DOCUMENT RESUME

ED 079 495 VT 020 538

AUTHOR	McAlister, Bernard Milton
TITLE	Curriculum Selection and Success of Tenth Grade Girls as Related to Selected Ninth Grade Characteristics.
INSTITUTION	Pennsylvania State Univ., University Park. Dept. of Vocational Education.
SPONS AGENCY	Pennsylvania Research Coordinating Unit for Vocational Education, Harrisburg.
REPORT NO	VDS-Monogr-9
PUB DATE	Mar 73
NOTE	113p.
EDRS PRICE	MF-$0.65 HC-$6.58
DESCRIPTORS	Academic Education; Career Choice; Grade 9; Grade 10; High School Curriculum; *Individual Characteristics; Longitudinal Studies; *Predictor Variables; Relevance (Education); Secondary Grades; Selection; *Success Factors; *Vocational Development; *Vocational Education
IDENTIFIERS	Pennsylvania; Vocational Development Study; Vocational Maturity

ABSTRACT

A replication of a previous study, this research was concerned with determining those characteristics of ninth grade girls which are predictive of high school curriculum selection and of success in a chosen curriculum. Composing the sample for this part of the longitudinal study were 362 girls enrolled in one of Altoona Senior High School's five curriculums. Data were collected when the students were enrolled in the ninth grade and again at the end of the tenth grade. Nine ability measures and seven occupational values which were selected by Kapes in a study carried out as an earlier part of the longitudinal were used as the variables in this study. Verbal and numerical aptitudes, attitudes toward salary, vocational maturity, and father's education were found to be significant predictors of grade point averages in the academic curriculum while verbal and numerical aptitudes, interest and satisfaction, and vocational maturity were predictors of the vocational grade point average. A review of related literature focused on career development theory as well as on the previous eight studies in this ongoing research, the Vocational Development Study, a 10-year project from three Pennsylvania school systems. (SN)

THE PENNSYLVANIA STATE UNIVERSITY
DEPARTMENT OF VOCATIONAL EDUCATION

CURRICULUM SELECTION AND SUCCESS OF TENTH GRADE GIRLS AS RELATED TO SELECTED NINTH GRADE CHARACTERISTICS

BERNARD MILTON McALISTER

Pennsylvania Department of Education
Bureau of Vocational, Technical and Continuing Education
Research Coordinating Unit
(Project No. 19-2007)

VOCATIONAL – TECHNICAL EDUCATION **Research Report**

VOCATIONAL DEVELOPMENT STUDY SERIES

VDS MONOGRAPH, NUMBER 9

March, 1973

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PREFACE

This monograph is the ninth in a series of publications resulting from the Vocational Development Study (VDS) which is a ten-year project utilizing as a beginning sample the entire ninth grade class of students from three large school systems chosen from non-metropolitan areas of Pennsylvania. The study is being undertaken by the Department of Vocational Education at The Pennsylvania State University with the support of Pennsylvania's Research Coordinating Unit (RCU) in Vocational Education. The major goal of the project is to create a longitudinal data bank which can be used to conduct studies involving the evaluation of vocational programs, the validation of vocational guidance measurement tools, and the testing and improvement of theories of vocational development.

One objective of the project is to replicate previous VDS studies in order to discover if the findings of a study conducted with one sample hold true for a different sample. In the study reported here, McAlister has utilized a female sample in attempting to replicate a previous study conducted using a male sample. As might be expected, this replication turned up differences between the two samples which have implications for curriculum planners as well as for vocational development theory.

Jerome T. Kapes, Assistant Professor
Graduate Studies and Research
Department of Vocational Education

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VDS CAPSULE

This section is an abstract of the findings and implications of the study reported in this monograph. Hopefully, these short statements will serve as an informative summary of the content of this publication. It is desired that these brief elements will provide educators, researchers and other interested persons with enough readily accessible information so as to encourage the investigation of the total work.

This is a study of high school age girls and is a replication of a previous VDS study which utilized a sample of boys from the same population. The research problem is concerned with student curriculum selection and success in the chosen curriculum. The differences and similarities between girls and boys are the major findings.

Those interested in a closer comparison of the findings of this study with those of the previous study conducted with male students should consult: Kapes, Jerome T. The Relationship Between Selected Characteristics of Ninth Grade Boys and Curriculum Selection and Success in Tenth Grade. University Park, Pennsylvania: Department of Vocational Education, The Pennsylvania State University, August, 1971, VDS Monograph Number 2.

Findings

1. Girls differ from boys in that the selected curriculums for girls may not be divided simply into two categories such as vocational and academic.
2. Generally, the characteristics examined in this study are effective predictors of girl's curriculum selection and success in the chosen

curriculum. However, the female characteristics differ somewhat from those most predictive of male selection and success behavior.

3. Success, in terms of grade point average (GPA) in the chosen curriculum in tenth grade, is much more predictable than is curriculum choice.
4. Success in the academic curriculum is much more predictable than success in the various vocational curriculums.
5. The girl's verbal and numerical aptitude, vocational maturity, value of salary, and father's educational level are the most useful predictors of academic success in terms of grade point average (GPA).
6. Aptitudes most predictive of vocational success as measured by GPA are verbal and numerical aptitude, vocational maturity and the value of interest and satisfaction.
7. Examining the variability for the characteristics used in both the Kapes (1971) study and this study, it appears that the girls in this sample are more heterogeneous than the boys in the Kapes sample.
8. There appears to be sufficient separation among the eight groups composed of successful and unsuccessful students in four different curriculums that at least five different types of curriculum patterns are distinguishable.

Implications

1. The characteristic differences between girl's and boy's curriculum selection and success in the chosen curriculum, should be considered by curriculum planners and career guidance personnel. If equality or equal opportunity for the female student is to become a reality, unequal or different curriculum alternatives and guidance techniques may be required.

2. If the differences between girls and boys in terms of curriculum selection and success are brought about mostly by the socialization process than changes in that process will be necessary if differences are to be eliminated.
3. Given the greater variability among ninth grade girls than ninth grade boys, perhaps more and different curriculum alternatives are necessary for girls.
4. Whatever curricul[illegible] alternatives are provided for girls, they should not be structured along academic versus vocational (i.e., career versus homemaking) lines.
5. Guidance materials prepared for girls especially those used in a predictive or expectancy manner should differ from those used with boys.
6. Characteristics from the affective and socio-economic domains are useful with both girls and boys in providing additional information about curriculum choice and high school success not provided by cognitive characteristics.
7. Since with both girls and boys, academic success is more predictable from the characteristics used in this study than is vocational success, it may be necessary to consider more non-traditional success measures when counseling vocational students.

I

ORIGIN OF THE STUDY

Introduction

The young generation of females often verbalize their concerns about the inequalities which exist between females and males. This condition has perhaps existed through many generations. The French woman, Simon de Beauvoir, authored a two volume text on this subject which was published in the French language in 1949. The English translation "The Second Sex" has undergone fourteen printings to date and this may be indicative of the tremendous amount of interest in the subject of feminine equality. Other writings on this subject have been appearing regularly in the popular media in this country as well as others.

The notion that the female has been a second class citizen may be debated, however, admittedly the female has been relegated a secondary position in the studies of vocational psychology. The writer has, after a limited search of the literature related to the human development process, become aware of pressures which may exist and possibly serve as a limiting force to the vocational participation of females (Komarovski, 1950; Bettelheim, 1962). The custom that men normally pursue involvement in the work world while women remain in the home has obviously had some bearing on the researcher's choice to study the vocational development of males as opposed to that of the females. Sex differences which are a result of natural development as well as those which result from the socialization of the individual have been noted by Roe (1956), Holland (1966), Cooley and Lohnes (1968) and others. Holland, in reference to those differences in relation to his theory states:

> ...it is based chiefly on studies of men and is probably less useful for understanding the behavior of women. A special but closely related theory for women is desirable, but at this point, I have none to offer (Holland, 1966, p. 13).

In recent years females in general are working more outside the home and this trend is increasing annually as indicated by the United States Department of Labor. Over one third of all females sixteen years and older are now part of the labor force (The United States Department of Labor, 1971, p. 47). Because of the increasing number of females deviating from the usual mother-wife-homemaker role, it becomes evident that the differences in career development of females versus males needs to be investigated. In the Cooley and Lohnes 1968 study, Project TALENT: Predicting Development of Young Adults, this condition is made quite clear:

> We subscribe to the suggestion of Roe and of Super that the career process for women needs to be conceptualized differently and researched differently than that for men. The process is probably more urgent to acquire adequate understandings of the process for males. We do not deny that many women in our society need career guidance during the years of their education, but plainly almost all young men need it, and more ugently (Cooley and Lohnes, p. 4-42).

The above statements present the complex nature of the female's problem in leaving the home and competing in a man's world of work. The attitude is obviously males first, all others second. A suggested alternative in the absence of career guidance information for females is presented by Cooley and Lohnes (1968):

> Hopefully an adquate psychology of female careers will soon emerge. Meanwhile, many young women who intend to compete with their male peers for careers on the male-style can attend to the career guidance we are trying to provide as if they were males (Cooley and Lohnes, p. 4-42).

Kapes (1971), in a study with high school age males, has found certain variables to be predictive of student program selection and success in the selected program. With respect to guidance information for males, this can be an important finding. However, this question is raised then pertaining to the female. Will the same variables be predictive of female program selection and success in the selected program? This study is primarily directed at the comparison of Kapes' (1971) findings and those which result from a replication of the same procedure utilizing the females as the sample from the same population.

Theories and Research of Vocational Development

Without attempting to write a historical account of the phases and periods through which the existing theories of vocational development evolved, it may be profitable to point out some persons who are commonly credited with this rather recent movement. Ginzberg, Ginsberg, Axelrad and Herma (1951) in their book, Occupational Choice: An Approach to a General Theory, established a platform for theory building. Ginzberg (1952) points to the need for theory building:

> After a comprehensive study of the literature of vocational guidance, my colleagues and I came to the conclusion that the movement was severely handicapped because both investigators and practitioners were working without the help of any theory at all or with severely limited theories (Ginzberg, p. 492).

Kapes (1971) summarized Ginzberg's theory as follows:

> The three basic elements of Ginzberg's theory were: 1) "occupational choice is a developmental process;" 2) "the process is largely irreversible;" and 3) "the process ends in a compromise." A second significant contribution of the Ginzberg work was that aspect dealing with the use of stages or decision points in the development process (Kapes, p. 3).

Super is perhaps the most noted theorist dealing with vocational development. And according to Osipow (1968) has developed the most adequate theory. After a thorough evaluation of the existing theory, Osipow explains:

> As a conceptual model, Super's theory seems to be the most highly developed and advanced. This is reflected in its explicitness, its fairly high degree of empirical support, and its substantially larger number of applications to human affairs (Osipow, p. 233).

Super (1953) admittedly builds on the ideas of Ginzberg. He also points out that Ginzberg's developmental process concept is clearly implied in Buhler's (1933) life stages (Super, 1953, p. 100). Kapes (1971) describes Super's approach to theory development:

> Super's approach has been one of developing theory through empirical research rather than testing a theory which has been previously defined. His major contributions have been the creation of a framework in which to study career development and the application of trait and factor methodology within a developmental model (Kapes, p. 4).

