a dropping of the program or lead to poor work performance not reflective of the students' abilities.

b. History - Other factors besides the student's competence for the job may influence his/her ability to be placed in a work situation related to the training within three months of completing the program (i.e. Oklahoma's economy diminishing work opportunities available to anyone).

c. Instrumentation - The interviewer may become more experienced or discriminating during the selection process or may allow personal situations to influence his/her rating of students. Some students may have been enrolled in a particular program for reasons other than having met the criteria determined as needed for successful placement.

4. This study is not intended to be predictive for programs which are non-vocational in nature.

Terminology

Job Placement - employment in the field for which the student received training; this could be directly or indirectly related to the training received. Continuing education in the same or a similar field is also considered a job placement.

Predictors of Success - criteria used to forecast whether a student will be able to successfully complete a vocational program.

Predictive criteria for this study include:

Interest Survey - a student's expressed interest in a program as matched with the course in which the student actually chose to enroll.

Grades in Related Courses - passing grades (as evidenced by a student's transcript) in courses related to (or a background for) the course in which the student desires to enroll.

Aptitude Test - meeting the cutting score on the Armed Services Vocational Aptitude Battery as determined by ASVAB and the State Department of Vocational-Technical Education.

Factors determining successful completion for this study are:

Passing Grades - maintaining at least a "D" average throughout the program.

Program Completion - completing two or four semesters of the program (depending upon the length of the program).

Job Placement - employment within three months of completion of the program in a field related to that for which the student received training.

Vo-Tech - In the state of Oklahoma, 24 school districts have been designated as area vocational-technical school districts to provide vocational training to juniors and seniors attending high schools within that district. As high school students are not the only ones in need of vocational training, adults may also enroll in the same programs when space is available. The area vo-tech school districts vary in size and structure with some districts having more than one campus.

The concept of area schools came about through the Vocational Education Act of 1963 and the 1968 amendment to that Act. Although the schools are coordinated by the State Department of Vocational-Technical Education, each school district is a separate entity and its local board of education and administration make decisions in compliance with legislative and state department guidelines or policies. Funding is provided to the area vo-tech schools through ad valorem (property) taxes; operational, building fund, and sinking fund tax levies; appropriations from the Oklahoma legislature; and federal aid.

In addition to the area vo-tech schools, vocational training is also offered in 486 comprehensive high school districts in Oklahoma which may or may not be a part of an area vo-tech school district.

Summary

This research study was designed to provide students, parents, counselors, and other school personnel with more information to help them plan an educational program to allow the student to reach established career goals with as few obstacles as possible. It was the intent of this study to examine three criteria which have been used as guides for enrollment in a vocational-technical school and determine if those criteria have a relationship to success in the program and to securing employment in the area following completion of the program.

The criteria used for enrollment were:

(a) a student's interest in the training program at the time of enrollment,

(b) grades in subjects taken at the home high school which were related to the program selected at the vocational-technical school, and

(c) scores on aptitude tests which were correlated to areas of study within the vocational program.

The criteria used to determine success in the program were:

(a) grades received in the training program,

(b) completion of the program, and

(c) placement in an occupation related to the training.

The following chapter provides a review of professional literature related to this topic. The authors cited have had a variety of experiences with vocational education; they have, therefore, come to a variety of conclusions as to what students need to be successful in a vocational training program. Since each situation was unique, the reader is advised to look at all aspects of the study before drawing conclusions for use with students in a situation with which he/she may be working. The importance of testing, counseling and determining student interests was, however, verified through the related literature.

Chapter III explains the methods used to conduct this study. An in-depth explanation of the criteria is also given to allow the reader to understand more fully how the enrollment process was completed and how a determination of successful completion was made.

The data analysis through the multiple regression method is shown in Chapter IV. Graphs and narrative more explicitly define the results of the data analysis.

Conclusions drawn from the data analysis and recommendations related to this study are found in Chapter V.

CHAPTER II

REVIEW OF RELATED LITERATURE

In today's labor force, 80% of the jobs require skills taught through vocational-technical education (National Center for Educational Statistics and the Oklahoma State Regents for Higher Education, 1985). This confirms a statement by Wircenski and Hyde (1974).

> It has been projected that by 1980 a college education will be necessary for only about twenty percent of all jobs and that technical education beyond high school will be sufficient for about twenty-five percent of all jobs. If these projections are true, the traditional academic stress of our secondary school system renders little service to the remaining fifty-five percent for whom a high school education may be terminal (p. 28).

Wircenski and Hyde also reported that the percent of unemployment among young people between the ages of 16 and 21 was on the rise (a 10% increase over a three-year period). "It is the aim of vocational education to check the growth of these percentages by providing young people with job orientation and training so they leave high school with salable skills" (p. 28).

Meeting the needs of students through vocational education requires that additional information be provided for counselors to ensure that students enroll in a program in which they can succeed (Frazier, Starr, Smith, & Hopkins, 1977). As most counselors are trained to counsel students regarding higher

education opportunities, many may not be prepared to give advice regarding vocational training.

A number of researchers (Enderlein & Enderlein, 1973; Kapes & O'Reilly, 1973; McAlister, 1973; Werner, 1969) have reported that although every person is a little different from every other person in existence, persons with similar characteristics, abilities, and likes and dislikes choose similar occupations in which they can be successful and receive satisfaction. This same concept seems to hold true for students in the selection of their educational preparation (Drummond et al., 1975; Kapes & O'Reilly, 1973; McAlister, 1973). It is the responsibility of those who will be guiding these young people in their decision-making process to be aware of these factors as they help students select a career in which they can be successful.

Predicting success in courses has been the subject of many studies, as reported in the following paragraphs. These studies look at determining whether academic, vocational, or a combination of courses will best meet the student's needs for occupational preparation. They also examine other student variables as they relate to training for future occupations. The importance of counseling and testing in the preparation of students for later life is also described.

Academic or Vocational Courses

Although it is not strictly an either-or situation, one of the first issues to be decided in helping a student select courses for career preparation is to determine whether academic or vocational courses (or a combination of both)

would best meet the student's needs. A large factor to consider in this decision is predicting the area in which the student will be most successful.

Thorndike and Hagen (1959) pointed out that while there had been some success in predicting academic success for college students, educators were consistently ineffective in predicting occupational success. In a study dealing strictly with a male sample, Cooley and Lohnes (1968) were able to predict successful vocational choices relating to academic or vocational curriculum for students completing the ninth grade. McAlister (1973), replicating a Pennsylvania project (Kapes, 1969), found academic success to be much more predictable than success in various vocational curricula. While verbal and numerical aptitudes and vocational maturity were useful in predicting both academic and vocational success (as measured by grade point average), the student's value of salary and father's educational level assisted in predicting only academic success. The student's interest and satisfaction levels relating to the occupation, however, were related to success in the vocational realm. In further differentiation between predicting academic and vocational success, Prediger, Waple, and Nusbaum (1968) found verbal IQ not to be a good predictor of success in vocational courses as it was often found to be for academic courses.

Kapes (1972) used the General Aptitude Test Battery, the Occupational Values Inventory, the Vocational Development Inventory, and personal student information to predict success in academic and vocational curricula. In the analysis, 14 of 16 factors were found to be significant in predicting success. These included the GATB aptitudes of verbal, numerical, spatial, form

perception, clerical perception, and motor coordination; the OVI values of interest and satisfaction, salary, prestige, and security; the VDI construct of vocational maturing; and personal information such as father's education and occupational levels, and the student's occupational aspiration level. Kapes concluded that a significant difference existed between successful and unsuccessful students in the academic and vocational curricula. He further concluded that cognitive ability and higher level socioeconomic background were more characteristic of successful academic and vocational students than of unsuccessful students in either curriculum. In addition, successful vocational students were more realistic in their occupational plans than unsuccessful academic students. Kapes did caution others about making conclusive decisions from this research. Although it may appear that those students who were unsuccessful in the academic curriculum would have been successful in a vocational curriculum since they resembled successful vocational students more closely, Kapes concluded that "it would be a grave mistake to counsel students on this basis" (p. 27).

Predictors which the West Virginia State Department of Education showed to have a relationship to success in vocational programs (in rank order) are: (1) grades, (2) mental ability, (3) math grades, (4) mechanical reasoning, (5) reading scores, (6) attendance, (7) attitude, (8) spatial scores, (9) program interest, (10) abstract reasoning, (11) achievement scores, and (12) aptitude scores (Associated Education Consultants, Inc., 1979). This study also promoted the Differential Aptitude Test and the General Aptitude Test Battery as the two most widely used standardized tests with which to obtain information

related to selection criteria for vocational programs. Other selection criteria not obtained from testing, but which were considered important in this study are: (1) program interest, as expressed by the student; (2) counselor recommendation; (3) attendance; (4) grade level; (5) teacher recommendation; (6) relative subject average (subjects related to program of interest); (7) ability to work with others; (8) physical condition; (9) math grades; (10) grade point average; and (11) English grades.

A model for the prediction of success in vocational-technical education research was developed by Kapes and O'Reilly (1973). They found that:

> the most specific measure of success (Ohio Trade and Industrial Education Achievement Test score --OTAT) is the least predictable, while the most general measure of success (GPA) is the most predictable, at least within each of the two years studied (p. 41).

These studies showed that certain student characteristics relate to success in academic or vocational courses. Although success in the academic courses was easier to predict in many of the studies, other variables must also be considered when assisting students as they make the important decisions relating to educational preparation.

Other Variables to be Considered

There are a great many considerations to keep in mind when predicting whether a student will be successful in a particular program (New York Center for Field Research and School Services, 1969). Behavioral characteristics must be considered, and ability must not be the only criteria used for selection. Students who achieve well in academic subjects are not necessarily destined for academic pursuits to the neglect of vocational training. The Center's

research found that "because of limited guidance information, students may inadvertently be deprived of an opportunity for trade or vocational training or may be unwisely guided toward trade training" (p. 1). Although specified knowledge, skills, aptitudes, and personality and character traits are necessary for success in various occupations, ability and attitudes also seem essential for success in specific individual trades and occupational areas. Specific content which may be used for prediction instruments include structured interview; intelligence test; interest inventory; English, reading, math, and science scores; industrial arts teacher's rating; aptitude tests such as space relations; manual dexterity test; qualifying physical examination; and pupil attendance. Personality factors which the Center study reported could have a positive bearing on pupil success were: (1) honesty, (2) neatness, (3) orderliness, (4) organization, (5) getting along with others, (6) ambition, (7) patience, (8) inquisitiveness, and (9) perseverance. The study's authors did caution, however, that none of these traits or tests be used as a sole determinant of student selection or prediction of success.

In a study of Connecticut schools, Whinfield (1984) found that for many years the schools had used an admission procedure which relied heavily upon previous grades, attendance, and the recommendations of the sending school. There were periodic attempts to use some other measures of vocational aptitude. The Differential Aptitude Test (DAT) (Bennett, Seashore, Wesman, & Super, 1982) was used for a few years, but was found not to be cost effective. In the 1960s, an effort was made to begin developing tests for trade and industrial areas, but the plan was never carried to completion. In 1974, concern

was expressed by a number of groups that the admission criteria were operating against minorities and women, so a standardized set of criteria was developed to include: (1) scores from the Academic Promise Test and the Comprehensive Test of Basic Skills, (2) grades from the sending school, (3) attendance, and (4) interview. Use of the criteria permitted a moderately high level of prediction of first-year academic grade point averages. However, the criteria did not accurately predict grades related to trade performance or to academic grades after the first year, nor could the criteria be used to predict persistence in school or success after leaving school.

Prediger, Waple, and Nusbaum (1967) used cognitive or motor ability predictors and found a greater predictability of success in some vocational areas than in others. In their study, success of girls in vocational programs was more highly predictable than that of boys, though both groups had low levels of predictive validity for dexterity tests. The writers concluded that both dexterity and perception contributed relatively little to the prediction of success, with IQ certainly not to be considered the final predictor of success in vocational courses. Testing in private post-secondary trade, technical, and business schools, Cox (1968) also found success of females to be more predictable than that of males in business subjects. Steurer (1977) used reading tests to predict success in vocational shop programs. Using the textbook of the vocational program as the test instrument, he found a 70% or better reading score was an accurate predictor of an applicant's success in the vocational program. He discovered this method to be much more successful as a predictor of success

than relying on an academic grade-level score in reading since the grade level skill and specific skills in reading are not the same.

Predictor variables for admission of 9th graders into college preparatory and vo-tech curricula, in a study by Cohen (1969), were 8th grade scholastic average, teachers' recommendations made in the 9th grade, Stanford Reading Achievement Test scores, and Stanford Arithmetic Achievement Test scores. The average of teacher recommendations was the best overall predictor, while 9th grade reading level was the least valid predictor of 10th grade scholastic average. The 8th grade scholastic average and 9th grade arithmetic level showed validity in predicting 10th grade scholastic average.

Teacher judgments were among 15 predictor variables to identify student talent in a study by Zirbel (1974). Three of the variables were teacher judgments about the student's ability to think, work habits, and responsibility. Other variables included GPA and various scores from the DAT, Iowa Test of Basic Skills, and Lorge-Thorndike Test of Mental Ability.

Student behavior and physical characteristics, past school performance, test results, and interviews were among the variables used in these studies to predict whether students would be successful in certain classes. None of the studies agreed on particular variables to be used to the exclusion of those which had been used in other studies. Exploring other options, then, seems to be in order.

Testing

One way to measure the characteristics or abilities a student has is to test

the student. Perhaps this scientific measurement through testing may be more accurate in finding criteria which can be used to predict student success in particular programs. These studies attempted to determine if testing would be an accurate predictor.

According to Pastrana (1976), however, "possession of minimum requirements will not guarantee success in an occupation, but lack of them will almost certainly guarantee difficulty or even failure" (p. 2). Even students who do not possess the minimum requirements have been known to compensate for the attributes needed for success, so testing is not all-conclusive. In addition to aptitude tests, Pastrana recommended performance testing to get a better picture of the abilities of the student.

Dutt (1969) found that the manner in which aptitude test results were interpreted to the student does have some effect on the vocational choice-related attitudes, decisions, and preparedness of ninth-grade boys who plan to enroll in vocational-technical programs. Thus, those who interpret test results are cautioned to present only the facts found by the testing process, and to not attempt to plan the student's future based exclusively on those particular test results.

Standardized Tests

Abilities of students are often measured through the use of standardized tests. Drummond et al. (1975) used standardized tests to differentiate among students in various vocational training programs, thus assisting in counseling for occupational paths. In Project MINI-SCORE, Nelson (1972) found three

instruments which proved most useful for predicting success for vocational students: (1) the Minnesota Vocational Interest Inventory, (2) the Sixteen Personality Factor Questionnaire, and (3) the Minnesota Importance Questionnaire.

Werner (1969) gave students in New York the Vocational Preference Inventory, the Kuder Preference Record, and a personal data questionnaire to determine attributes which were the same in vocational students. He discovered that male students with the identified attributes had higher satisfaction scores in the training program. All students who were determined to have these vocational attributes were more apt to remain in their training program than the students who did not have them. Werner concluded that a student enrolled in a training program which had the same classification as the father's occupation did not appear to make any difference in achievement or satisfaction. However, students who were in a training program similar to their fathers' occupation had significantly higher attrition rates.

Selection criteria were recommended by a variety of sources with a variety of conclusions. Hall (1957) recommended the DAT, while Doppelt, Seashore, and Odgers (1959) found the DAT effective as a predictor for the Machine Shop program, but not for Auto Mechanics. Ewald (1961) found that the Mechanical Reasoning test of the DAT was not highly effective in predicting grades in vocational education; however, 10th grade scores on the DAT could be used to predict the tendency to remain in high school until graduation.

GATB. The General Aptitude Test Battery (GATB) has been used many times to extract qualities or abilities characteristic of a particular occupation to

determine probable success in that training. Super (1956) rated the GATB as the most factor-pure test and most useful in vocational counseling among other multifactor tests, including the Differential Aptitude Test (DAT). Droege (1965), in his study using the GATB, reported a multiple correlation between the four aptitude scores (Intelligence [G], Verbal [V], Clerical Perception [Q], and Manual Dexterity [M]) and the instructor's rating of good or poor equal to (.38) and significant at the .01 level. Thomas and Maxine Enderlein (1973) studied the relationship between selected characteristic variables of 11th graders and laboratory achievement using the GATB as a predictor of achievement on the Ohio Trade and Industrial Education Achievement Test (OTAT). Verbal, spatial, numerical, and clerical categories of the GATB were found to yield a relationship at the .05 level.

Samuelson (1956), a proponent of the GATB for success prediction, observed that students are more often accepted on their stated preference rather than by a method that would include placement in programs to increase their probability of success. Tate (1965) found a significant relationship between aptitude scores on the GATB and course grades in selected vo-tech courses. Ingersoll and Peters (1966) predicted vocational and business course grades from the students' aptitude scores on the GATB.

Kapes (1969) supported the use of the GATB as the best instrument to provide information for 9th graders contemplating entrance into the senior high school vocational curriculum.

> It can be hypothesized that the GATB is superior to other aptitude measures in predicting shop achievement because it contains manipulative, as well as cognitive aptitudes. Its value to counselors

> may thus lie in its ability to assess youngsters' potential motor skill development (p. 31).

Services such as Manpower Development and Training (later replaced by the Comprehensive Employment and Training Act and the Job Training and Partnership Act) and employment services have long used the GATB for vocational prediction (Bemis, 1971). If the appropriate scores are used with caution and in conjunction with other factors, Bemis wrote, the aptitude tests of the GATB can be helpful predictors of success.

Goldman (1971) studied the GATB and found no significant difference between the aptitude scores of successful students and those of unsuccessful students at the .05 level of significance. A significant difference was found between form perception and Auto Body; numerical aptitude and success in Machine Shop; finger dexterity and Welding success; motor coordination and manual dexterity with completion of the Appliance and Refrigeration program; and intelligence, verbal aptitude, numerical aptitude, spatial aptitude and success in the Business Education program.

Manley (1973) found significant negative correlations between vocational choice, preference and aspirations, and the GATB test categories of intelligence, verbal, numerical, spatial relations, form perception, clerical perception, motor coordination, and finger dexterity. The Enderleins (1973) also concluded that the manipulative portion of the GATB did not show a relationship to shop performance, making the time needed to administer this portion of the test most inefficient. Despite these negative findings, the GATB is used extensively by employment services and vocational schools across the

nation to predict success in vocational programs (U. S. Department of Labor, 1970).

ASVAB. The Armed Services Vocational Aptitude Battery came about, according to Jensen and Valentine (1976), when military personnel were assigned the task of developing a test that would:

> stimulate interest in military service, provide counselor and student information on vocational aptitudes, provide the services with information on enlistment prospects, establish mental qualifications for enlistment and induction, identify enlistment applicants for particular occupational or training systems, and classify and assign personnel (p. 5).

Bower, Lewis, and Krockover (1975) used the ASVAB to calculate expectancy tables for 28 civilian vocational-technical courses. They also developed a Technical Research Report to be used by educational testing and measurement specialists to supplement the ASVAB guide, concluding that Form 2 of the ASVAB "does do well in predicting success in a number of vocational-technical categories" (p. 18).

Harris and Huckell (1974) found the General Technical composite of the ASVAB to significantly relate to overall academic performance. A correlation between teacher grades and the sub-tests of the ASVAB was determined by Pawling (1981). He recommended, however, that the ASVAB not be used as the sole criterion for selection into a vocational program. Instead, area vocational-technical schools should develop a selection process whereby students who have been accepted for training can be given some degree of assurance that, if they apply themselves, they can be successful in a given occupation.

Non-Standardized Tests

Tests which have not gone through the process of standardization have also been used to predict student success in various educational programs. Utah Technical College developed a series of tests which link basic skills to a specific vocational training program for success prediction (Anderson & Peterson, 1983; Bernavidez & Miyatake, 1983; Gaillard & Mostaghel, 1983). Crawford (1966) reported that the combination of traits and factors of intelligence should be coupled with aptitude testing for the basis of selection of vo-tech students. She identified a list of appropriate aptitude test batteries with validity studies and correlation to instructor grades, as well as other psychometric data. In comparing the relationship between Holland's theory, the Vocational Preference Inventory, and the California Psychology Inventory, Folsom (1971) suggested that mental abilities and reading skills influence the testing direction.

Hutchins (1978) conducted a study of drafting students who were using individualized instruction in their programs. He found that students who had high aptitude for drafting also had a high cognitive ability in technical drafting upon completion of the course. Students with low aptitude for drafting showed low cognitive ability in technical drafting upon completion of the course. The students' ability to succeed in the course was not affected by either reading ability or attitude toward self-paced, programmed instruction, so Hutchins considered the aptitude test scores to be highly predictive.

Thirteen of the sub-sets of the Career Questionnaire were used by Forrest (1971) to create a new instrument to measure vocational maturity for

adolescents. He found the Readiness for Career Planning scale to be most consistent as a predictor of success. Tests were developed by instructors to determine the generalizability of math skills of students in academic settings with those required for the vocational programs and in occupations for which these programs train (Greenan, 1984). The student self-rating assessments, teacher ratings, and performance tests demonstrate to students how "academic" math will be used in jobs later in life. Benn (1982) developed a series of program-specific vocational locator tests with questions in writing, reading, and math for use in predicting vocational students' success. The tests were used to determine student deficiencies in specific academic areas to allow them to be referred to remedial programs before enrollment in the vocational programs takes place.