Other significant theories have been developed including Roe (1956) and Holland (1959). Roe's theory proposes to explain vocational choice based upon early childhood experiences. Roe makes two major distinctions in choice: individuals who are oriented "toward persons" and those oriented "not toward persons." Based on this interest, persons select from among eight occupational fields and seek one of six levels of the chosen field. Roe and Siegelman (1964) have reported studies attempting to validate her theory, the results of which have provided more negative rather than supportive evidence.

Holland's theory is somewhat more documented than Roe's. Holland (1959) describes his theory as resembling that of Roe's in that there

are six dominant personality types which seek out one of six occupational environments. He also indicates that levels in these six environments do exist. Holland (1966) updated his theory and the same year Ashby, et al. (1966) and Osipow, et al. (1966) published their research findings applying this theory to college freshmen. Perhaps the most useful contribution by Holland is the instrument which he developed to measure personality types. The Vocational Preference Inventory (VPI) has been widely used and reasonably well researched.

Little more than twenty years have passed since Ginzberg, et al. (1951) presented their theory of vocational choice. Considerable research has been conducted and other theories have been advanced since that time. Osipow (1968) has described the adequacy of vocational development theory by stating:

> The theories' strength lies in their general explanation of the way career decision making occurs. For formal adequacy as theories, much seems to be lacking. In general, the theories have failed to pay serious attention to the satisfaction of the criteria applied to the scientific evaluation of theory (Osipow, p. 232).

In further evaluating the existing theory, Kapes (1971) states:

> Among the theories now available, Super's appears to have been the most adequate and the most researched. One of the necessary features of a theory, in addition to its usefulness in explaining a phenomena, is its ability to generate research on that phenomena (Kapes, p. 6).

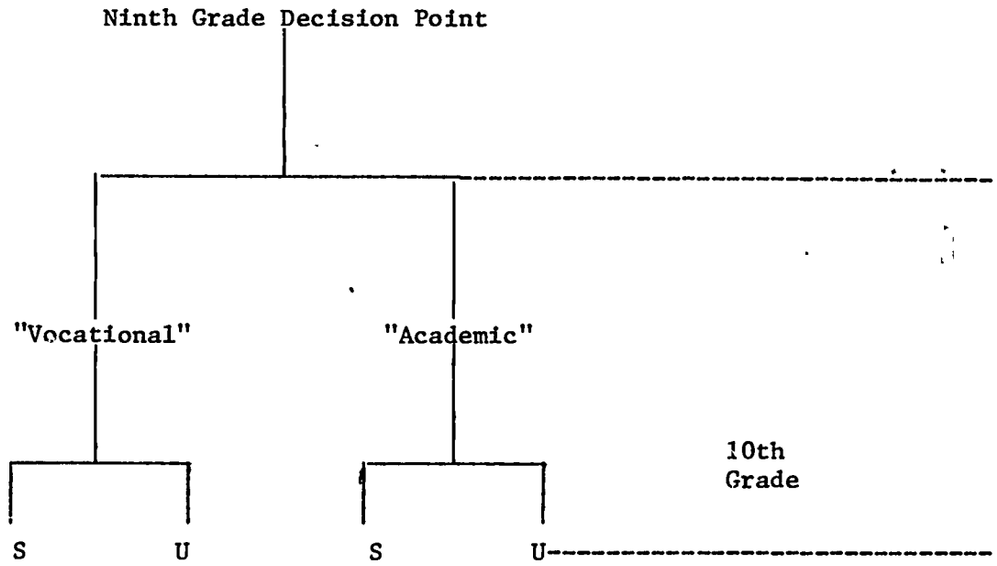
Some significant research resulting from Super's theorizing has been done by Cooley and Lohnes (1968) and Kapes (1971). These two studies are of particular interest to this effort in that the theoretical aspects and the methodology have been applied in this investigation of females. Cooley and Lohnes (1968) in their research utilized a dichotomous classification at four points in the development of the individuals

in their sample. This classification was used in describing their proposed "Career Development Tree." Kapes (1971) replicated one aspect of the Cooley and Lohnes' work with a sample of high school age boys. The dichotomy was the choice between vocational versus an academic curriculum. Kapes extended Cooley and Lohnes' work by attending to the degree of belongingness to the chosen group in the sense of being a successful or unsuccessful member of that group.

In summary, this section has described some of the current theories explaining the vocational development process. Super was not the first to present a theory of vocational development; however, it appears that his theory has been the most productive. Those aspects of Super's theory which have been applied by Cooley and Lohnes in their "Career Development Tree" and further applied and extended by Kapes are of interest to this study. Within the framework of Super's theory, this study will attempt to replicate the Kapes' work using a sample of females.

Statement of the Problem

This study is a replication of Kapes' (1971) study: The Relationship Between Selected Characteristics of Ninth Grade Boys and Curriculum Selection and Success in Tenth Grade. In attempting this replication, it became necessary to group the females in the sample into two groups as illustrated in Figure 1. The females were enrolled in all five of the school's curriculums; therefore, an artificial grouping was necessary to facilitate comparison of the ninth grade dichotomy-curriculum choice. By longitudinally studying the process from the placement of the students into these two groups and following with a measure of success in the group, it becomes possible to compare four high



"S" Represents Successful

"U" Represents Unsuccessful

Figure 1. A Chronological Graphic Representation Illustrating the Combined Curriculums to Form the "Vocational" and "Academic" Groups Used in this Model

school female groups. A graphic representation of this model is presented in Figure 1.

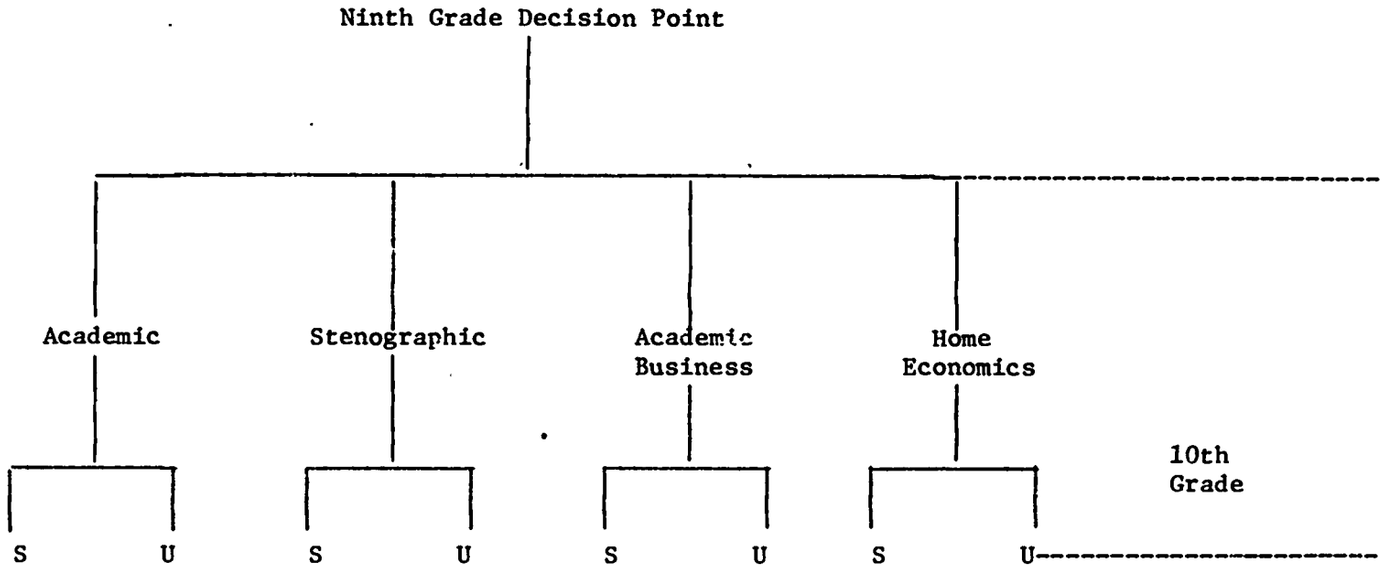
After giving some thought to the possibility that the artificial grouping of individuals into "vocational" and "academic" groups may not facilitate an accurate comparison, it was decided to extend the study as indicated in Figure 2. Four distinct groups are used in this model with no artificial grouping, but instead the actual students who selected the curriculum are compared as shown in Figure 2. The vocational-technical students were not included in this model because of the small number in the group and no attempt was made to construct regression models for each of the four groups using the success criterion.

The purpose of this study is to explore in general the following two questions with respect to females:

1. What characteristics of ninth grade females are predictive of high school curriculum selection?
2. What characteristics of ninth grade females are predictive of success in the high school curriculum selected?

Within the limits of this study, answers to the following question numbers 1, 2, 3 and 4 are sought as represented in the first model which is graphically presented in Figure 1:

1. What characteristics of ninth grade females are predictive of tenth grade enrollment in a "vocational" versus an "academic" curriculum?
2. What characteristics of ninth grade females who have enrolled in the "vocational" curriculum in tenth grade are predictive of success in tenth grade as measured by grade point average (GPA)?



"S" Represents Successful

"U" Represents Unsuccessful

Figure 2. A Chronological Graphic Representation Illustrating the Four Distinct Groups by Selected Curriculum and the Eight Tenth Grade Groups - Successful and Unsuccessful

3. What characteristics of ninth grade females who have enrolled in the "academic" curriculum in tenth grade are predictive of success in tenth grade as measured by grade point average (GPA)?
4. What characteristics of ninth grade females differentiate among the following four tenth grade groups?
   a. successful "vocational" students
   b. unsuccessful "vocational" students
   c. successful "academic" students
   d. unsuccessful "academic" students

With respect to the second model which is graphically presented in Figure 2, answers are sought to the following two specific questions:

5. What characteristics of ninth grade females differentiate among the following four tenth grade groups?
   a. academic
   b. stenographic
   c. academic business
   d. home economics
6. What characteristics of ninth grade females differentiate among the following eight tenth grade groups?
   a. successful academic
   b. unsuccessful academic
   c. successful stenographic
   d. unsuccessful stenographic
   e. successful academic business
   f. unsuccessful academic business
   g. successful home economics
   h. unsuccessful home economics

Definition of Terms

In an attempt to remain as consistent as possible with Kapes' (1971) study, the thorough listing of terms which are well defined in VDS Monograph Number 2 will also be applicable for this study. To conserve space, these terms have not been reproduced here. However, the reader may refer to Kapes (1971), pp. 16-19 for a written definition of terms which also apply to this study.

II

REVIEW OF RELATED LITERATURE

Introduction

In order to identify other studies which contain information that relates to this study, a review of the literature was conducted. The findings were grouped in the following three categories:

1. Publications concerning career development which relate specifically to the theoretical aspects of this study.

2. Studies in the areas of career development, psychology or sociology which relate to the student characteristics of interest in this study.

3. Studies or other publications in career development or in other behavioral sciences which relate to the methodology and techniques used in this study.

Because of the relationship between this study and Kapes' (1971) VDS Monograph Number 2 entitled "The Relationship Between Selected Characteristics of Ninth Grade Boys and Curriculum Selection and Success in Tenth Grade," an extensive discussion of the three categories will not be presented in this review. Reference will be made to Kapes' (1971) very extensive review of the literature which is pertinent to the three categorical divisions of this chapter. In the first and second divisions, Kapes' (1971) summaries have been reproduced and the available literature dealing specifically with females has been added. In the third category, which deals with the methodology, only the summary from monograph number two has been included and no additional information will be required because the methodology for the two studies is identical.