These studies show that, whether standardized or non-standardized tests have been used, a variety of student characteristics and skills have been linked to successful performance in certain vocational programs. Persons charged with the responsibility of guiding students as they select courses which will prepare them for their future work may choose to use some of the tests recommended by these authors, or develop tests of their own which may better fit the students' needs.

Counseling

Regardless of whether a standardized or non-standardized test has been used, or whether an interview or assessment of the student's behavioral characteristics has been done, the counselor must determine the proper

placement of the student. Counseling may be done on an individual or group basis, and may involve interpretation of whatever variable (or combination of variables) is being used as a predictor of success.

Soltys (1971) reaffirmed the importance of looking at student characteristics in working with students on career and educational planning when he worked with a group of students in the community colleges. He stated that identification of student characteristics is essential to the development of institutional goals and educational goals for vocational-technical students.

In counseling, Aucker (1970) used 24 predictors of success and 4 criteria to measure success in vocational education. He termed predictors of success as variables which were known prior to student participation in the vocational program. These included the GATB, Iowa Test of Educational Development (ITED), three counselors' ratings from the student's home high school, a binary rating of the enrollment total of the student's home high school, and a three-point similarity rating between the student's vocational program major (VPM) and father's occupation. Measures of success were variables based upon student participation in the vocational program: grade point average and ratings by his vocational teacher and counselor on three traits. Aucker reached four conclusions:

> First, high school vocational students appeared to be average students in terms of their performance on the GATB and the ITED. They also received average grades and ratings by their vocational teachers and by their counselors.
>
> Second, a counselor's rating of a student's traits was the most consistently significant predictor of success when correlations were made between predictors of success and criteria of success.

> Third, the traditional academic achievement measured by the ITED was significantly correlated with success in vocational education, as "success" was defined by the criterion of success.
>
> Fourth, a counselor should use both general and specific estimates of a student's potential when evaluating him for selection into a high school vocational program (Aucker, 1970, p. 86).

Stenson (1971) advocated multi-type, short-term counseling to enhance vocational maturity of other 10th grade males. He claimed that 10th grade male vocational students are not less vocationally mature than other 10th grade males, and most of them are ready for in-depth career planning activities. A need for more counseling time was also expressed by Bachman, Green, and Wirtanen (1971) as they concluded that students who dropped out of school exhibited symptoms of other problems which originated earlier in their lives, but about which they may never have had an opportunity to talk with others.

Brantner and Enderlein (1973) reported 20 student characteristic variables which may help identify potential dropouts, thus allowing someone the opportunity to counsel the students into programs in which they can be successful. Among other information, they found that the vocational dropouts scored higher on the Occupational Values Inventory sections of prestige and security and lower on vocational maturity than students who remained in school. They concluded that these dropouts valued those things that could not be satisfied in a school environment but were found in the world of work, prompting them to leave school. They lacked the vocational maturity, however, that would "point out to them the importance of the in-school experience necessary to satisfy these values in the future" (p. 51). Brantner and Enderlein

suggested that, perhaps with proper counseling and discussion on these issues, the students would not have dropped out of school.

Vocational maturity was also studied by Olson (1971) as he compared vocational maturation with the Program of Education and Career Exploration (PECE). He found there was no significant difference between the students who participated in PECE and those who did not, nor was there a significant difference from students in schools not participating in the PECE program.

O'Neill (1985) conducted a survey of area vo-tech school directors and counselors regarding counselors' responsibility for recruitment of students into vocational programs, though the counselors many times do not have all of the appropriate information with which to do the best job of placing students. The directors believed that visitations by junior high school students to the area vo-tech schools and good working relationships with sending school personnel were major strengths in the recruitment and selection process. Protectionism and negative attitudes on the part of sending schools were viewed as major difficulties in the recruitment process.

Other findings on counseling students into programs where there is a likelihood for success were identified by Scanlon, Arrington, Cheek, and Beeman (1982).

> (1) the recruitment practice that received the highest ranking in terms of frequency of use and perceived success was personal contact with prospective students made by past and present students, (2) approximately thirty percent of those dropouts who returned cited personal contact by school faculty or past/present students as their main reason for returning; and (3) faculty groups perceived the financial needs of students and inability to attend class as the greatest program barriers (p. v).

Scanlon's recommendations included increased emphasis on student guidance and counseling and development of a model for implementing alternative recruitment/retention strategies.

In a questionnaire for community college students, Hullman (1971) found career days, scheduling a conference with the community college guidance counselor, and brochures, flyers, leaflets, and booklets were ranked first, second, and third, respectively, as the three most influential recruitment techniques. Parents, guardians, or relatives and the community college counselor were ranked first and second, respectively, by the students as being the most influential in offering personal advice. While parents, guardians, or relatives ranked first as an influential source, they were found to rank sixth in providing recruitment information to the students. It would seem, then, to be advantageous to provide more recruitment information to the parents, guardians, or relatives, considering their influence with the students.

Summary

> Most vocational educators justifiably believe that a student's aptitudes and interests are among the characteristics relevant to his choice of a vocational program. However, counselors have very little information on this point that is directly relevant to vocational guidance. Almost all of the standardized tests used in vocational guidance were normed and validated with a different purpose in mind (Prediger, 1972, p. 15).

It would seem from the examples cited here that although numerous ways of predicting student success in training programs have been tried, none provides the magic guarantee that a student will be placed in the perfect program and will be ensured success.

CHAPTER III

RESEARCH METHODOLOGY

The purpose of this study is to determine the predictive value of three criteria for success in vocational programs. In order to be useful to those who work with student selection and placement, the criteria must be readily available. For that reason, information which is available to all high school and vo-tech counselors was used in this study. Criteria, then, are aptitude test scores, grades in subjects taken at the high school which relate to or are preparatory to vo-tech courses, and an interest questionnaire completed during student interviews. The three predictive criteria will be correlated with each of three criteria of success: passing grades earned in the vo-tech program, completion of the program, and job placement.

Population and Sample

The population for this study consisted of all secondary students who attended the Indian Meridian Area Vocational-Technical School. All high school juniors or seniors who enrolled for the first time in Indian Meridian Area Vocational-Technical School programs during the 1986-87 school year served as the sample. Although adults are enrolled in these programs, as well as in the full-time adult programs offered, they were not considered for this study.

The area vo-tech school used in this study is the Indian Meridian Area Vocational-Technical School located in Stillwater, Oklahoma. It serves 10 high schools in its district: Agra, Carney, Glencoe, Guthrie, Morrison, Mulhall-Orlando, Pawnee, Perkins-Tryon, Perry, and Stillwater. Twenty-six programs are offered during the daytime as well as a vast number of offerings to adults in the evening, both on campus and through the extension division. Four of the daytime programs were not included in this study as they were designed to serve only full-time adults. Programs at Indian Meridian for which student selection information was gathered were: Air Conditioning and Refrigeration; Auto Body; Auto Mechanics (2 sections); Business Training Center (5 sections); Carpentry; Commercial Food Production; Diesel Mechanics; Drafting; Health Service Careers; Home and Business Services; Hydraulics, Pneumatics and Mechanics; Industrial Electricity; Industrial Electronics; Machine Tool; Masonry; Metal Fabrication; and Offset Printing.

Enrollment Procedures

Enrollment in the area vo-tech school is a lengthy and complex process since only a limited number of students can be accepted into any given program in order to provide maximum training opportunities. To begin the enrollment process, all sophomores in the 10 school districts served by the Indian Meridian Area Vocational-Technical School tour the school in January or February to get an idea of what programs are available for them for the coming year. At some of the schools, this is preceded by a Career Fair in which displays of each of the programs are taken to the high schools by instructors

and Indian Meridian student representatives. Sophomores get an idea of what is taught in each program and have an opportunity to ask questions about the programs, visiting with the students and instructors and examining the display items which depict that program's activities.

When students travel to Indian Meridian for the tour, they are first shown a slide presentation depicting the programs in which they can enroll. Following a tour of the entire facility, they are asked to choose the two programs which were the most interesting to them and to visit those programs for 30 minutes each. By viewing the students and instructor in action in these programs, they can get a better idea of what the programs are like and whether they would like to be a part of one of them. Sophomores then complete an Interest Survey (Appendix A), indicating whether they intend to enroll for the coming year and, if so, in what program.

From the information on the Interest Survey, students are mailed a Pre-Enrollment Form (Appendix B), a brochure describing the program in which they showed an interest, and a letter thanking them for visiting Indian Meridian. The completed Pre-Enrollment Form is turned in to the counselor's office at their home high school and the Indian Meridian Director of Student Services comes to the school to interview each student personally.

Predictive Criteria

As noted previously, the criteria used to predict whether a student will be successful in a vocational training program are an interest survey, the grades the student made in related courses at the home high school, and the scores

made on an aptitude test (ASVAB). These criteria will be correlated with the criteria used to determine success in the vocational program through a multiple regression analysis to find what relationship exists between the two sets of criteria.

Interest Survey

At the time of the interview, students are ranked according to their interest in the program and the potential usefulness of the program in their future plans, utilizing the Interview Interest Rating Instrument (Appendix C). Questions asked during the interview and rated on the Interview Interest Rating Instrument are considered those which will give the interviewer the information necessary to select those students who will benefit most from the training offered at Indian Meridian, as well as those which will help students outline future plans and determine whether this training fits into those plans. The student's responses to the interviewer's questions regarding plans following high school graduation will give an indication of whether the student plans to pursue additional training in the same field as the program selected, go to work in that field, or pursue training or employment in another field. Those who plan to actually use the skills gained in the training program would be enrolled before those who wanted to take the program merely as an interest area.

To verify if a student has really decided this is the direction to take, it is noted whether the program in which the student enrolled was the same as the one indicated on the Interest Survey. If the choices differ, an effort is made to determine the reason for the change in interest. Since some of the students

cannot be enrolled in their first choice of program because of space limitations, it is necessary to have the students indicate two choices on the Pre-Enrollment Form.

Grades in Related Courses

During the interview, grades which relate to the program in which a student wishes to enroll are noted from the student's transcript. The grades give an indication of academic preparation for the vocational program, as well as showing the interviewer an interest the student may have had in the area as similar subjects were successfully completed in high school. Grades in the related courses will be noted on a student's application for the program indicated, as shown in Table I.

The courses give an idea of preparation level of the students and interest in a particular type of course as shown by the electives they have taken or their performance in required courses. Content of the courses listed in Table I are incorporated in some manner into the vocational program.