Publications Concerning Career Development Which Relate Specifically to the Theoretical Aspects of this Study

The literature for this category has been very adequately discussed by Kapes (1971) in VDS Monograph Number 2. Should any particular study mentioned be of further interest to the reader, reference should be made to the above mentioned study. The following summary items were taken from Kapes (1971) pp. 33-34:

1. Super's theory of career development has evolved considerably since its inception in 1951 and at the present time, it appears to be most promising for explaining vocational behavior (Super, 1953, 1963, 1961, 1969a; Super, et al., 1957, 1960; Tiedeman, et al., 1963; Cooley and Lohnes, 1968).

2. The career model appears to have replaced the occupational model in much of vocational development research (Super, et al., 1957; Super, 1961, 1969a, 1969b; Tiedeman, 1961; Tiedeman, et al., 1963; Cooley and Lohnes, 1968).

3. The concept of stages of career development is fairly well accepted among psychologists, sociologists and career development researchers (Buehler, 1933; Havighurst, 1950, 1953; Miller and Form, 1951; Ginzberg, 1951; Erickson, 1950, 1959; Super, et al., 1969a; Tiedeman and O'Hara, 1963; Cooley and Lohnes, 1968).

4. Most career development researchers appear to be in agreement concerning the end of ninth grade as a critical vocational decision point at which to study the constructs and determinants of career development (Super, et al., 1957, 1960; Crites, 1961; Jordaan, 1963; Tiedeman and O'Hara, 1963; Cooley and Lohnes, 1968).

5. Super's theoretical model appears to lend itself well to the type of study of vocational development and career prediction model proposed and explored by Cooley and Lohnes (Cooley and Lohnes, 1968; Super, 1969a, 1969b).

A search of the literature gives one the idea that research on the female is lacking. However, among the studies reviewed, there is an increasing interest which seems to intensify as the publishing dates

approach the present. Some significant research has been conducted which is related to the career development of women. In many instances the major focus is on the female's choice of career versus that of homemaker. A knowledge of this choice is important, however, this knowledge does not explain the ongoing developmental process which leads up to the decision point.

Matthews (1963) has studied the attitudes of young women toward career and marriage. Her findings indicate that during the developmental process, attitudes toward career and marriage go through three stages which are affected by a number of social stimuli. These developmental stages include: fantasy career choices, declining career interest, and being useful and needed (Matthews, 1963, p. 274-275). Matthews and Tiedeman (1964) indicate that female considerations related to career and marriage change during the individual's development. Also during junior high years interest in a career is often expressed by the female, and in high school the percent expressing interest in careers is reduced while those expressing interest in marriage is increased. At both levels the students did not feel that marriage and a career were compatible. Risch and Beymer (1967) suggest that a framework for investigating women's career choice may include two basic divisions. Those of "instrumental" occupational roles and those of "expressive" occupational roles comprise the two basic groupings. The choice of the young female depends rather heavily on the orientation of the mother, toward these two groups, according to Risch and Beymer. This is another method of describing the female choice of career versus homemaker, indicating the social influence of the mother upon the young female's choice. The "instrumental" individual is more career oriented while the expressive individual is more homemaker oriented.

Since males are not faced with the possibility of childbirth and the option of career versus homemaker, a separate theory to explain career development for each sex may be desirable. Holland (1966) indicated that a separate theory is needed for the female, but at that time he had none to offer. Zytowski, in reference to the need for a theory of vocational development for women states:

> No special theory of vocational development for women would be necessary if the portion of their lives which they spend as a mother and homemaker could be regarded as one of the several occupations which they have available to choose from. But such is not the case (Zytowski, 1969, p. 660).

Some interesting studies like that conducted by Helen Austin (1968) deal with specific periods in the developmental process. Austin attempted to identify ninth grade characteristics which would predict vocational choice three years later at the twelfth grade level. Differences were noted between girls with science or teaching careers and those with office careers. Also, those girls anticipating careers in science were least like those planning on being housewives and girls who chose careers requiring less than a college degree. Considering these findings, Austin suggests that the post high school vocational plans of women may be conceived as a career versus a non-career dichotomy. Austin studied the high school age female and utilized multiple regression analysis technique in her study.

The most recent and perhaps the most significant contribution to explaining the career development of women is contained in the work of Donald G. Zytowski. In March, 1969, Zytowski published an article in the Personnel and Guidance Journal, "Toward a Theory of Career Development for Women." In this article he presented the nine postulates which

comprise the most complete theoretical description of the career development of women presently available.

Zytowski (1969) borrows from the works of some noted researchers in formulating his postulates: Matthews and Tiedeman (1964), Risch and Beymer (1967), Super (1957), and Ginzberg, et al. (1966). The nine postulates attempt to tie the current research findings together and due to the paucity of research avail on the career development of females, this is obviously a difficult task. The nine postulates presented by Zytowski are included here because they represent the best available theory for explaining the vocational development of females (Zytowski, 1969, pp. 661-664).

I. The modal life role for women is described as that of the homemaker.

II. The nature of the woman's role is not static: It will ultimately bear no distinction from that of men.

III. The life role of women is orderly and developmental and may be divided into sequences according to the preeminent task in each.

IV. Vocational and homemaker participation are largely mutually exclusive. Vocational participation constitutes departure from the homemaker role.

V. Three aspects of vocational participation are sufficient to distinguish patterns of vocational participation: age or ages of entry; span of participation; and degree of participation.

VI. The degree of vocational participation represented by a given occupation is defined as the proportion of men to the total workers employed in the performance of that job.

VII. Women's vocational patterns may be distinguished in terms of three levels, derived from the combination of entry age (s), span, and degree of participation, forming an ordinal scale.

VIII. Women's preference for a pattern of vocational participation is an internal event, and is accounted for by motivational factors.

IX. The pattern of vocational participation is determined jointly by preference (representing motivation) and by external, situational and environmental, and int rnal, such as ability, factors.

Summary

1. Females tend to divide themselves into two additudinal groups: those preferring a career, and those preferring the homemaker role. Being in either group is seen as being mutually exclusive (Matthews, 1963; Matthews and Tiedeman, 1964; Risch and Beymer, 1967; Zytowski, 1969).
2. Females have been found to differ in characteristics between career preference groups (Austin, 1968).
3. A special theory for the career development of women is needed because of the period of time spent in the wife-homemaker role (Holland, 1966; Zytowski, 1969).
4. Zytowski's theory appears to be the most concise and complete statement dealing with the career development of women (Zytowski, 1969).

Studies in the Areas of Career Development, Psychology or Sociology Which Relate to the Student Characteristics of Interest in the Study

Kapes (1971) in VDS Monograph Number 2 summarized his findings in seven concise statements. The following summary items were taken from Kapes (1971) pp. 56-57.

1. As a multiple ability measure, the GATB appears to be very complete and extremely useful for studies related to adolescent career decision making and school achievement in both the academic and vocational-technical areas (Droege, 1965, 1966; Impellitteri and Kapes, 1969; Ingersol and Peters, 1966; Jacobsen, 1965; Kapes, 1969a, 1969b; Pickett, 1958; Samuelson, 1956; Super and Crites, 1962; U.S. Department of Labor, 1967).

2. Occupational values as a career development construct are receiving increasing attention and appear to possess valid and useful relationships to many of the student behaviors of interest in career development research (Dipboye and Anderson, 1959; Gribbons and Lohnes, 1965; Kapes, 1969; Kinnane and Pable, 1962; Singer and Stefflre, 1954; Sprinthall, 1966; Super, 1962; Thompson, 1966; Zytowski, 1970).

3. A strong argument can be made for the essentially ipsative nature of occupational values (Beck and Barek, 1967; Impellitteri and Kapes, 1970; Kapes, 1969; Katz, 1963; Zytowski, 1970).

4. The Vocational Development Inventory appears to be one of several possible valid measures of the construct of vocational maturity and has been shown to be related to intelligence, age, grade, sex, curriculum choice, and socio-economic status (Asbury, 1968; Bathory, 1967; Crites, 1965, 1969; Crites and Samler, 1967; Dutt, 1968; Gribbons and Lohnes, 1968; Holloway, 1967; Impellitteri, et al., 1969; Pucel, et al., 1970, 1971).

5. The two variables, father's educational and occupational level, appear to contain enough information to be representative of a student's socio-economic background (Blau and Duncan, 1967; Hollingshead, 1949; Reiss, et al., 1961; Super and Overstreet, 1960; Warner, 1949).

6. A student's socio-economic level has been shown to be related to his intelligence, vocational aspirations, curriculum choice, school participation, school grades, and overall achievement as well as to other measurable characteristics (Bachman, 1970; Blau and Duncan, 1967; Clark, 1967; Gribbons and Lohnes, 1966, 1968; Hollingshead, 1949; Krippner, 1963; Super and Overstreet, 1960; Weinberg and Skager, 1966).

7. An individual's level of occupational aspiration has been shown to be both a predictor and a resultant of his interaction with his environment, and is stable enough at the ninth grade level to be useful in developmental research (Asbury, 1968; Bachman, 1970; Bathory, 1967; Clark, 1967; Flanagan, 1966; Gribbons and Lohnes, 1966, 1968; Krippner, 1963; Miller and Haller, 1964; Montesano and Geist, 1963; Super and Overstreet, 1960; Thomas, 1956; Whitney, 1969).

In addition to the summary of literature which deals with the selection and use of the variables, some findings dealing specifically with females will be included. Surette (1967), using a locally devised rating scale found that accomplishment or prestige and material

satisfaction or salary differentiated between those female students who chose a career and those who chose homemaking instead of a career. He also found a preponderance of vocationally immature students among the upper socio-economic families. This finding correlated highly with the lack of work experience and knoweldge of the world of work. The SVIB-W was used by Surette in his study, as in a number of other studies encountered in this search of the literature.

Anderson and Heimann (1967) in attempting to measure vocational maturity of girls applied a revision of Super's (1960) vocational maturity scale in addition to a test dealing with knowledge of the world of work. They were successful in determining increases in vocational maturity between the experimental and control groups. The experimental group was exposed to six short sessions with a vocational counselor and the control group was not offered this opportunity. This study points out again the socialization of the females which leave them in need of career information at the time of curriculum choice for the high school years.

A study of occupational values of high school students by Thompson (1966) indicates some differences between males and females in his sample. The males had the highest value for "interesting job", "job you are sure to keep" and the females valued highest "interesting job" and "helping other people". This study indicates that these males value interest and satisfaction, and perhaps security while the females valued interest and satisfaction in work and helping others. This finding corresponds to that of Risch and Beymer (1967) in that the females tend to be oriented toward the "expressive" role or service oriented homemaker.

Austin (1968) used some of the same variables as were selected for use in this study. She included a socio-economic measure, curriculum

choice and a measure of grade point average (GPA). Austin's investigation also dealt with high school age girls.

Summary

1. Occupational value measures have been successfully used in studies involving females (Surette, 1967; Thompson, 1966).
2. Measures of vocational maturity have been successfully used in studies involving females (Anderson and Heimann, 1967; Surette, 1967).
3. Curriculum choice and grades (GPA) have been used by some researchers in studies of females (Austin, 1968).

Studies or Other Publications in Career Development or in Other Behavioral Sciences Which Relate to the Methodology and Techniques Used in This Study

The methodology for this study is identical to that used by Kapes (1971) as presented in VDS Monograph Number 2. If additional information is desired on any aspect related to the rationale for the methodology, reference should be made to the above mentioned study. The following summary of this section has been included from Kapes (1971) pp. 64-65.

1. Large scale longitudinal studies of human behavior using multivariate techniques have become more feasible and profitable in recent years due to the availability of computerization and the subsequent improvement in statistical capabilities (Austin, 1967; Bachman, 1970; Cooley and Lohnes, 1968; Flanagan, et al., 1962; Gribbons and Lohnes, 1968; Super, 1969b; Super and Overstreet, 1960; Thorndike and Hagen, 1959).
2. Multiple regression analysis appears to be one of the more useful statistical techniques for large scale longitudinal research in the behavioral sciences (Cooley and Lohnes, 1968; Hu, Lee and Stronsdorfer, 1971; Kaufman, et al., 1967; Moss, 1968; Rulon, 1967; Sonquist, 1970; Super, 1969b; Tatsouka, 1957; Wallberg, 1971).

3. Multiple discriminant function analysis appears to be the most appropriate statistical technique for working with multiple groups in vocational development research (Austin, 1967; Cooley and Lohnes, 1968; Fisher, 1963; Gribbons and Lohnes, 1968; Prediger, 1970; Rulon, 1951; Super, 1969b; Tiedeman, 1951; Tatsouka, 1957).

III

PROCEDURE

Population and Sample

The population from which the sample was obtained consists of the total ninth grade class of the three public junior high schools in the city of Altoona, Pennsylvania for the 1968-69 school year. The Altoona schools have an estimated 15,000 enrollment which includes approximately 1,100 ninth grade students. The school system is organized on a six-three-three plan which places the ninth grade in the junior high or middle unit of the system. The high school program is comprehensive in its offerings and the classes are conducted in the two building facility including a very modern vocational-technical school. The instruction cost per student during 1968-69 school year was $622.01 as compared to the state average of $681.76 for the same period.

The city of Altoona is located in west central Pennsylvania along the main line of the Pennsylvania Railroad. In years past, the railroad and the railroad shops were the main economic support of this area. However, today, the near 70,000 population community has varied small industry and boasts a much larger trade and service area than in years past. The students in the Altoona sample have a variety of occupations to choose from as a result of the new businesses which have located there in recent years.

The female sample for this study was part of the total sample of ninth graders enrolled in the three junior high schools of Altoona, Pennsylvania during the school year 1968-69. All of the data was collected for the purpose of a longitudinal study of vocational

development being conducted by the Department of Vocational Education at The Pennsylvania State University and supported by the Pennsylvania Research Coordination Unit (RCU). Ninth grade data were collected on 579 females, however, some of these students were missing certain data necessary for this study. In order to remain in the sample for this study, a student must have completed tenth grade at the end of the 1969-70 school year and be assigned course grades for that year. Of the 579 females in the sample at the end of ninth grade, 362 remained in the sample and were available for this study at the end of tenth grade. Most of the students lost to the sample were missing one or more pieces of data while a small percentage were no longer attending school in the Altoona system.

Essential Data

Independent Variables. Because it is desired to follow Kapes' (1971) procedure as closely as possible, the same independent variables will be used. A brief description of the independent variables is provided here, and a more comprehensive description can be obtained from VDS Monograph Number 2, pp. 68-76.

a) Ability Measures--Kapes, in discussing this section, reminded the reader of Benet's early efforts to measure ability. He also pointed out Super and Overstreet's (1960) use of an ability measure (Otis Quick Scoring Mental Ability Test). Also, Cooley and Lohnes (1968) have suggested the use of commercially available tests such as the General Aptitude Test Battery (GATB) and the Differential Aptitude Test (DAT).

Cooley and Lohnes state:

> We think that these results suggest that a series of equating studies involving a representative group of commercial batteries and a suitable sample of subjects would establish acceptable alternative procedures for scaling the MAP ability factors...
> (Cooley and Lohnes, p. 1-31).

Kapes (1971), in reference to the use of the GATB, states:

> In choosing an appropriate commercial battery for this study, consideration was given to its appropriateness for vocational as well as academic students. On the basis of previous studies (Impellitteri and Kapes, 1969), the GATB was selected because it contained manipulative as well as cognitive abilities and because the manipulative ability scores were shown to be related to vocational students' shop grades (Kapes, p. 69).

The GATB was developed by the United States Employment Service (USES) in 1947 for use in adult employment counseling. The USES later extended the GATB for use with ninth and tenth grade age groups. There are twelve subtests in the battery which yield the following aptitude scores:

G - Intelligence--General learning ability. The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgements. Closely related to doing well in school.

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

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

S - Spatial Aptitude--Ability to think visually of geometric forms and to comprehend the two-dimensional

representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space.

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

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

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

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

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

Eight of the nine GATB aptitudes were used and will be applicable to this study. It becomes necessary to omit G because this aptitude is made up of weighted combinations of subtests which are also used in aptitudes V, N and S. The use of such a variable may make the results of any multivariate statistical analysis difficult to interpret.

b) Occupational Values--For this study the instrument used to test occupational values is the "Occupational Values Inventory" (OVI). Kapes (1971) points out:

> The unique contribution of this instrument is that it contains actual "valuing tasks" in an ipsative format phrased in a language easily understood by ninth graders (Kapes, p. 71).

In reviewing Kapes' (1971) discussion on occupational values, it was noted that occupational values of adolescents have been actively researched by Singer and Stefflre (1954), Dipboye and Anderson (1959), Super (1962), Gribbons and Lohnes (1965), Thompson (1966) and Impellitteri and Kapes (1970) (Kapes, p. 70-71).

The following seven occupational values are assessed by the OVI:

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

2. Advancement--One perceives the opportunity to get ahead in the work; sees a good future in it; it provides an opportunity to improve oneself.

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

4. Prestige--One is impressed by the respectability attached to the work; can earn recognition from it; desires the feeling of importance that goes with it.

5. Personal Goal--One sees the work as fitting into his way of life; is what one always wanted to do; has been shooting for it; it's the ideal.

6. Preparation and Ability--One can succeed in the work; is good at it; it's where one's talents lie; is suited to it.

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

The four OVI values used in this study are: Interest and Satisfaction, Salary, Prestige and Security. Kapes (1971) states the reason for using these four values:

> Because this instrument is ipsative, it is necessary to include fewer than all of the values which the instrument measures in order to make it possible to apply multivariate, statistical techniques. The nature of an ipsative instrument is such that the expected intercorrelations among its measures is not zero, but negative. Given scores on six of the values, the seventh would be determined and not free to vary independently. In order to allow the values to vary independently, it was decided that no more than four values could be used and the four selected were those that showed the greatest promise based on previous studies (Kapes, p. 72).

c) Vocational Maturity--Vocational Maturity is defined by Super (1957):

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

Super and Overstreet (1960) concerning the vocational maturity of ninth grade boys state:

> ...The data of this study suggests that a substantial number of boys are not yet ready, in the ninth grade, to decide on direction of endeavor or, specifically, on a future occupation.

Kapes (1971) being cognizant of this finding states:

> Since the issue of ninth grade choice is central to this study, it was necessary to include a measure of vocational maturity. Crites (1965, 1969) has developed an instrument to measure

> vocational maturity called the Vocational Development Inventory (VDI) attitude scale (Kapes, p. 73).

The VDI was included as a measure of vocational maturity in this study.

d) Family Background Measures--Kapes (1971) found noted researchers using: parents' education, parents' occupational level, house rating, and cultural stimulation as indicators of family background. Reference was made to Hollingshead (1949), Super (1957), Super and Overstreet (1960), Gribbons and Lohnes (1968), and Blau and Duncan (1967) (Kapes, p. 74).

Of the above mentioned measures of family background, this study will use two: father's educational level and father's occupational level. The other measures were not used because of the difficulty in obtaining an accurate appraisal as in the case of family housing. The mother's occupational level was not included because of the large number of non-working mothers in the sample. Mother's educational level has been shown to relate favorably with father's education and, therefore, this measure was not felt to be necessary. When the data was collected, father's education was recorded in the following seven categories: 1) one year through six years, 2) seven years through nine years, 3) ten years through eleven years, 4) high school graduate--twelve years, 5) one year through three years of college, 6) college graduate, and 7) college graduate plus

additional graduate studies. The father's occupational level was converted and recorded in one of Roe's six classifications: 1) Professional and Managerial I, 2) Professional and Managerial II, 3) Semi-Professional and Small Business, 4) Skilled, 5) Semi-Skilled, and 6) Unskilled.

e) Occupational Aspirations--The significance of this variable as a predictor of future vocational behavior has been noted by Super and Overstreet (1960), Clark (1967), Gribbons and Lohnes (1968), Bachman (1970), and Kapes (1971). Miller and Haller's (1964) suggestion was applied in forming the two questions used in collecting the occupational aspiration data for this study. Both the idealistic and realistic aspirations were obtained. The realistic response was used in this study as an indication of occupational aspirations. "What occupation do you realistically believe you will enter?" This question was asked to the females in this sample, and the responses were coded according to the six levels of Roe's classification scheme.

Dependent Variables. Two dependent variables were used in this study: high school curriculum choice and success in high school. These criterion variables and the description of how they were obtained is presented here.

a) Curriculum--The Altoona school system provides five curriculums for tenth grade students: vocational-technical, academic, stenographic, academic business,

and home economics. For the purposes of this study in answering question numbers 1, 2, 3 and 4, the "academic" and "vocational" groups were composed as follows: the "academic" group includes 153 academic majors and 64 academic business majors. The two programs are very similar at the tenth grade level in that they both require college preparatory courses primarily. The "vocational" group includes: 61 home economics majors, 74 stenographic majors, and 10 vocational-technical majors. These three programs are considered to be similar in that the student is involved in training related to a specific work involvement. On this basis and for the above expressed reasons, the sample was divided into two groups, "academic" and "vocational." For the purposes of this study, these terms, when set off in double quotes, will refer to these specific groups. The dichotomous variable "curriculum choice" is, thus, composed of 217 "academic" female students and 145 "vocational" female students. For the analysis in question numbers 5 and 6, the actual enrollment in the curriculum groups was used with the exception of the vocational-technical curriculum which was excluded for this analysis because of the small number enrolled. The four group variables "curriculum choice" is thus composed of 153 academic majors, 74 stenographic majors, 64 academic business majors, and 61 home economic majors.

b) Success in high school--Student success in high school, for the purposes of this study, is determined by the tenth grade GPA. In determining student GPA, two adjustments have been made to assigned course grades for certain students as follows: advanced courses which may be taken by tenth graders include geometry, chemistry, and a third year foreign language. For these advanced courses, a student receives a twenty percent weighting or increase of his earned grade for that course. Vocational-technical weighting was used for the ten vocational-technical students which were included in the first model for question numbers 1, 2, 3 and 4. Reasoning that these students spend 50 percent of their day in vocational shops or laboratories, a weighting of 50 percent was given to the ten vocational-technical students for their course grades in this area. This was done by taking the student's GPA and adding this to her vocational grades, and the sum was divided by two to obtain a combined weighted GPA for the ten vocational-technical students.