TABLE I

HIGH SCHOOL COURSES RELATED
TO VO-TECH PROGRAMS

Vo-Tech Program	Related Courses
Air Conditioning and Refrigeration	Physics, general science, math, algebra, communications
Auto Body	Math (ratio and proportion), industrial arts, reading
Auto Mechanics	Reading, math, industrial arts
Business Training Center	Business courses, English, general math, communications
Carpentry	Math (fractions), industrial arts, reading
Commercial Food Production	Math (fractions), home economics
Diesel Mechanics	Industrial arts, math, reading, welding
Drafting	Geometry, mechanical drawing
Hydraulics, Pneumatics and Mechanics	Physical science, algebra, trigonometry, industrial arts
Health Service Careers	Health, chemistry, math, reading
Industrial Electricity	Physical science, algebra, geometry, trigonometry
Industrial Electronics	Physical science, algebra, geometry, trigonometry
Machine Tool	Algebra, trigonometry, geometry, physical science, mechanical drawing
Masonry	Math (fractions and reading a rule), industrial arts
Metal Fabrication	Vocational agriculture, general science, mechanical drawing, general math, metal shop
Offset Printing	Art, journalism, English, general math, typing

Aptitude Tests

According to the personnel who developed the Armed Services Vocational Aptitude Battery, aptitude tests measure self-developed abilities and are intended to predict what a person could accomplish with training or further education (Aucker, 1970). Students in the 10th grade take an aptitude test to

assist with a counselor's recommendation for the student's future plans. The test used by the majority of the schools in the Indian Meridian district is the Armed Services Vocational Aptitude Battery.

Armed Services Vocational Aptitude Battery. The ASVAB is a multiple aptitude test offered free of charge by the Department of Defense to students in secondary and post-secondary schools. The battery consists of 10 subtests and takes about three hours to administer. In addition to providing information for educational and career exploration and decision making, the ASVAB provides measures of learning potential that are useful for predicting performance in school courses (U. S. Department of Defense, 1984). The occupational components which are reported to high school counselors and students can be used to estimate how well students would perform in these different types of occupations. The occupational concepts and the jobs with which they correlate are:

MECHANICAL AND CRAFTS – carpenter, aircraft mechanic, cement mason, automobile mechanic and machinist
BUSINESS AND CLERICAL – secretary, bookkeeper, stock clerk, paralegal assistant, transportation agent, data entry operator and personnel specialist
ELECTRONICS AND ELECTRICAL – repairers of TV, radio, electrical equipment, radar and computers; electrician
HEALTH, SOCIAL AND TECHNOLOGY – medical service technician, police officer, computer operator and air traffic controller

The academic composites contain the following subtests:

ACADEMIC ABILITY – word knowledge, paragraph comprehension and arithmetic reasoning
VERBAL – general science, word knowledge and paragraph comprehension
MATH – arithmetic reasoning and math knowledge

The occupational composites contain the following subtests:

MECHANICAL AND CRAFTS – arithmetic reasoning, auto and shop information, mechanical comprehension and electronics information
BUSINESS AND CLERICAL – word knowledge, paragraph comprehension, math knowledge and coding speed
ELECTRONICS AND ELECTRICAL – general science, arithmetic reasoning, math knowledge and electronic information
HEALTH, SOCIAL AND TECHNOLOGICAL – word knowledge, paragraph comprehension, arithmetic reasoning and mechanical comprehension

The average validity for courses in high school and two-year colleges was .4 as predictors of grades in several academic and vocational courses. In a recent study of more than 1,000 high school students (U. S. Department of Defense, 1984), the Academic Ability composite correlates highly with similar tests from other batteries (.90 with California Achievement Test and .85 with the Differential Aptitude Test). In another study (U. S. Department of Defense, 1984), the Academic Ability component correlated .85 with the literacy measurement from the Adult Basic Learning Examination. The average validity coefficient for occupational components was .6, indicating they can be used to predict performance with the four groups of occupations.

The ASVAB is nationally normed for ages 16-23. The parallel (alternate) form reliability of the occupational and academic components was computed on samples of applicants for military enlistment. These results were used to estimate the reliability coefficient for 18-23 year old youth, which are listed for each composite area in Table II.

TABLE II

ASVAB RELIABILITY COEFFICIENTS
BY COMPOSITE AREA

Composite	18-23 Youth	11th Grade Male	11th Grade Female	12th Grade Male	12th Grade Female	2-Year College Male	2-Year College Female
Academic Ability	.94	.94	.92	.93	.93	.88	.88
Verbal	.94	.94	.93	.93	.93	.89	.89
Math	.94	.93	.91	.93	.91	.92	.90
Mechanical and Crafts	.93	.93	.87	.92	.86	.91	.99
Business and Clerical	.94	.94	.93	.93	.92	.90	.90
Trade and Technical	.94	.94	.91	.93	.92	.92	.90
Health, Social and Technology	.95	.95	.92	.94	.92	.92	.90

Table III shows the ASVAB composite areas which have been correlated to vocational program areas by the U. S. Department of Defense to help predict success in vocational training programs. Students participating in the norm group who scored at the indicated percentile level or above on the ASVAB test were successful in the vocational programs for which the composite areas were correlated (U. S. Department of Defense, 1984).

TABLE III

RECOMMENDED MINIMUM SCORES ON ASVAB COMPOSITE AREAS AS CORRELATED WITH CAREER AREAS

Career Areas	ASVAB Composite	Percentile
Air Conditioning/Refrigeration	Trade/Technical	50
Auto Body	Trade/Technical	40
	Mechanical/Crafts	40
Auto Mechanics	Trade/Technical	40
	Mechanical/Crafts	40
Banking and Savings and Loan	Business/Clerical	80
Business and Office Education	Business/Clerical	60
	Verbal	60
Carpentry	Trade/Technical	40
Cosmetology	Academic Ability	60
Data Processing	Academic Ability	60
	Business/Clerical	60
Diesel Mechanics	Trade/Technical	40
	Mechanical/Crafts	40
Distributive Education	Verbal	40
Drafting and Design	Trade/Technical	60
Electricity	Trade/Technical	50
Electronics	Trade/Technical	80
Food Services	Academic Ability	40
Graphic Arts--Printing	Academic Ability	60
Health Service Careers	Academic Ability	60
Machine Shop	Trade/Technical	40
Masonry	Trade/Technical	40
Welding	Mechanical/Crafts	40
	Trade/Technical	40

Success Criteria

The criteria identified in this study as indicators of success in a vocational training program are the grades made throughout the training, whether a student completed the program, and whether the student was placed in a job

related to the training. These criteria will be correlated with the predictive criteria mentioned earlier through the use of a multiple regression analysis.

Grades

Students in the sample received letter grades for each semester they were enrolled at the Indian Meridian Area Vocational-Technical School. Those who were enrolled in a one-year program had two semester grades to use for this study; students in a two-year program had four semester grades. These grades were assigned by the instructor of the program based on competencies completed during that grading period. Letter grades were converted to a numerical grade point average for purposes of this study, with an "A" equal to 4 points, a "B" equal to 3 points, a "C" equal to 2 points, a "D" equal to 1 point, and an "F" equal to 0 points. The grades received during the program (either two or four) were averaged to arrive at a grade point average for each student during the time of their enrollment at the vo-tech school. Having satisfactory grades during the training was interpreted as maintaining at least a "D" or 1.0 grade point average throughout the training.

Program Completion

Successful completion of the program was determined by those students who completed both semesters of a one-year program or four semesters of a two-year program. In this study, students were coded for data analysis as completers of either a one-year or two-year program, or non-completers, identified as those who dropped out in the middle of the year and those who

were unable (for whatever reason) to return for the second year of a two-year program.

Job Placement

Students who successfully completed the vocational training program and who obtained employment in the field for which they received training within three months of their high school graduation were considered to have a successful job placement. Other aspects of successful job placement included students being employed in fields related to the area in which they received training while attending school to receive further training, and those who were in the military or pursuing additional education in the field of training, but not employed. Students who were unemployed or working in an area unrelated to the training were not considered to have successful job placements.

Data Analysis

The data provided by this study were analyzed through the multiple regression equation method. The three predictive criteria of interest, related courses, and aptitude test scores were correlated with grades received in the vo-tech program. The predictive criteria mentioned above were then correlated with completion of the vo-tech program. Job placement was the final factor to be correlated with the predictive criteria.

Summary

It is the purpose of this study to use the information obtained through the

interview as well as transcript grades and aptitude scores from the home high schools to determine whether the aforementioned criteria for students who enrolled for 1986-87 had a relationship to the grades, completion, and placement of these students or if other criteria should be implemented which would more accurately predict student success. Grades of these students were recorded for each semester as the students progressed through the program. For students who left the program prior to completion, the reason for leaving was noted and considered in the analysis of data at the completion of the study. Follow-up of the students was conducted upon completion of the program to indicate placement in an occupation related to the training received or whether additional education was pursued.

CHAPTER IV

DATA COLLECTION AND ANALYSIS

Data Collection

For this study, data were collected from 398 students enrolled at the Indian Meridian Area Vocational-Technical School for school years 1986-87 and 1987-88. The actual enrollment process began in the spring of 1986. Data were recorded for sophomores in the 10 communities served by the vo-tech school who had expressed interest in attending the school for the coming year. Table IV shows the choice of programs of these 398 new students. As indicated, 91 students (22.91% of the total) enrolled in the Business Training Center programs; Auto Mechanics was the second most popular program with an enrollment of 53 (13.3% of the total). It should be noted that these programs, as well as the Industrial Technology program, are multi-teacher programs. Auto Mechanics has two full-time instructors; the Business Training Center has five instructors; and two instructors teach in Industrial Technology. The largest enrollment for a single-teacher program during these school years was in Auto Body. New students in these 16 program areas ranged from six students in Air Conditioning and Refrigeration to 91 in the Business Training Center.

Students completing a Pre-Enrollment Form were personally interviewed by Indian Meridian's Director of Student Services. A part of the interview

TABLE IV

NUMBER OF STUDENTS PARTICIPATING IN THE STUDY BY VOCATIONAL PROGRAM IN WHICH ENROLLED

Name of Program	Number of Students in Study
Air Conditioning/Refrigeration	6
Auto Body	31
Auto Mechanics	53
Business Training Center	91
Carpentry	8
Commercial Food Production	20
Cosmetology	27
Diesel Mechanics	17
Drafting	28
Health Service Careers	17
Home and Business Services	18
Industrial Technology	22
Machine Tool	11
Metal Fabrication	22
Masonry	12
Offset Printing	15
	398

process included the completion of an Interview Interest Rating Instrument, indicating whether the program was useful in the student's future plans and the choice of programs was consistent with interest expressed earlier in the enrollment process on the Interest Survey. Data were obtained for each student's attendance during that school year at the home high school. Also noted were the recommendation of the principal or counselor for placement and the parents' permission to participate in the program.