Analysis

The statistical methodology used in this study was twofold. Question numbers 1, 2 and 3 were answered by using multiple regression analysis (MRA). Question numbers 4, 5 and 6 were answered by utilizing the multiple discriminate function analysis (MDFA) technique.

The multiple regression model used in answering question numbers 1, 2 and 3 is exactly the same model used in the Kapes (1971) study and is of the following form:

$$y = b_o + b_1x_1 + b_2x_2 + \ldots + b_kx_k + e$$

where

y = dependent variable

$x_1, x_2 \ldots x_k$ = independent variable

$b_o, b_1, b_2 \ldots b_k$ = partial regression coefficients

e = error term

The particular equations used here are:

$$y_1 = b_o + b_1x_1 + b_2x_2 + \ldots + b_{16}x_{16} + e$$

where

y_1 = academic versus vocational curriculum (a dichotomous variable)

y_2 = GPA in the academic curriculum (a continuous variable)

y_3 = GPA in the vocational curriculum (a continuous variable)

and

x_1 = GATB--Verbal Aptitude (V)

x_2 = GATB--Numerical Aptitude (N)

x_3 = GATB--Spatial Aptitude (S)

x_4 = GATB--Form Perception (P)

x_5 = GATB--Clerical Perception (Q)

x_6 = GATB--Motor Coordination (K)

x_7 = GATB--Finger Dexterity (F)

x_8 = GATB--Manual Dexterity (M)

x_9 = Occupational Value--Interest and Satisfaction

x_{10}= Occupational Value--Salary

x_{11}= Occupational Value--Prestige

x_{12}= Occupational Value--Security

x_{13}= Vocational Maturity

x_{14}= Father's Educational Level

x_{15}= Father's Occupational Level

x_{16}= Occupational Aspiration Level

Through the use of multiple regression analysis, it is possible to determine the total amount of variance explained by all variables taken together, as well as isolating the unique contribution of each independent variable, while holding the effects of all other independent variables constant. The unique contribution of independent variables only holds true for the set of variables in the model. Any addition or deletion of variables has the effect of redistributing the explained variance. It becomes necessary, therefore, for useful interpretation of the partial regression coefficients to select meaningful variables for inclusion in the model.

A restructed model comprised of the independent variables making a significant unique contribution toward explaining the dependent variable was calculated using a step-down technique. An Alpha level of .05 was used for this step-down procedure. Previous research demonstrating the usefulness of multiple regression analysis includes: Kaufman, et al. (1967), Moss (1968), Impellitteri and others (1969), Kapes (1971), and Enderlein (1972).

Hallberg (1969) prepared the program used in this analysis which is available at The Pennsylvania State University Computer Center under the title of QSASE.

As stated in the beginning of this section, multiple discriminate function analysis (MDFA) was utilized in answering question numbers 4, 5 and 6. To answer question number 4, the "Vocational" and "Academic" curriculums were divided into successful and unsuccessful groups. This division was made on the basis of GPA with the point of division occurring as close to the median as possible without splitting up those who were exactly at the median. By this method, it was possible to examine the relationship among the four groups described in Table 1.

In answering question number 5, all the curriculums were left intact which means, in effect, that no two curriculums were grouped together. The curriculum name used represents the actual curriculum selected by the student with no artificial grouping existing. The curriculums included for question 5 were: academic, stenographic, academic business, and home economics. The vocational-technical curriculum was excluded because of a low N, having only ten selecting this curriculum in the sample. A graphic representation of the breakdown for question 5 is presented in Figure 2.

Question number 6 attempts to further explore the use of the success information, with the four groups included in question number 5, in a similar manner as was done in question number 4. The breakdown for question number 6 for the eight groups is composed of successful and unsuccessful students in the four curriculums. A graphic presentation of this breakdown is presented in Figure 3 and a description of the groups is provided in Table 2.

Table 1. Mean, Standard Deviation and Median GPA for Each Curriculum Group and for the Total Sample

Curriculum	N	$\bar{X}$	SD	MED	Four Groups	N
"Vocational"	145	2.91	.87	3.00		
					Successful "Vocational"	66*
					Unsuccessful "Vocational"	79*
"Academic"	217	3.14	.87	3.00		
					Successful "Academic"	111*
					Unsuccessful "Academic"	106*
Total	362	3.05	.87	3.00		

*The difference in group size (N) is a result of dividing the curriculum groups as near the median as possible without splitting up individuals having the same GPA.

Table 2. Mean, Standard Deviation and Median GPA for Each of Four Curriculums. The Eight Group Breakdown, Resulting From Dividing Each Curriculum Near the Median, was used in Question 6 of this Study

Curriculum	N	$\bar{X}$	SD	MED	Eight Groups	N
Academic	152	3.29	.90	3.20		
					Successful Academic	75*
					Unsuccessful Academic	77*
Stenographic	74	3.09	.76	3.10		
					Successful Stenographic	37*
					Unsuccessful Stenographic	37*
Academic Business	64	2.78	.67	2.80		
					Successful Academic Business	30*
					Unsuccessful Academic Business	34*
Home Economics	61	2.64	.98	2.60		
					Successful Home Economics	30*
					Unsuccessful Home Economics	31*

*The differences in group size (N) is a result of dividing the curriculum groups as near the median as possible without splitting up individuals having the same GPA.

The assumption made when applying MDFA are similar to those for MRA. It is possible to extract k-1 discriminant functions although two discriminant functions are usually sufficient to account for most of the explainable variance (Kapes, 1971, p. 84).

In answering question numbers 4, 5 and 6, the discriminant ability of the 16 independent variables was tested by the Wilkes' Lambda statistic along with the F-distribution. Significance of the possible discriminant functions was tested using the chi-square distribution. Alpha levels of .05 and .01 were used in these three analyses.

Additional descriptive information includes F-ratios among the group means for each variable and correlations between each variable and each function was provided. All groups were graphically represented in the discriminant space consistant with the number of significant discriminant functions and the percent of each group classified correctly and incorrectly was also computed.

The need and desirability of MDFA have been pointed out by: Rulon (1951), Tiedeman (1951), Lohnes (1966), Cooley and Lohnes (1968), Prediger (1970), and Kapes (1971).

The program used for MDFA was prepared by Hallberg (1971) and was written in Fortran IV and titled DSCRIM. This program provided all the necessary information required in answering question numbers 4, 5 and 6 in this study.

IV

FINDINGS

Introduction

The findings of this investigation are reported under the subsections which correspond to the questions posed in the problem statement. The statistical information presented in this chapter will only be discussed to the extent necessary to clarify the interpretation. Conclusions concerning the data will be discussed in Chapter V.

In this introductory section, three tables are presented to provide background information descriptive of the 16 independent variables used in this study. Table 3 lists the means and standard deviations for each of the 16 independent variables, for the total sample and the "vocational" and "academic" curriculums. From the information descriptive of the total sample in Table 3, it can be seen that the GATB variables range from 87.43 to 106.67, while the standard deviations for these variables range from 10.91 to 20.39. These means and standard deviations are approximately normal for ninth grade students. It can also be seen that the "academic" students scored slightly higher than the "vocational" students on all GATB aptitudes except "Form Perception." The "academic" students scored slightly higher on interest and satisfaction than did the "vocational" students who, in turn, scored higher on the values: salary, prestige, and security. The "academics" scored higher on vocational maturity and father's education while the "vocationals" scored higher on father's occupational level and occupational aspirations.

The differences are slight in most cases between the "vocational" and "academic" scores. As an example, the difference between the two

Table 3. Means and Standard Deviations for the 16 Independent Variables for the Total Sample and for the "Vocational" and "Academic" Curriculums

Variables		Total Sample (N = 362)		"Vocational" Curriculum (N = 145)		"Academic" Curriculum (N = 217)	
No.	Name	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
1.	GATB-Verbal	94.66	10.91	93.25	10.51	95.61	11.10
2.	GATB-Numerical	97.88	13.21	97.48	13.91	98.15	12.75
3.	GATB-Spatial	97.12	15.08	95.95	14.48	97.91	15.45
4.	GATB-Form Perception	103.93	15.50	104.12	17.51	103.81	14.04
5.	GATB-Clerical Perception	106.67	12.70	106.57	13.01	106.74	12.53
6.	GATB-Motor Coordination	96.34	15.13	94.81	15.62	97.36	14.75
7.	GATB-Finger Dexterity	99.96	20.39	98.70	20.45	100.73	20.35
8.	GATB-Manual Dexterity	87.43	19.48	85.91	19.26	88.44	19.60
9.	Value-Interest and Satisfaction	20.66	4.40	20.10	4.38	21.04	4.39
10.	Value-Salary	10.72	6.91	11.27	6.82	10.36	6.97
11.	Value-Prestige	12.12	4.72	12.19	4.43	12.08	4.91
12.	Value-Security	12.06	5.35	12.22	5.67	11.95	5.15
13.	Vocational Maturity	35.48	4.98	35.23	5.38	35.65	4.69
14.	Father's Education	3.78	1.03	3.77	1.01	3.79	1.05
15.	Father's Occupation	4.18	.99	4.31	.97	4.09	1.00
16.	Occupational Aspiration	3.44	1.15	3.60	1.07	3.34	1.19

groups on father's education (3.77 and 3.79) is a matter of months rather than years of educational preparation. It should be remembered when comparing scores on father's occupational level and occupational aspirations for the two curriculums, that Roe's classification was used, thus a lower numerical score represents a higher level. A t-test could be used to test the difference between the various pairs of scores if desired, and all the necessary information for this test is included in the tables of this chapter.

The variables used in this study were selected by Kapes (1971) who expected them to differentiate between curriculums and between successful and unsuccessful students for his sample of ninth grade boys. The same expectation existed for this study of ninth grade girls. The total unique contribution of the variables was investigated by use of Multiple Regression Analysis (MRA) and Multiple Discriminate Function Analysis (MDFA). Table 4 presents the zero-order correlations among the 16 independent variables used in this study. The intercorrelations, as shown in Table 4, range from .61 to -.42. The greatest amount of shared variance is equal to 36 percent and the other relationships yield much lower values.

Table 5 presents the zero-order correlations between the 16 independent variables and the dependent variables curriculum choice and grade point average (GPA) for the "vocational" and "academic" curriculums. It can be observed that the values prestige and security did not bear a significant relationship to any of the criterion variables while only 4 of the 16 independent variables were significantly related to all three dependent variables. The same four: GATB-Verbal, Value-Interest and Satisfaction, Father's Occupation, and Occupational Aspiration were significantly related at the .05 level to curriculum choice. Overall the

Table 4. Zero- Order Correlations Among the 16 Independent Variables for the Total Sample (N = 362)

Variables	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. GATB-V	.57	.37	.19	.32	.19	.24	.18	.34	-.20	-.11	-.00	.47	.26	-.27	-.26
2. GATB-N		.41	.41	.53	.29	.33	.28	.23	-.21	-.05	-.08	.31	.15	-.13	-.27
3. GATB-S			.37	.26	.13	.34	.22	.19	-.14	-.06	-.05	.21	.12	-.09	-.19
4. GATB-P				.61	.31	.40	.35	.03	.03	-.01	-.13	.03	.08	-.05	-.12
5. GATB-Q					.34	.31	.32	.10	-.06	-.05	-.10	.13	.08	-.04	-.20
6. GATB-K						.33	.49	.06	.03	.03	-.12	.11	.10	-.08	-.04
7. GATB-F							.53	.02	.01	.01	-.16	.11	.15	-.15	-.09
8. GATB-M								-.05	.12	-.02	-.11	.10	.19	-.09	-.04
9. Interest and Satisfaction									-.42	-.14	-.13	.31	.13	-.13	-.22
10. Salary										-.20	-.27	-.23	-.04	.04	.12
11. Prestige											-.08	-.16	-.06	.07	.03
12. Security												-.00	.00	.01	-.08
13. Vocational Maturity													.12	-.16	-.17
14. Father's Education														-.37	-.05
15. Father's Occupation															.08
16. Occupational Aspiration															

$r \geq .11$ Significant at .05 $r \geq .14$ Significant at .01

Table 5. Zero-Order Correlations Between the 16 Independent Variables and the Dependent Variables Curriculum Choice and GPA

No.	Variables Name	Curriculum[a] Choice (N = 362)	"Vocational" GPA (N = 145)	"Academic" GPA (N = 217)
1.	GATB--V	-.10*	.59**	.64**
2.	GATB--N	-.02	.49**	.57**
3.	GATB--S	-.06	.22**	.41**
4.	GATB--P	.00	.23**	.16*
5.	GATB--Q	-.00	.33**	.17*
6.	GATB--K	-.08	.20*	.18*
7.	GATB--F	-.04	.23**	.25**
8.	GATB--M	-.06	.17*	.14*
9.	Interest and Satisfaction	-.10*	.42**	.32**
10.	Salary	.06	-.25**	-.31**
11.	Prestige	.01	-.09	-.12
12.	Security	.02	-.04	-.01
13.	Vocational Maturity	-.04	.43**	.53**
14.	Father's Education	-.01	.17*	.28**
15.	Father's Occupation	.10*	-.16*	-.19**
16.	Occupational Aspiration	.11*	-.27**	-.28**

[a] "Vocational" = 1, "Academic" = 0

* Significant at .05

** Significant at .01

correlations range from .64 to -.31. It should be remembered when interpreting the correlations for the variables father's occupational level and occupational aspiration, a negative sign indicates a positive relationship with a higher level.

Using the raw data included in Tables 3, 4 and 5, the 16 independent variables were investigated further to determine the amount of unique and useful information available to answer the questions presented in the statement of the problem.

Question #1

What characteristics of ninth grade females are predictive of tenth grade enrollment in a "vocational" versus an "academic" curriculum?

By referring to Table 5, it can be seen that only 4 of the 16 independent variables are related significantly to the dependent variable curriculum choice. GATB verbal aptitude (V), value interest and satisfaction, father's occupational level and occupational aspiration are all negatively related although for the last two variables the signs are reversed due to the higher number being associated with the lower level in Roe's classification. The other 12 variables are not significantly related to curriculum choice in this sample.

MRA was undertaken in order to examine the total amount of unique predictive information available for the 16 independent variables. The results from the analysis are presented in Table 6. The total multiple correlation (R) obtained from this analysis is not shown in the table but is equal to .22. The coefficient of determination (R^2) is equal to .0483. Adjusting R^2 for degrees of freedom to account for shrinkage expected upon

Table 6. Regression Analysis Between the 16 Independent Variables and the Dependent Variable Curriculum Choice[a]

(N = 362)

Variables No.	Name	Partial Regression Coefficient	Standard Error	Student "t"
1.	GATB--V	-.0043	.0033	1.29
2.	GATB--N	.0034	.0028	1.23
3.	GATB--S	-.0012	.0020	0.59
4.	GATB--P	.0014	.0023	0.60
5.	GATB--Q	.0011	.0028	0.41
6.	GATB--K	-.0024	.0020	1.17
7.	GATB--F	.0001	.0016	0.07
8.	GATB--M	-.0016	.0017	0.94
9.	Interest and Satisfaction	-.0047	.0075	0.63
10.	Salary	.0046	.0049	0.93
11.	Prestige	.0020	.0061	0.33
12.	Security	.0040	.0055	0.73
13.	Vocational Maturity	.0047	.0061	0.77
14.	Father's Education	.0285	.0276	1.03
15.	Father's Occupation	.0448	.0286	1.56
16.	Occupational Aspiration	.0419	.0241	1.73
	Intercept	.0441	.04971	

Standard Error of Estimate = .4896

Coefficient of Determination $(\bar{R}^2)^b$ = .0042

Overall F-Ratio $(\frac{MSR}{MSE})$ = 1.0953

[a] "Vocational" = 1, "Academic" = 0

[b] Adjusted for degrees of freedom

cross validation, the adjusted coefficient of determination ($\bar{R}^2$) is .0042. The significance of this total relationship was tested using the F-test with 16 and 345 degrees of freedom. The overall F-ratio ($\frac{MSR}{MSE}$) for this equation is 1.0953 and is not significant at the .05 level.

The partial regression coefficient (Table 6) represents the amount of units of the independent variable which is uniquely associated with the curriculum choice with the effect of all other 15 independent variables partialled out. The regression coefficient is tested for its probable departure from zero by the use of "t" test. The student "t's" shown in Table 6 are not significant at the .05 level. This test indicates that none of the 16 independent variables possess enough of a unique contribution to be statistically significant. All 16 variables taken together account for only four-tenths of one percent of the dependent variable curriculum choice; therefore, a restricted model MRA was not calculated.

Question #2

What characteristics of ninth grade females who have enrolled in a "vocational" curriculum in tenth grade are predictive of success in tenth grade as measured by grade point average (GPA)?

The zero-order correlations presented in Table 5 for the criterion variable "vocational" GPA will assist in examining the simple relationships between the 16 independent variables and the dependent variable "vocational" GPA. Fourteen of the 16 variables are significantly related to the criterion at either the .05 or .01 levels. All of the GATB variables are positively related as is the value interest and satisfaction while salary is negatively related. Vocational maturity, and father's

occupational level and occupational aspirations bear a negative sign. The values prestige and security are not significantly related to "vocational" GPA in this sample.

In order to examine the total amount of unique information available from the 16 independent variables in predicting "vocational" GPA, a multiple regression analysis (MRA) was computed. The results of the full model analysis are presented in Table 7. The total multiple correlation (R) is not shown in the table but is equal to .69 with the unadjusted coefficient of determination (R^2) equal to .48. The adjusted coefficient of determination ($\bar{R}^2$) is equal to .42 and the significance of the total relationship as tested by the overall F-ratio is equal to 7.6412 and is significant beyond the .01 level. Of the 16 variables GATB-V, interest and satisfaction, and vocational maturity are significant unique contributors to the prediction of "vocational" GPA.

All but three of the variables in the full model did not in themselves possess enough unique information to be statistically significant. In order to discover which variables possess the most information which is unique and useful for prediction, a restricted model was computed. A step-down technique successively omitting one independent variable at a time on the basis of least reduction in sum of squares regression was used. Only the variables which are significant at the .05 level or above remained. The results of the restricted model are presented in Table 8. The overall F-ratio for the restricted model is equal to 29.8572 and is significant beyond the .01 level. The adjusted coefficient of determination ($\bar{R}^2$) is equal to .44; a slight increase as a result of dropping out the less useful variables. The four variables remaining in the restricted model possess most of the unique information available from the 16 independent variables in the full model. The variables remaining in the

Table 7. Regression Analysis Between the 16 Independent Variables in the Full Model and the Dependent Variable GPA for the "Vocational" Curriculum

(N = 145)

Variables No.	Name	Partial Regression Coefficient	Standard Error	Student "t"
1.	GATB--V	.0302	.0073	4.10**
2.	GATB--N	.0093	.0059	1.57
3.	GATB--S	-.0040	.0045	0.90
4.	GATB--P	.0041	.0050	0.82
5.	GATB--Q	-.0056	.0071	0.80
6.	GATB--K	.0052	.0044	1.19
7.	GATB--F	.0029	.0035	0.83
8.	GATB--M	-.0016	.0039	0.42
9.	Interest and Satisfaction	.0468	.0168	2.78**
10.	Salary	-.0030	.0110	0.27
11.	Prestige	.0068	.0145	0.47
12.	Security	.0036	.0114	0.31
13.	Vocational Maturity	.0250	.0121	2.05*
14.	Father's Education	.0387	.0607	0.63
15.	Father's Occupation	.0388	.0636	0.61
16.	Occupational Aspiration	-.0717	.0568	1.26
	Intercept	-2.8779	1.1520	

Standard Error of Estimate = .6636

Coefficient of Determination $(\bar{R}^2)^a$ = .4245

Overall F-Ratio $(\frac{MSR}{MSE})$ = 7.6412**

[a] Adjusted for Degrees of Freedom

* Significant at .05

** Significant at .01

Table 8. Regression Analysis Between the Independent Variables in the Restricted Model and the Dependent Variable GPA for the "Vocational" Curriculum

(N = 145)

Variables No.	Name	Partial Regression Coefficient	Standard Error	Student "t"
1.	GATB--V	.0292	.0068	4.25**
2.	GATB--N	.0115	.0048	2.39**
9.	Interest and Satisfaction	.0456	.0132	3.43**
13.	Vocational Maturity	.0233	.0116	2.01*
	Intercept	-2.6824	.5239	

Standard Error of Estimate = .6517

Coefficient of Determination $(\bar{R}^2)^a$ = .4449

Overall F-Ratio $(\frac{MSR}{MSE})$ = 29.8572**

[a] Adjusted for Degrees of Freedom

* Significant at .05

** Significant at .01

restricted model which were found to be most useful in predicting "vocational" GPA are vocational maturity, GATB-V and N, and interest and satisfaction. Taken together, these four variables account for approximately 44 percent of the variation in GPA among the 145 "vocational" students in the sample.

Question #3

What characteristics of ninth grade females who have enrolled in the "academic" curriculum in tenth grade are predictive of success in tenth grade as measured by grade point average (GPA)?

Question number 3 is a restatement of number 2 except the curriculum group has changed. Of the 16 independent variables, 14 were found to be significantly related at least at the .05 level to the criterion "academic" GPA. As was true for the "vocational" group in question 2, all the variables except the two values, prestige and security, were found to be significantly related to the criterion for this group. It should be remembered that the two variables, father's occupational level and occupational aspiration, carry negative signs but reflect a positive relationship between a higher level and a higher GPA.