Appendix C illustrates the point values possible for each student in the categories described, making a 10 point score maximum. Students who rated

0-4 on the Interview Interest Rating Instrument were not normally enrolled in the programs at Indian Meridian; students with point scores of 5-10 were enrolled on a space-available basis, with students scoring 10 enrolled first, scores of 9 next, etc. As shown in Table V, ratings of 0-4 points on the Interview Interest Rating Instrument were earned by 20 of the students (5%), while 378 students (95%) earned 5-10 points. Nine of the sixteen programs had new students who ranked below five. Masonry, with 25% had the highest percentage of students in this category; Commercial Food Production had 20% of its new students ranked below five. Although the Business Training Center had the same number of new students in this category as Commercial Food Production, these accounted for only four percent of their new enrollment. Home and Business Services is an occupational home economics course designed for disadvantaged and handicapped students, so the 17% of its enrollment ranking below five was not considered unusual by the Indian Meridian Director of Student Services.

Data were collected regarding successful completion of courses taken at the home high school, which have been determined to be related to the vocational program in which the student desired to enroll. These courses gave an indication of academic preparation for the vocational program, as well as showing the interviewer an interest the student may have had in the area. Successful completion was interpreted to mean that the identified related courses had been finished by the student with an average grade of "D" or better. Students who had successfully completed the courses related to their vocational-choice program are categorized in Table VI. Of the 398 students,

TABLE V

NUMBER OF STUDENTS AND THEIR SCORES ON THE INTERVIEW INTEREST RATING INSTRUMENT AT THE TIME OF ENROLLMENT

Name of Program	Interview Interest 0-4	Rating Instrument Score 5-10
Air Conditioning/Refrigeration	0	6
Auto Body	0	31
Auto Mechanics	0	53
Business Training Center	4	87
Carpentry	0	8
Commercial Food Production	4	16
Cosmetology	0	27
Diesel Mechanics	0	17
Drafting	1	27
Health Service Careers	0	17
Home and Business Services	3	15
Industrial Technology	1	21
Machine Tool	1	10
Metal Fabrication	2	20
Masonry	3	9
Offset Printing	1	14
TOTAL	20	378
PERCENT OF TOTAL	5.0%	95.0%

291 (73.1%) had met this standard. While some programs had an equal number of new students in each category, Auto Body was the only program having more students who did not complete courses related to this trade than those who did. Offset Printing and Auto Mechanics were the next highest (with 40% and 38% respectively) in percentage of students who did not complete the related courses. Health Service Careers was the only program for which all students who enrolled had completed the related courses. Since this was only

TABLE VI

NUMBER OF STUDENTS WHO SUCCESSFULLY COMPLETED RELATED COURSES AT THE HOME HIGH SCHOOL PRIOR TO ENROLLMENT AT THE VO-TECH

Name of Program	Number of Students	
	Courses Completed	Courses Not Completed
Air Conditioning/Refrigeration	3	3
Auto Body	14	17
Auto Mechanics	33	20
Business Training Center	79	12
Carpentry	4	4
Commercial Food Production	13	7
Cosmetology	17	10
Diesel Mechanics	17	3
Drafting	24	4
Health Service Careers	17	0
Home and Business Services	16	2
Industrial Technology	16	6
Machine Tool	7	4
Metal Fabrication	16	6
Masonry	9	3
Offset Printing	9	6
TOTAL	291	107
PERCENT OF TOTAL	73.1%	26.9%

one of the factors used in the enrollment process, not having completed the related courses did not exclude a student from enrolling at the vo-tech school.

The aptitude of the student for the desired vocational program was also considered in the enrollment process. The Armed Services Vocational Aptitude Battery (ASVAB) was used to measure this aptitude. According to the personnel who developed the ASVAB (Aucker, 1970), aptitude tests measure self-developed abilities and are intended to predict what a person could

accomplish with training or further education. Cutting scores on certain areas of the test, correlated with particular vocational operations, were used in selecting students for enrollment in the programs. Of the 398 students, 180 had achieved a score on the ASVAB greater than the recommended cutting score. As shown in Table VII, this accounted for 45.2% of the total, indicating that 54.8% of the students did not meet this criterion. Only four of the 16 programs had more students who did meet the aptitude cutting score than those who did not. Of these, Drafting had the highest percentage who met the criterion, with 79% having the appropriate aptitude. Air Conditioning had 50% in each category. The percentage of students not meeting the aptitude cut in the remaining 11 programs ranged from 51% to 80% of the total new enrollees, with Commercial Food Production having the higher percentage and Business Training Center, the lower. As one of three measures used for student enrollment, not having met the cut score did not exclude a student from enrolling.

While the previously-reported data were recorded for the students prior to their attendance at the vo-tech school in August of 1986, other data were collected as they progressed through the one- and two-year training programs. Included in the data collection were grades the students earned throughout their training. Students completing a one-year program had two semester grades to average for a composite grade; those in a two-year program had four semester grades to average. These composite grades were reported on a point system with an "A" equal to four points and a "B" equal to three points, etc. A measure of satisfactory grades for this study was interpreted as maintaining

TABLE VII

NUMBER OF STUDENTS WHO SCORED HIGHER THAN THE RECOMMENDED CUTTING SCORE ON THE ARMED SERVICES VOCATIONAL APTITUDE BATTERY

Name of Program	Number of Students	
	Below Cutting Score	At or Above Cutting Score
Air Conditioning/Refrigeration	3	3
Auto Body	19	12
Auto Mechanics	34	19
Business Training Center	46	45
Carpentry	6	2
Commercial Food Production	16	4
Cosmetology	14	13
Diesel Mechanics	7	10
Drafting	6	22
Health Service Careers	13	4
Home and Business Services	12	6
Industrial Technology	7	15
Machine Tool	7	4
Metal Fabrication	10	12
Masonry	8	4
Offset Printing	10	5
TOTAL	218	180
PERCENT OF TOTAL	54.8%	45.2%

at least a 1.0 (D) grade point average throughout the training. The letter grades earned in the program were converted to a numerical grade point average for statistical analysis, and then converted back to letter grades for reporting purposes. In the averaging process (and in converting from letter grade to numerical grade point average and back to letter grades), the grade averages were rounded up to the nearest letter or number as appropriate. These grades,

by program, are shown in Table VIII. Those considered successful completors, as identified by grades higher than "F," accounted for 98.5% of the total, with only 1.5% failing their training program. Three of the programs (Diesel Mechanics, Health Service Careers, and Home and Business Services) had no students who earned below a "C." Air Conditioning and Refrigeration was the only program in which no student earned an "A."

TABLE VIII

NUMBER OF STUDENTS BY GRADES RECEIVED THROUGHOUT THE TRAINING PROGRAM AT THE VO-TECH SCHOOL

Name of Program	Average Grade Received A	B	C	D	F
Air Conditioning/Refrigeration	0	2	2	2	0
Auto Body	5	12	11	3	0
Auto Mechanics	8	24	13	8	0
Business Training Center	25	37	20	7	2
Carpentry	1	4	0	3	0
Commercial Food Production	4	7	8	1	0
Cosmetology	8	6	11	2	0
Diesel Mechanics	5	7	5	0	0
Drafting	5	15	5	3	0
Health Service Careers	7	8	1	0	1
Home and Business Services	2	12	4	0	0
Industrial Technology	7	9	5	1	0
Machine Tool	3	3	3	1	1
Metal Fabrication	2	11	7	1	1
Masonry	5	3	1	2	1
Offset Printing	2	3	7	3	0
TOTAL	89	163	103	37	6
CUMULATIVE PERCENT OF TOTAL	22.4%	63.3%	89.2%	98.5%	100.0%

Completion of the program was another criterion for success. This was determined by those students who completed both semesters of a one-year program or all four semesters of a two-year program. For data analysis in this study, students were coded as completers of a one-year program, completers of a two-year program, students who dropped during the first or second year, or students who completed only one year of a two-year program. Table IX shows the number of students who completed their entire training program as 319 of the 398 students; this is 80.2% of the new students. Of this number, 85 completed a one-year program in the Business Training Center, while the remainder completed two years of training; both are options in the Business Training Center, though all other programs require two years to complete. The number who did not complete the second year of a two-year program was 64, or 16.0% of the total; these students completed one year of training, but did not return to the vo-tech school to complete the second year of the two-year program. The number of students dropping during either the first or second year of their training program was 15, or 3.8% of the total. Four of the programs (Business Training Center, Diesel Mechanics, Masonry, and Metal Fabrication) had over 90% of their students complete the program, with 95%, 94%, 92%, and 91% respectively. All except two programs had at least a 70% completion percentage, with Auto Mechanics and Industrial Technology lowest at 64% each.

The third criterion for success was job placement. Students were considered to have achieved successful placement if they were (1) employed in the field for which they had received training within three months of their

TABLE IX

NUMBER OF STUDENTS WHO COMPLETED ONE YEAR OF A ONE-YEAR PROGRAM, ONE YEAR OF A TWO-YEAR PROGRAM, TWO YEARS OF A TWO-YEAR PROGRAM, AND THOSE WHO DROPPED MID-YEAR

Name of Program	Dropped Mid-Year	Portion of the Training Completed: One Year/ Two Years	One Year/ One Year	Two Years/ Two Years
Air Conditioning/Refrigeration	0	1		5
Auto Body	2	5		24
Auto Mechanics	4	15		34
Business Training Center (1-Year)			85	
Business Training Center (2-Year)	0	5		1
Carpentry	0	2		6
Commercial Food Production	0	7		13
Cosmetology	3	5		19
Diesel Mechanics	0	1		16
Drafting	0	5		23
Health Service Careers	0	5		12
Home and Business Services	2	2		14
Industrial Technology	0	8		14
Machine Tool	2	0		9
Metal Fabrication	1	1		20
Masonry	1	0		11
Offset Printing	0	2		13
TOTAL	15	64	85	234
PERCENT OF TOTAL	3.8%	16.0%	21.4%	58.8%

graduation, (2) pursuing further education, (3) serving in one of the armed services, or (4) both employed and attending school. Students who were unemployed or working in an area unrelated to their training at the time of follow-up were not considered to have achieved successful job placement. Placement data for the subjects three months following graduation are itemized in Table X. The State Department of Vocational-Technical Education requires

that all students (regardless of their completion status) be contacted for follow up, so both completors and non-completors are included in the data analysis for employment.