The full model of the 16 independent variables and "academic" grade point average is presented in Table 9. The total multiple correlation (R) is not included in the table, but is equal to .76 and the unadjusted coefficient of determination (R^2) is equal to .58. The adjusted coefficient of determination ($\bar{R}^2$) is equal to approximately .55 while the significance of the total relationship as tested by the F-ratio is equal to 17.7885 and is significant beyond the .01 level. The analysis indicates

Table 9. Regression Analysis Between the 16 Independent Variables in the Full Model and the Dependent Variable GPA for the "Academic" Curriculum

(N = 217)

Variables No.	Name	Partial Regression Coefficient	Standard Error	Student "t"
1.	GATB--V	.0223	.0052	4.29**
2.	GATB--N	.0177	.0045	3.92**
3.	GATB--S	.0042	.0031	1.34
4.	GATB--P	.0008	.0036	0.22
5.	GATB--Q	-.0086	.0041	2.10*
6.	GATB--K	.0016	.0031	0.51
7.	GATB--F	.0020	.0024	0.81
8.	GATB--M	-.0009	.0026	0.35
9.	Interest and Satisfaction	-.0088	.0115	0.76
10.	Salary	-.0223	.0075	2.95**
11.	Prestige	-.0173	.0090	1.91
12.	Security	-.0112	.0090	1.23
13.	Vocational Maturity	.0438	.0100	4.36**
14.	Father's Education	.0911	.0431	2.10*
15.	Father's Occupation	.0184	.0440	0.41
16.	Occupational Aspiration	-.0491	.0365	1.34
	Intercept	-1.6525	.7577	

Standard Error of Estimate = .5799

Coefficient of Determination $(\bar{R}^2)^a$ = .5542

Overall F-Ratio $(\frac{MSR}{MSE})$ = 17.7885*

[a] Adjusted for Degrees of Freedom

* Significant at .05

** Significant at .01

that the six variables, GATB-V, N and Q; the value salary; vocational maturity and father's education, are significant unique predictors of "academic" GPA in the presence of the total 16 independent variables. The variables GATB-Q and the value salary are negatively related to the criterion variable "academic" GPA.

Using a step-down technique as was employed in question 2, a restricted model was computed in order to identify the variables which possess the most unique and useful information for prediction. The results of the restricted model are presented in Table 10. The overall F-ratio is equal to 53.3367 and is significant well beyond the .01 level. The adjusted coefficient of determination ($\bar{R}^2$) is equal to .54 and reflects a slight loss in precision when compared to the full model. The five variables remaining in the restricted model are the GATB variables V and N, value salary, vocational maturity, and father's education. It should be noted that in the restricted model the independent variable, value salary, is negatively related to the criterion variable. Taken together, these five variables account for approximately 54 percent of the variation in GPA for the 217 academic students in this sample.

Question #4

What characteristics of ninth grade females differentiate among the following four tenth grade groups?

a. successful "vocational" students

b. unsuccessful "vocational" students

c. successful "academic" students

d. unsuccessful "academic" students

In this question, the criterion variable is composed of four mutually exclusive categories that combine the variables of course selection and

Table 10. Regression Analysis Between the Independent Variables in the Restricted Model and the Dependent Variable GPA for the "Academic" Curriculum

(N = 217)

No.	Variables Name	Partial Regression Coefficient	Standard Error	Student "t"
1.	GATB--V	.0236	.0048	4.88**
2.	GATB--N	.0183	.0038	4.77**
10.	Salary	-.0154	.0060	2.57*
13.	Vocational Maturity	.0480	.0098	4.89**
14.	Father's Education	.0883	.0397	2.22*
	Intercept	-2.8040	.4402	

Standard Error of Estimate = .5841

Coefficient of Determination $(\bar{R}^2)^a$ = .5478

Overall F-Ratio $(\frac{MSR}{MSE})$ = 53.3367**

[a] Adjusted for Degrees of Freedom

* Significant at .05

** Significant at .01

success. Through this method, it becomes possible to determine the overall predictive strength of the 16 independent variables when they are used to differentiate among the four categories which simultaneously consider group membership and success. The use of this information in combination with that obtained in earlier analysis, the student characteristic variables are identified which contribute the most information about course selection and success.

Means for each of the four groups were computed and tested using the F-ratio with k-1 and N-1 degrees of freedom. This analysis does not consider the intercorrelations among variables (Table 4), therefore, the total amount of discriminant information is considerably less than the sum of that available from each analysis as presented in Table 11. By examination, it can be seen that 12 of the 16 independent variables significantly discriminate among the four groups. The GATB variables P and M, values prestige and security do not significantly discriminate among the four groups. The size and direction of the group means can be observed by inspection of Table 11.

Multiple discriminant function analysis (MDFA) was utilized to determine the combined discriminant ability of the 16 independnet variables in maximizing the total differences among the four groups considered in this question. This technique seeks to maximize the ratio of between group sum of squares to within group sum of squares. The results of this analysis are presented in Table 12. The Wilks' Lambda statistic was computed to determine whether or not the 16 variables contain enough information to produce significant discrimination. This statistic was then tested by the F-ratio, and from the table it can be seen that the overall F-ratio is equal to 4.202 and is significant at the .0001 level. The

Table 11. Group Means and Overall F-Ratio for the 16 Independent Variables Among the Four Groups: Successful "Vocational," Unsuccessful "Vocational," Successful "Academic," Unsuccessful "Academic"

No.	Variables Name	(N = 66) Successful "Vocational" 1	(N = 79) Unsuccessful "Vocational" 2	(N = 111) Successful "Academic" 3	(N = 106) Unsuccessful "Academic" 4	F-Ratio
1.	GATB-V	98.22	89.10	101.06	89.90	37.21***
2.	GATB-N	102.56	93.24	103.77	92.27	23.39***
3.	GATB-S	97.96	94.26	102.89	92.70	10.17***
4.	GATB-P	106.28	102.31	105.13	102.43	1.34
5.	GATB-Q	109.83	103.86	108.03	105.39	3.50*
6.	GATB-K	96.98	93.00	100.07	94.52	4.18*
7.	GATB-F	100.72	97.18	105.27	95.98	4.50*
8.	GATB-M	87.75	84.37	90.08	86.72	1.38
9.	Interest and Satisfaction	21.78	18.69	22.12	19.91	12.95***
10.	Salary	9.54	12.72	8.26	12.56	10.85***
11.	Prestige	12.07	12.29	11.36	12.83	1.82
12.	Security	12.57	11.93	12.04	11.85	0.26
13.	Vocational Maturity	37.56	33.29	37.58	33.63	24.35***
14.	Father's Education	3.96	3.60	4.00	3.58	4.52*
15.	Father's Occupation	4.15	4.44	3.98	4.21	3.43*
16.	Occupational Aspiration	3.33	3.82	3.04	3.65	9.21***

* Significant at .05
** Significant at .001
*** Significant at .0001

Table 12. Zero-Order Correlations Between the Three Discriminant Functions Generated Among the Four Groups (Successful and Unsuccessful - "Vocational" and "Academic") and the 16 Independent Variables

(N = 362)

No.	Variables Name	DF I	DF II	DF III
1.	GATB--V	.16	-.04	.02
2.	GATB--N	.08	.02	-.06
3.	GATB--S	.02	-.09	.00
4.	GATB--P	-.00	.03	-.01
5.	GATB--Q	-.07	.13	.00
6.	GATB--K	.05	-.05	.01
7.	GATB--F	.02	-.04	-.01
8.	GATB--M	-.02	.02	.03
9.	Interest and Satisfaction	.00	.49	.11
10.	Salary	-.19	-25	-.00
11.	Prestige	-.14	.36	.03
12.	Security	-.02	.26	-.02
13.	Vocational Maturity	.22	.31	-.08
14.	Father's Education	.50	.13	-.50
15.	Father's Occupation	.24	-.22	-.73
16.	Occupational Aspiration	-.72	.53	-.42
Chi Square		156.13***	19.91	12.70
% Variance Extracted		85.46	8.91	5.62

Wilks' Lambda = .585 Overall F-Ratio = 4.202***

*** Significant at .0001

significance of each of the three discriminant functions (DF) was tested using the Chi Square distribution. The Chi Square values reported in Table 12 indicate that DF I is significant at the .0001 level while DF II and III are not significant at the .05 level. DF I extracts 85.46 percent of the explainable variance; DF II extracts 8.91 percent; and DF III extracts only 5.62 percent. Together, 99.99 percent of the explainable variance was extracted by the three possible DF's (three roots extracted 99.99 percent of trace).

The zero-order correlations for each DF shown in Table 12 are the result of computed correlations between each function for each of the 16 independent variables. An examination of the correlations provide the necessary information to give meaning and select names for each function. A function can be identified by contrasting the high negative and positive correlations. By observing Table 12 it can be seen that only one DF is significant at the .05 level or above. Father's education has a positive .50 correlation and occupational aspiration has a negative .72 which represents a high positive correlation. Considering these two variables it has been decided to name DF I, Socio-Economic.

In an attempt to examine the efficiency of the discriminant function analysis, the percent of each group correctly and incorrectly classified into the four groups was computed. Table 13 presents the information concerned with classification and the diagonal elements of the matrix represents correct classification. It can be seen that 19.70 percent of the successful "vocational" group are correctly classified while 50 percent of this group is incorrectly classified in the successful "academic" group. The unsuccessful "vocational" group is 25.32 percent correctly classified and a 48.10 percent is incorrectly classified in the unsuccessful "academic" group. Successful and unsuccessful "academic" groups are

74.78 and 59.43 percent correctly classified respectively. It can be observed that roughly 50 percent of the "vocational" groups are incorrectly classified in the respective (successful-unsuccessful) "academic" groups.

The discriminant centroids for each group are also presented in Table 13. These centroids may be used to produce a graphic display in discriminate space which is defined by the significant DF's. The centroids represent the nucleus of the dispersed sample and the density of the nucleus may be estimated from the percent correctly classified. This chart has not been constructed for this question because only one of the DF's was significant.

Question #5

What characteristics of ninth grade females differentiate among the following four tenth grade groups?

a. academic

b. stenographic

c. academic business

d. home economics

Question number 5 is an application of the technique used in question number 4. The four groups included in this analysis are the actual chosen curriculums with no artificial grouping existing.

In order to examine the ability of each of the 16 independent variables to differentiate among the four groups included in this question, means were computed for each group and were tested by using the F-ratio with k-1 and N-1 degrees of freedom. The results of the preliminary analysis are presented in Table 14. By examination of the table, it

Table 13. Percent of Each Group Classified into the Four Possible Groups (Successful and Unsuccessful - "Vocational" and "Academic") and Group Centroids for Each of the Three Discriminant Functions

	% Classified in Each Group					Group Centroids		
	Group 1	Group 2	Group 3	Group 4	Total	DF I	DF II	DF III
Group 1 Successful "Vocational" (N = 66)	19.70	12.12	50.00	18.18	100%	28.78	33.09	-7.60
Group 2 Unsuccessful "Vocational" (N = 79)	7.59	25.32	18.99	48.10	100%	24.62	31.03	-7.66
Group 3 Successful "Academic (N = 111)	4.50	6.31	74.78	14.41	100%	30.37	31.24	-7.23
Group 4 Unsuccessful "Academic" (N = 106)	1.89	21.70	16.98	59.43	100%	24.62	32.14	-7.06

_____ Diagonal Elements Represent Percent Correctly Classified.

Table 14. Group Means and Overall F-Ratio for the 16 Independent Variables Among the Four Groups: Academic, Stenographic, Academic Business, Home Economics

No.	Variables Name	(N = 153) Academic 1	(N = 74) Stenographic 2	(N = 64) Academic Business 3	(N = 61) Home Economics 4	F-Ratio
1.	GATB--V	97.48	94.31	91.07	91.09	8.40***
2.	GATB--N	100.19	99.50	92.93	93.96	7.16**
3.	GATB--S	100.03	96.43	92.68	94.27	4.58*
4.	GATB--P	103.80	106.06	103.85	100.91	1.24
5.	GATB--Q	107.61	107.94	104.65	104.21	1.85
6.	GATB--K	97.26	98.14	97.96	90.08	4.38*
7.	GATB--F	101.59	100.81	98.37	96.27	1.13
8.	GATB--M	88.74	86.95	88.09	83.13	1.25
9.	Interest and Satisfaction	21.27	20.54	20.40	19.55	2.41
10.	Salary	9.48	10.48	12.43	11.75	3.49*
11.	Prestige	12.11	12.54	12.09	12.31	0.15
12.	Security	12.46	12.12	10.78	12.54	1.65
13.	Vocational Maturity	36.33	36.33	34.09	34.09	5.16*
14.	Father's Education	3.90	3.75	3.54	3.68	1.95
15.	Father's Occupation	4.01	4.29	4.26	4.32	2.28
16.	Occupational Aspiration	3.03	3.29	4.07	3.88	18.23***

* Significant at .05
** Significant at .001
*** Significant at .0001

can be seen that 7 of the 16 independent variables significantly discriminate among the four groups and that two of the seven are significant at the .0001 level. The significant variables include: GATB variables V, N, S and K; value salary; vocational maturity; and occupational aspiration. The size and direction of the group means may be observed by referring to Table 14.