TABLE X

JOB PLACEMENT STATUS OF STUDENTS THREE MONTHS FOLLOWING GRADUATION DATE

Name of Program	Unsuccessful Placement		Successful Placement		
	Unemployed	Employed Unrelated	School/ Military	Employed/ School	Employed Related
Air Conditioning/Refrigeration	1	1	1	1	2
Auto Body	4	7	13	1	6
Auto Mechanics	3	13	14	9	13
Business Training Center	12	8	27	21	23
Carpentry	1	3	2	1	1
Commercial Food Production	3	6	2	3	6
Cosmetology	1	3	5	3	15
Diesel Mechanics	2	2	9	0	4
Drafting	2	2	17	6	1
Health Service Careers	3	1	5	1	7
Home and Business Services	7	2	2	0	7
Industrial Technology	1	3	10	4	4
Machine Tool	1	0	4	2	4
Metal Fabrication	2	2	11	1	6
Masonry	3	3	2	0	4
Offset Printing	1	5	4	3	2
TOTAL	48	61	128	56	105
PERCENT OF TOTAL	12.0%	15.3%	32.2%	14.1%	26.4%
PERCENT UNSUCCESSFUL		27.3%			
PERCENT SUCCESSFUL				72.7%	

Successful job placement was achieved by 289 of the 398 subjects, or 72.7%. Of these, 128 were pursuing further education or serving in the military; 56 were employed while attending school; 105 were employed full-time in a job related to their training. Machine Tool had the largest percentage of its students in this category, with 91% of the students successfully placed. Three of the programs (Carpentry, Home and Business Services, and Masonry) maintained only a 50% successful placement rate. Ten of the remaining programs had a 65% or higher rate of successful placement. Cosmetology had the highest percentage of students placed in full-time, related jobs at 56%; Drafting was lowest, with 4%. Others ranged from 13% (Carpentry and Offset Printing) to 41% (Health Service Careers). Those who did not achieve successful job placement numbered 109, or 27.3% of the total. Of these, 48 were not employed, and 61 were employed in a job unrelated to their training. The program with the lowest percentage of students who were not successfully placed was Machine Tool, with 9%; those having the greatest percentage of students not successfully placed were Carpentry, Home and Business Services, and Masonry at 50%. Although one-fourth of the number of students who were unemployed had been taught in the Business Training Center, this accounted for only 3% of their total.

In reviewing the predictive criteria for the 398 students participating in this study, 95% rated 5-10 on the Interview Interest Rating Instrument; 73.1% had completed related courses; and 45.2% had an aptitude score at or above the recommended cutting score. For success criteria, 98.5% had grades of "D" or

above in their training program; 80.2% completed the training; and 72.7% were successfully placed within three months of graduation from the program.

Data Analysis

A Multiple Regression Analysis and a Stepwise Linear Multiple Regression Analysis through the SPSSX program were performed to determine the ability of the criteria of interest, courses taken at the home high school, and aptitude test scores to predict success in a vo-tech school, defined as receiving passing grades (1.0 or better grade point average) throughout the training, completing the entire program, and being placed in a job related to the training received or furthering education in the area. This method was selected since a regression analysis is typically used to assess the relationship between one dependent variable and several independent variables, and is generally used when the intent of the analysis is prediction (Norusis, 1983). Regression techniques are especially useful because they do not require that the independent variables be uncorrelated. The flexibility of the regression techniques is, then, of special importance to the researcher interested in real-world problems.

The result of applying multiple regression techniques to a data set is an equation that represents a best-fit line between a (usually) continuous dependent variable and several continuous or dichotomous independent variables. A high multiple correlation indicates that great variability is shared between one variable and a set of others, but not that the variables are causally

related. Shared variability could stem from many sources, including the influence of other, currently unmeasured variables.

Stepwise regression allows the order of entry of variables into the analysis based on statistical rather than theoretical criteria (Tabachnick & Fidell, 1983). At each step the variable that adds most to the prediction equation, in terms of increasing R^2, is entered. The process continues until no more useful information can be gleaned from further addition of variables, with the researcher specifying statistical criteria for entry and deletion of variables. The technique is typically used to develop a subset of independent variables that is useful in predicting the dependent variable, and to eliminate those independent variables that do not provide additional prediction.

The dichotomous independent variable means for this study are shown in Table XI. The mean was 1.95 for "interest," with ratings of 0-4 coded as "1" and 5-10 scores coded as "2." The "aptitude" mean was 1.455, whereas "1" designated students who did not meet the recommended cutting scores correlated with their program choice and "2," those who did. The mean for "courses" taken at the home high school which relate to the vo-tech training was 1.731, with "1" for students who had successfully completed the courses and "2" for those who had not. The dependent variable mean for "grades" was 2.741, with an F coded as "0," and D coded as "1," etc. "Completion's" mean was 2.314. Students who dropped mid-year were coded as "0;" those completing one year of a two-year program were coded as "1;" one-year completors were "2;" and two year completors were "3." Mean for placement was 3.274, with "1" for unemployed, "2" for employed unrelated, "3" for

school/military, "4" for working in a job related to their training and attending school, and "5" for employed full-time in a job related to their training.

TABLE XI

MEAN, STANDARD DEVIATION, AND VARIANCE FOR PREDICTIVE CRITERIA AND SUCCESS CRITERIA

Criteria	Mean	Standard Deviation	Variance
Predictive Criteria:			
Interest	1.950	.219	.048
Aptitude	1.455	.499	.249
Courses	1.731	.444	.197
Success Criteria:			
Grades	2.741	.953	.908
Completion	2.314	.914	.836
Placement	3.274	1.325	1.756

In the following sections, results of the data analysis will be presented according to the ability of an independent variable to predict success for students in the vo-tech program. The predictive criterion of "courses" will refer to those courses students took at the home high school which have been determined to be related to the vocational program in which the student enrolled. "Aptitude," as a second predictive criterion, will refer to whether the

student met the cutting score on the Armed Services Vocational Aptitude Battery which has been correlated to the training program chosen. The third predictive criterion, "interest," is the score the student made on the Interview Interest Rating Instrument at the time of enrollment. These criteria will be discussed in terms of their relationship to the success criteria. "Grades," the first success criterion, will hereafter mean the average of the semester grades the student earned while attending Indian Meridian. "Completion" refers to whether the student completed the entire training program, whether enrolled in a one-year or two-year program. The final success criterion, "placement," indicates whether the student was successfully placed within three months following graduation from the vo-tech program. These criteria will be referred to by their one-word identification in the analysis to follow.

Predictors of Grades

The standard multiple regression analysis showed that 25.2% of the variance in grades can be explained by differences in the predictor variables of courses, interest, and aptitude. As shown in Table XII, all three of these variables have a statistical significance of .0000 to the regression. Courses was found to be the best predictor, with a beta of .297, while aptitude had a beta of .262; and interest was .189. Another view of the contribution of courses lending predictive strength to grades can be seen when 10.02% of the 25.2% R^2 (correlation) would be reduced if interest and aptitude variables were removed from the analysis, using the formula for squared semipartial correlation.

TABLE XII

STANDARD MULTIPLE REGRESSION TABLE FOR COURSES, INTEREST, AND APTITUDE TO GRADES

Analysis of Variance Table

	DF	Sum of Squares	Mean Square	F	Sig of F
Regression	3	90.79867	30.26622	44.24073	.0000
Residual	394	269.54556	.68413		

Multiple R	.50197
R Square	.25198
Adjusted R Square	.24628
Standard Error	.82712

Variables in the Equation

	B	SE B	95% Conf. Int. B			Beta	SE Beta	F	Sig of F
Courses	.636882	.096223	.447707	to	.826058	.296755	.044835	43.808	.0000
Interest	.826165	.192634	.447447	to	1.204884	.189683	.044228	18.394	.0000
Aptitude	.500417	.085351	.332617	to	.668217	.261879	.044666	34.375	.0000
(Constant)	-.700146	.392408	-1.471621	to	.071330			3.183	.0752

In the stepwise regression, courses also was found to be the best predictor of grades earned in the vo-tech program, accounting for 14.2% of the variance in the criterion grades, as shown in Table XIII. The predictor criterion of aptitude was also found to be a significant determination of fit for grades. Table XIV shows a 21.7% proportion of variance accounted for with the addition

of the aptitude criterion. With the criterion of interest added, on Table XV, 25.2% of the variance is explained, again indicating a significant linear relationship between interest and grades.

TABLE XIII

STEPWISE MULTIPLE REGRESSION TABLE
FOR COURSES TO GRADES

Analysis of Variance Table

	DF	Sum of Squares	Mean Square	F	Sig of F
Regression	1	51.23159	51.23159	65.63209	.0000
Residual	396	309.11263	.78059		

Multiple R	.37706
R Square	.14217
Adjusted R Square	.14001
Standard Error	.88351

Variables in the Equation

	B	SE B	95% Conf. Int. B			Beta	SE Beta	F	Sig of F
Courses	.809230	.099888	.612053	to	1.005607	.377060	.046543	65.632	.0000

Variables Not in the Equation

	Beta In	Partial	Min. Toler.	F	Sig of F
Interest	.213328	.227865	.978722	21.633	.0000
Aptitude	.279347	.295454	.959601	37.779	.0000

TABLE XIV

STEPWISE MULTIPLE REGRESSION TABLE FOR APTITUDE TO GRADES

Analysis of Variance Table

	DF	Sum of Squares	Mean Square	F	Sig of F
Regression	2	78.21503	39.10752	54.75318	.0000
Residual	395	282.12919	.71425		

Multiple R	.46589
R Square	.21706
Adjusted R Square	.21309
Standard Error	.84513

Variables in the Equation

	B	SE B	95% Conf. Int. B			Beta	SE Beta	F	Sig of F
Courses	.688729	.097540	.496966	to	.880491	.320912	.045449	49.857	.0000
Aptitude	.533797	.096847	.363057	to	.704536	.279347	.045447	37.779	.0000
(Constant)	.772356	.194149	.390663	to	1.154050			15.826	.0001

Variables Not in the Equation

	Beta In	Partial	Min. Toler.	F	Sig of F
Interest	.189683	.211193	.944455	18.394	.0000

TABLE XV

STEPWISE MULTIPLE REGRESSION TABLE
FOR INTEREST TO GRADES

Analysis of Variance Table

	DF	Sum of Squares	Mean Square	F	Sig of F
Regression	3	90.79867	30.26622	44.24073	.0000
Residual	394	269.54556	.68413		

Multiple R	.50197
R Square	.25198
Adjusted R Square	.24628
Standard Error	.82712

Variables in the Equation

	B	SE B	95% Conf. Int. B			Beta	SE Beta	F	Sig of F
Courses	.636882	.096223	.447707	to	.826058	.296755	.044835	43.808	.0000
Aptitude	.500417	.085351	.332617	to	.668217	.261879	.044666	34.375	.0000
Interest	.026165	.192634	.447447	to	1.204884	.189683	.044228	10.394	.0000
(Constant)	-.700146	.392408	-1.471621	to	.071330			3.183	.0752

Predictors of Completion

The combination of the three predictive criteria (courses, interest, and aptitude) proved to be significant in predicting whether or not a student would complete the training program as computed by the standard multiple regression analysis and the stepwise method. Table XVI shows the 3.67% of variance

explained in completion by interest, courses, and aptitude, as well as the statistical significance of .0021. The best predictor of completion was interest, with a beta weight of .138 and a 2.39% contribution to completion's variance; this was followed by courses with a .114 beta weight.

TABLE XVI

STANDARD MULTIPLE REGRESSION TABLE FOR COURSES, INTEREST, AND APTITUDE TO COMPLETION

Analysis of Variance Table

	DF	Sum of Squares	Mean Square	F	Sig of F
Regression	3	12.15803	4.05268	4.99637	.0021
Residual	394	319.58317	.81112		

Multiple R	.19144
R Square	.03665
Adjusted R Square	.02931
Standard Error	.90062

Variables in the Equation

	B	SE B	95% Conf. Int. B			Beta	SE Beta	F	Sig of F
Courses	.234535	.104775	.028548	to	.440523	.113895	.050881	5.011	.0257
Interest	.576937	.209753	.164562	to	.989311	.138054	.050191	7.566	.0062
Aptitude	7.23650	.092936	-.181989	to	.183436	3.947	.050689	.000	.9938
(Constant)	.782118	.427281	-.057918	to	1.622155			.3351	.0679

The stepwise linear regression method also shows interest to be the best predictor of completion, as shown in Table XVII. Interest's contribution to the variance in completion was 2.4%, and interest had a beta weight of .155. Courses also showed a statistical significance in predicting completion, as shown in Table XVIII; its beta weight was .114. When forced into the regression equation by the enter method, aptitude showed statistical significance as the 4.99637 F value exceeded the required 3.0 critical F value for significance (according to Tabachnick & Fidell, 1983). Aptitude did not, however, show any contribution to the explained variance in completion as shown by the R^2 in Table XIX.

Predictors of Placement

Interest was the only criterion (through both statistical analyses) which showed a significant linear relationship as a predictor of placement. Table XX (standard multiple regression analysis) shows interest to be significant at the .01 level, with a beta of .139 as the best predictor of placement.

Table XXI shows the 2.1% variance for placement which interest contributes. Though the variance is small, the statistic is considered significant since the calculated F value of 8.29 exceeds the critical F value of 3.0 required for significance (Tabachnick & Fidell, 1983).

TABLE XVII

STEPWISE MULTIPLE REGRESSION TABLE FOR INTEREST TO COMPLETION

Analysis of Variance Table

	DF	Sum of Squares	Mean Square	F	Sig of F
Regression	1	7.94068	7.94068	9.71125	.0020
Residual	396	323.80053	.81768		

Multiple R	.15471
R Square	.02394
Adjusted R Square	.02147
Standard Error	.90426

Variables in the Equation

	B	SE B	95% Conf. Int. B			Beta	SE Beta	F	Sig of F
Interest	.646561	.207478	.238665	to	1.054456	.154714	.049647	9.711	.0020

Variables Not in the Equation

	Beta In	Partial	Min. Toler.	F	Sig of F
Aptitude	.021626	.021737	.986149	.187	.6659
Courses	.113969	.114124	.978722	5.213	.0230

TABLE XVIII

STEPWISE MULTIPLE REGRESSION TABLE FOR COURSES TO COMPLETION

Analysis of Variance Table

	DF	Sum of Squares	Mean Square	F	Sig of F
Regression	2	12.15798	6.07899	7.51354	.0006
Residual	395	319.58322	.80907		

Multiple R	.19144
R Square	.03665
Adjusted R Square	.03177
Standard Error	.89948

Variables in the Equation

	B	SE B	95% Conf. Int. B			Beta	SE Beta	F	Sig of F
Interest	.577086	.208614	.166953	to	.987219	.138089	.049919	7.652	.0059
Courses	.234688	.102794	.032597	to	.436779	.113969	.049919	5.213	.0230

Variables Not in the Equation

	Beta In	Partial	Min. Toler.	F	Sig of F
Aptitude	3.947	.000392	.944455	.000	.9938

TABLE XIX

STEPWISE MULTIPLE REGRESSION TABLE FOR INTEREST TO COMPLETION (ENTER METHOD)

Analysis of Variance Table

	DF	Sum of Squares	Mean Square	F	Sig of F
Regression	3	12.15803	4.05268	4.99637	.0021
Residual	394	319.58317	.81112		

Multiple R	.19144
R Square	.03665
Adjusted R Square	.02931
Standard Error	.90062

Variables in the Equation

	B	SE B	95% Conf. Int. B			Beta	SE Beta	F	Sig of F
Interest	.576937	.209753	.164562	to	.989311	.138054	.050191	7.566	.0062
Courses	.234535	.104775	.028548	to	.440523	.113895	.050881	5.011	.0257
Aptitude	7.23650	.092936	-.181989	to	.183436	3.947	.050689	.000	.9938
(Constant)	.78248	.427281	-.057918	to	1.622155			3.351	.0679

TABLE XX

STANDARD MULTIPLE REGRESSION TABLE FOR COURSES, INTEREST, AND APTITUDE TO PLACEMENT

Analysis of Variance Table

	DF	Sum of Squares	Mean Square	F	Sig of F
Regression	3	14.47771	4.91480	2.03766	.0379
Residual	394	682.40383	1.73199		

Multiple R	.14543
R Square	.02115
Adjusted R Square	.01370
Standard Error	1.31605

Variables in the Equation

	B	SE B	95% Conf. Int. B			Beta	SE Beta	F	Sig of F
Courses	.032871	.153104	-.268131	to	.333873	.011011	.051288	.046	.8301
Interest	.042628	.306504	.240040	to	1.445216	.139089	.050593	7.558	.0062
Aptitude	.056295	.135804	-.210696	to	.323286	.021180	.051095	.172	.6787
(Constant)	1.492155	.624371	.264640	to	2.719670			5.711	.0173

TABLE XXI

STEPWISE MULTIPLE REGRESSION TABLE
FOR INTEREST TO PLACEMENT

Analysis of Variance Table

	DF	Sum of Squares	Mean Square	F	Sig of F
Regression	1	14.29348	14.29348	8.28905	.0042
Residual	396	682.85476	1.72438		

Multiple R	.14319
R Square	.02050
Adjusted R Square	.01803
Standard Error	1.31316

Variables in the Equation

	B	SE B	95% Conf. Int. B	Beta	SE Beta	F	Sig of F
Interest	.867460	.301299	.275116 to 1.459805	.143188	.049734	8.289	.0042
(Constant)	1.582540	.591133	.420390 to 2.744690			7.167	.0077

Variables Not in the Equation

	Beta In	Partial	Min. Toler.	F	Sig of F
Aptitude	.023233	.023312	.986149	.215	.6433
Courses	.014990	.014984	.978722	.089	.7660

Table XXII illustrates the lack of significance of the predictor variables of aptitude and courses to placement through both the significant F values and the calculated F value of 2.84 being smaller than the required critical F value of 3.0.

The .1% variance of the combination of these variables as contributing to prediction is, therefore, related to chance rather than significance.

TABLE XXII

STEPWISE MULTIPLE REGRESSION TABLE FOR APTITUDE AND COURSES TO PLACEMENT (ENTER METHOD)

Analysis of Variance Table

	DF	Sum of Squares	Mean Square	F	Sig of F
Regression	3	14.74441	4.91480	2.83766	.0379
Residual	394	682.40383	1.73199		

Multiple R	.14543
R Square	.02115
Adjusted R Square	.01370
Standard Error	1.31605

Variables in the Equation

	B	SE B	95% Conf. Int. B			Beta	SE Beta	F	Sig of F
Interest	.842628	.306504	.240040	to	1.445216	.139089	.050593	7.558	.0062
Aptitude	.056295	.135804	-.210696	to	.323286	.021180	.051095	.172	.6787
Courses	.032871	.153104	-.268131	to	.333873	.011011	.051288	.046	.8301
(Constant)	1.492155	.424371	.264640	to	2.719670			5.711	.0173

Summary

This study included 398 students enrolled in 16 programs at the Indian Meridian Area Vocational-Technical School during the school years 1986-87 and 1987-88. Of these students, 95% ranked 5-10 on the Interview Interest Rating Instrument; 73.1% had successfully completed related courses; and 45.2% had met the cutting score on the ASVAB for the predictive criterion of aptitude. In reviewing the statistics related to the success criteria, 98.5% of the students received a grade point average of 1.0 or better; 80.2% successfully completed their training program; and 72.7% were successfully placed within three months of graduation from the program.

When these statistics were analyzed through the standard multiple regression analysis and the stepwise linear multiple regression analysis, it was found that all three criteria (interest, aptitude, and courses) were significant predictors for success in terms of grades and completion. Courses was the best predictor of grades, with a beta weight of .297; aptitude and interest were second and third, with .262 and .189 beta weights respectively. Completion could best be predicted by interest, with a .138 beta weight; courses was the next most significant predictor with a .114 beta weight. Aptitude showed statistical significance when forced into the regression analysis by the enter method; it did not, however, contribute any to the explained variance in completion. Interest was the only criterion which showed a significant relationship to the prediction of placement, with a beta weight of .139.

CHAPTER V

CONCLUSIONS, RECOMMENDATIONS, AND COMMENTARY

The purpose of this study was to compare predictive measures used to determine success in training programs with the actual performance of students in the program as evidenced by passing grades, program completion, and placement of the student in a job related to the field for which training was received. Results of this study may provide assistance to parents, to students, and to guidance counselors in selecting a program in which the student is most likely to find success.

The objective of this study was to determine the relationships between:

(a) a student's interest in the training program at the time of enrollment,

(b) grades in subjects taken at the home high school which are related to the program selected at the vocational-technical school, and

(c) scores on aptitude tests which have been correlated to areas of study within the vocational program

and

(d) grades received in the training program,

(e) follow-through or completion of the program, and

(f) placement in an occupation related to the training.

The population for this study consisted of all secondary students who attended the Indian Meridian Area Vocational-Technical School in Stillwater, Oklahoma. All high school juniors or seniors who enrolled for the first time at the vo-tech school during the 1986-87 school year served as the sample, a total of 398 students.

Twenty-two programs offered during the daytime were used to gather student selection information. These programs included Air Conditioning and Refrigeration; Auto Body; Auto Mechanics (2 sections); Business Training Center (5 sections); Carpentry; Commercial Food Production; Diesel Mechanics; Drafting; Health Service Careers; Home and Business Services; Industrial Technology (Hydraulics, Pneumatics and Mechanics; Industrial Electricity; Industrial Electronics); Machine Tool; Masonry; Metal Fabrication; and Offset Printing.

The criteria used to predict whether a student would be successful in a vocational training program were interest in the program, related courses taken at the home high school, and aptitude for the chosen occupational area. These criteria were correlated with the criteria used to determine success in the vocational program (grades earned in the program, completion of the program, and placement in a job related to the training) through a multiple regression analysis.

An Interview Interest Rating Instrument was used to collect data for the criterion of interest. Courses taken at the home high school which relate to the vo-tech program in which the student wished to enroll were used for the criterion of courses. Aptitude was measured by recommended cutting scores

correlated to the vocational program through the Armed Services Vocational Aptitude Battery.

The success criterion of grades was an average of the semester grades earned by the student throughout the vocational training program. Denotation of completion was whether the student completed a one- or two-year program, dropped in the middle of the year, or did not return for the second year of a two-year program. Placement was categorized as unemployed, employed in a field unrelated to the training received, pursuing further education or serving in the military, pursuing further education and working, and working full-time in a job related to the training received.

The data provided by this study were analyzed through the standard multiple regression equation method. The three predictive criteria of interest, related courses, and aptitude test scores were correlated with grades received in the vo-tech program. The predictive criteria mentioned above were then correlated with completion of the vo-tech program. Job placement was the final factor to be correlated with the predictive criteria. A stepwise linear multiple regression analysis was then conducted to determine which of the three predictive criterion (interest, courses, or aptitude) was the best predictor of each success criteria (grades, completion, and placement).

The standard multiple regression analysis showed that 25.2% of the variance in grades could be explained by differences in the predictor variables of courses, interest, and aptitude. All three of these variables had a statistical significance of .0000 to the regression. Courses was found to be the best predictor, with a beta of .297; aptitude had a beta of .262; and interest, .189.

In the stepwise regression, related courses taken at the home high school also was identified as the best predictor of grades earned in the vo-tech program, accounting for 14.2% of the variance in the criterion grades. The predictor criterion of aptitude test scores was also found to be a significant determination of fit for grades earned in the vo-tech course, as was interest.

The combination of the three predictive criteria proved significant in predicting completion. Interest was the best predictor, with a .138 beta weight and a contribution of 2.39% to the variance in completion. Courses was also a significant predictor, with a beta weight of .114. Although aptitude was included in the significant predictors through the standard multiple regression analysis and showed statistical significance in the stepwise method, it did not contribute to the explained variance in completion.

Interest was the only criterion which showed a significant linear relationship as a predictor of placement in a job related to the vo-tech training program through both statistical analyses. Interest was significant at the .01 level, with a beta of .139, making it the best predictor of placement among the three predictive criteria.

These statistics support McAlister's (1973) study in which he found academic success (usually denoted by grades) to be much more predictable than success in various vocational curricula. He also found students' interest and satisfaction levels for the occupation related to success in the vocational realm. This study also agrees with the West Virginia State Department of Education study (Associated Education Consultants, Inc., 1979), in which grades were found to have the best relationship to success in vocational

programs. Tate's (1965) findings were also substantiated, as he found a significant relationship between aptitude scores and course grades in selected vo-tech courses. Pawling (1981) also found a correlation between teacher grades and the sub-tests of the ASVAB.

Conclusions

Statistical analysis of the data provided in this study includes:

1. Grades a student earns in the vocational-technical program can be predicted by related courses the student took at the home high school, the aptitude the student exhibited for that occupational area, and the interest the student showed in the program area.

2. Completion of the training program could be accurately predicted by interest and related courses previously completed. Aptitude, though statistically significant, did not contribute to the explained variance in the criterion completion.

3. Placement in a job related to the program could not be predicted by the combination of predictive criteria. Interest the student showed in the occupational area at the time of enrollment was, however, a significant predictor. Neither of the other two criteria alone could accurately predict placement.

Recommendations

Based upon the findings of this study, several recommendations are proposed in regard to predicting success for students in vocational-technical

programs. These recommendations are made in two sections. The first section outlines recommendations for the Indian Meridian Area Vocational-Technical School to consider in future endeavors attempting to predict student success. The other section recommends future studies which could be conducted on a statewide basis, thus addressing the Oklahoma State Department of Vocational-Technical Education.

It is recommended that the Indian Meridian Area Vocational-Technical School continue to use these predictive criteria as a part of the enrollment procedure due to the correlation with grades earned in the vo-tech program and the student's completion of the program. It is recommended, however, that the school use additional efforts toward student retention after enrollment since the criteria were not as effective in predicting whether the student would complete the training once it was begun as they were in predicting grades. Additional efforts to assist graduates with placement in a job related to the training the student received should also be explored because of the lack of predictive relationship the criteria used for enrollment showed to the ability to secure related placement.

It is further recommended that a statewide study be conducted by the Oklahoma State Department of Vocational-Technical Education to establish standard enrollment procedures which can be implemented by all of the area vo-tech school districts in the state. Components of this study could include a larger, more diverse population (including rural, suburban, and urban school districts across the State of Oklahoma who might offer programs or geographic and demographic statistics not available at the school used in this study), as

well as a greater number of predictive criteria than were analyzed through this analysis (such as attendance, previous work experience, transportation availability, travel distance to the area vo-tech school, etc.). Another aspect could involve additional measurements for various programs to determine whether particular criteria could be predictive for one program and a different set of criteria predictive for another program.

This recommendation is supported by Pawling (1981), who suggested area vocational-technical schools should develop a selection process whereby students who have been accepted for training can be given some degree of assurance that, if they apply themselves, they can be successful in a given occupation.

Commentary

This researcher would like to note, as did Pastrana (1976), that "possession of minimum requirements will not guarantee success in an occupation, but lack of them will almost certainly guarantee difficulty or even failure" (p. 2). Even students who do not possess the minimum requirements have been known to compensate for the attributes needed for success. As the study indicated, interest, courses related to the program, and aptitude test scores were significant predictors for the grades students would earn in the vocational program. There are many times, however, when students who do not meet these standards have performed very well in the vo-tech program. It is recommended, therefore, that these criteria, though predictive, not be used as

strict cutting mechanisms to exclude a student from a vocational training program.

Although the criteria were found to be significantly predictive of completion of the program, this researcher has also found a number of extraneous variables which would affect the predictive reliability. The lack of completion does not necessarily relate to the student's ability to complete or lack of interest in the program. Students are frequently required to give up their vocational program to return to the home high school to complete requirements for graduation which could not be fit into a schedule with the vocational program. Other students move with their families, making it impossible for them to complete the program. Transportation problems may prevent completion because of the distance of the area vo-tech school from the students' homes.

Likewise, placement is not always a predictable criterion. The state of the economy in Oklahoma recently has made it very difficult for even those students who have excelled in a vocational training program to secure employment as they are competing with experienced workers who are out of work. Thus, the availability of jobs for these inexperienced graduates is a problem contributing to lack of placement in a related job which has no relationship to the student's ability to perform in a job related to their training. The maturity of young graduates and their lack of work experience in that field are also negative factors in their search for employment in a vocational trade related to their training.

The fact that certain criteria were found to be of assistance in predicting successful grades in a vocational program will help counselors as they work

with students interested in vocational training. These criteria, however, should not be considered to be the only ones which might have such a relationship. Vo-tech schools are encouraged to continue to explore this concern to find several criteria which will help ensure a student's success in a vocational training program.

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APPENDICES

APPENDIX A

INTEREST SURVEY

INDIAN MERIDIAN AREA VOCATIONAL-TECHNICAL SCHOOL

INTEREST SURVEY

Name_____Home School_____

Address_____10 11 12
street city zip phone current grade level

After my visit to Indian Meridian, I have decided I _____am_____am not interested in finding out more about the programs that are available to me.

I plan to attend Indian Meridian during my_____ junior/_____ senior year(s) of high school.

I am interested in the possibility of enrolling in the following program(s):

_____Air Conditioning & Refrigeration

_____Auto Body

_____Auto Mechanics

_____Business Training Center

_____Carpentry

_____Commercial Food Production

_____Computerized Numerical Control Machining

_____Cosmetology

_____Diesel Mechanics

_____Drafting

_____Health Service Careers

_____Home and Business Services

_____Industrial Technology
Hydraulics, Pneumatics, Mechanics
Industrial Electricity
Industrial Electronics

_____Machine Tool

_____Masonry

_____Metal Fabrication

_____Offset Printing

These programs are interesting to me because_____

_____

_____

_____

APPENDIX B

SECONDARY PRE-ENROLLMENT FORM

INDIAN MERIDIAN AREA VOCATIONAL-TECHNICAL SCHOOL
1312 South Sangre Road
Stillwater, Oklahoma 74074

SECONDARY PRE-ENROLLMENT FORM

Date _____ Home High School _____ 1986-87 Grade: 10 11 12 (circle one)

Name _____ Social Security No. _____
(last) (first) (middle initial) (optional)

Age _____ Date of Birth _____ Home Phone _____
(as of 8-31-86) (month) (date) (year) (area code) (number)

Names of Parents or Guardians _____

Home Address _____ _____
(street or box number) (city) (state) (zip)

Father's Place of Business _____ Phone _____
(area code) (number)

Mother's Place of Business _____ Phone _____
(area code) (number)

What do you plan to do following graduation? _____

_____

_____

_____

Do these plans include attending college? YES NO (please circle one)

If so, what would you choose as a major? _____

Estimated number of absences thus far in the 1985-86 school year: _____

Reason for absences: _____

I have looked over my son's or daughter's pre-enrollment form for Indian Meridian Area Vocational-Technical School and would approve his/her taking advantage of the opportunity to acquire a skill in a vocational occupation for employment or as a basis for further education at a college or university.

_____
Parent's or Guardian's Signature

APPENDIX C

INTERVIEW INTEREST RATING INSTRUMENT

INTERVIEW INTEREST RATING INSTRUMENT

1. Plans following graduation relate to program selected — 0 1 2
   - 0 = plans not related to program
   - 1 = plans indirectly related
   - 2 = plans directly related

2. Reason for selecting program is relevant to plans following graduation and purpose of program — 0 1 2
   - 0 = no relation to plans
   - 1 = selected as background for additional education
   - 2 = selected to prepare for employment

3. Student pre-enrolled in same program as indicated on interest survey — 0 1
   - 0 = no
   - 1 = yes

4. Student indicated second-choice program as another interest or merely to have two choices — 0 1
   - 0 = would take second-choice program or any other program available
   - 1 = student would not take second-choice program; or second-choice program also related to plans

5. Attendance for present school year reflects ability to show interest in and follow through on tasks — 0 1 2
   - 0 = more than 10 absences first semester
   - 1 = 5-10 absences first semester
   - 2 = less than 5 absences first semester

6. Counselor's/Principal's recommendation indicates a genuine interest of student in this program — 0 1
   - 0 = no
   - 1 = yes

7. Parent's signature/recommendation reinforces the student's interest — 0 1
   - 0 = no
   - 1 = yes

VITA

Anita Jo McCune

Candidate for the Degree of

Doctor of Education

Thesis: HOW THE PREDICTIVE CRITERIA OF APTITUDE, INTEREST AND COURSES TAKEN AT THE HOME HIGH SCHOOL RELATE TO STUDENT SUCCESS IN PROGRAMS AT THE INDIAN MERIDIAN AREA VOCATIONAL-TECHNICAL SCHOOL

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