In order to arrive at the combined discriminant strength of the 16 independent variables in maximizing the total differences among the four groups, MDFA was undertaken. The results of this analysis are presented in Table 15. Wilks' Lambda statistic was computed and tested using the F-ratio. From the table, it can be seen that the overall F-ratio is equal to 2.152 and is significant at the .0001 level. The significance of each of the possible DF's were tested using the Chi Square statistic. The values reported in Table 15 indicate that DF I is significant at the .0001 level and DF II and DF III are not significant at the .05 level. DF I extracts 74.83 percent of the explainable variance; DF II extracts 15.47 percent; and DF III extracts 9.71 percent. Together, the three DF's extract 99.96 percent of the explainable variance (three roots extract 99.91 percent of trace).

In order to examine the efficiency of the discriminate function analysis, the percent of each group which would be classified correctly into its own group as well as those classified incorrectly into one of the other groups was computed. Table 16 presents the information concering classification of the four groups with the diagonal elements of the matrix representing correct classification. It can be seen that for each of the four groups the largest percentage of the group is correctly or incorrectly classified as academic (Group 1). Group 1 has 82.24

Table 15. Zero-Order Correlations Between the Three Discriminant Functions Generated Among the Four Groups (Academic, Stenographic, Academic Business, and Home Economics and the 16 Independent Variables

(N = 352)

No.	Variables Name	DF I	DF II	DF III
1.	GATB--V	.57	.15	-.27
2.	GATB--N	.53	.10	.24
3.	GATB--S	.43	-.03	-.22
4.	GATB--P	.08	.34	.33
5.	GATB--Q	.25	.16	.21
6.	GATB--K	.16	.80	.11
7.	GATB--F	.19	.21	.01
8.	GATB--M	.12	.37	-.18
9.	Interest and Satisfaction	.26	.32	-.24
10.	Salary	-.38	.10	.04
11.	Prestige	.00	-.00	.20
12.	Security	.18	-.39	.05
13.	Vocational Maturity	.45	.17	.13
14.	Father's Education	.28	-.11	-.09
15.	Father's Occupation	-.24	-.10	.47
16.	Occupational Aspiration	-.83	-.05	-.08
	Chi Square	73.73***	16.60	10.51
	% Variance Extracted	74.83	15.47	9.71

Wilks' Lambda = .744 Overall F-Ratio = 2.152***

*** Significant at .0001

Table 16. Percent of Each Group Classified into the Four Possible Groups (Academic, Stenographic, Academic Business, Home Economics) and Group Centroids for Each of the the Three Discriminant Functions

	% Classified in Each Group					Group Centroids		
	Group 1	Group 2	Group 3	Group 4	Total	DF I	DF II	DF III
Group 1 Academic (N = 153)	82.24	1.32	8.55	7.89	100%	2.56	8.57	9.25
Group 2 Stenographic (N = 74)	71.62	9.46	10.81	8.11	100%	2.06	8.82	10.09
Group 3 Academic Business (N = 64)	42.18	4.69	35.94	17.19	100%	.82	9.51	9.26
Group 4 Home Economics (N = 61)	45.90	4.92	22.95	26.23	100%	1.20	7.11	9.46

_____ Diagonal Elements Represent Percent Correctly Classified

percent correctly classified. Group 2 has only 9.46 percent correctly classified. Group 3 has 35.94 percent correctly classified while Group 4 has 26.23 percent. When computing MDFA the most ideal condition is to have all groups of equal size (equal N). In question number 5 this was not possible and the high percentage of individuals classified into group one (academic) is related to the difference in group size. The discriminant centroids are also included on Table 16 for each of the four groups.

By observing Table 15 we see that the one significant DF indicates a high negative correlation for occupational aspiration of -.83 which represents a positive correlation with a higher occupational level in Roe's classification scheme. Also GATB variables V and N have a high positive correlation of .57 and .53 respectively. Considering these relationships it has been decided to name DF I, Cognitive - Socio-Economic. The DF's II and III were not found to be significant and will not be named.

Question #6

What characteristics of ninth grade females differentiate among the following eight tenth grade groups?

a. successful academic
b. unsuccessful academic
c. successful stenographic
d. unsuccessful stenographic
e. successful academic business
f. unsuccessful academic business
g. successful home economics
h. unsuccessful home economics

In order to examine the ability of each of the 16 independent variables to differentiate among the eight groups, means for each group on

each variable were computed and tested using the F-ratio with k-1 and N-1 degrees of freedom. The results of this preliminary investigation are presented in Tables 17A and 17B. It can be seen that 11 of the 16 independent variables significantly discriminate among the eight groups and 7 of the 11 variables are significant at the .0001 level. Only the GATB variables P, Q and M; value security; and father's occupation are not significant discriminators for the eight groups. The size and direction of the differences among the group means can be observed from inspection of the information presented in Tables 17A and 17B.

MDFA was undertaken in order to determine the combined discriminant strength of the 16 independent variables in maximizing the total difference amont the eight groups. The results of this analysis are presented in Table 18. Wilks' Lambda statistic was computed to answer the question whether or not the 16 variables contain sufficient information to produce significant discrimination. From the table, it can be seen that the Wilks' Lambda, when computed, is equal to .403 and the overall F-ratio is equal to 2.837 which is significant at the .0001 level. The significance of each of the seven possible DF's was tested by Chi Square. The obtained Chi Square values reported in Table 18 indicates that DF I is significant at the .0001 level and extracted 65.86 percent of the explainable variance. DF II was found to be significant at the .0001 level and extracted 15.46 percent of the explainable variance. The remaining five DF's were not significant at the .05 level and the total percent of variance extracted by the five DF's is equal to 18.68 percent. Taken together, the seven DF's extract 99.59 percent of the explainable variance (seven roots extract 99.59 percent of trace).

The zero-order correlations between the first three DF's and each of the variables are presented in Table 18. These correlations provide

Table 17A. Group Means and Overall F-Ratio for the 16 Independent Variables Among the Eight Groups: Successful Academic, Unsuccessful Academic, Successful Stenographic, Unsuccessful Stenographic, Successful Academic Business, Unsuccessful Academic Business, Successful Home Economics, Unsuccessful Home Economics

No.	Variables Name	(N = 75) Successful Academic 1	(N = 77) Unsuccessful Academic 2	(N = 37) Successful Stenographic 3	(N = 37) Unsuccessful Stenographic 4
1.	GATB-V	103.34	91.76	97.48	91.13
2.	GATB-N	105.98	94.54	103.67	95.32
3.	GATB-S	105.65	94.57	98.97	93.89
4.	GATB-P	105.01	102.63	105.83	106.29
5.	GATB-Q	109.02	106.24	108.59	107.29
6.	GATB-K	99.28	95.29	99.75	96.54
7.	GATB-F	104.74	98.51	103.67	97.94
8.	GATB-M	90.24	87.28	87.40	86.51
9.	Interest and Satisfaction	22.52	20.06	22.21	18.86
10.	Salary	7.46	11.45	8.72	12.24
11.	Prestige	11.42	12.77	13.27	11.81
12.	Security	12.02	12.88	12.10	12.13
13.	Vocational Maturity	38.33	34.38	37.24	34.72
14.	Father's Education	4.05	3.75	3.89	3.62
15.	Father's Occupation	3.94	4.09	4.10	4.48
16.	Occupational Aspiration	2.69	3.37	3.13	3.45

Table 17B. Group Means and Overall F-Ratio for the 16 Independent Variables Among the Eight Groups: Successful Academic, Unsuccessful Academic, Successful Stenographic, Unsuccessful Stenographic, Successful Academic Business, Unsuccessful Academic Business, Successful Home Economics, Unsuccessful Home Economics

No.	Variables Name	(N = 30) Successful Academic Business 5	(N = 34) Unsuccessful Academic Business 6	(N = 30) Successful Home Economics 7	(N = 31) Unsuccessful Home Economics 8	F-Ratio
1.	GATB-V	92.46	89.85	97.16	85.22	17.55***
2.	GATB-N	94.03	91.97	99.53	88.58	11.85***
3.	GATB-S	94.16	91.38	97.50	91.16	6.13***
4.	GATB-P	102.83	104.76	105.46	96.51	1.44
5.	GATB-Q	104.76	104.55	108.96	99.61	2.33
6.	GATB-K	101.86	94.52	93.13	87.12	3.34*
7.	GATB-F	106.70	91.02	97.73	94.87	2.63*
8.	GATB-M	90.66	85.82	85.56	80.77	.93
9.	Interest and Satisfaction	21.23	19.67	21.66	17.51	7.34***
10.	Salary	10.63	14.02	10.60	12.87	5.16***
11.	Prestige	11.16	12.91	10.36	14.00	2.43*
12.	Security	10.23	11.26	12.30	12.77	.94
13.	Vocational Maturity	35.50	32.85	36.83	31.45	11.38***
14.	Father's Education	3.80	3.32	3.93	3.45	2.49*
15.	Father's Occupation	4.23	4.29	4.40	4.25	1.53
16.	Occupational Aspiration	4.46	3.73	3.70	4.06	12.28***

* Significant at .05
** Significant at .001
*** Significant at .0001

Table 18. Zero-Order Correlations for Three of the Seven Discriminant Functions Generated Among the Eight Groups (Successful and Unsuccessful Academic, Stenographic, Academic Business, and Home Economics) and the 16 Independent Variables

(N = 352)

No.	Variables Name	DF I	DF II	DF III
1.	GATB-V	.78	.05	.12
2.	GATB-N	.67	-.02	.08
3.	GATB-S	.50	-.06	-.12
4.	GATB-P	.15	.06	.44
5.	GATB-Q	.27	.03	.34
6.	GATB-K	.25	.28	.00
7.	GATB-F	.26	.25	-.37
8.	GATB-M	.15	.12	-.00
9.	Interest and Satisfaction	.49	.25	.06
10.	Salary	-.45	-.06	.31
11.	Prestige	-.17	-.32	-.31
12.	Security	-.00	-.26	-.05
13.	Vocational Maturity	.64	.22	.10
14.	Father's Education	.30	.11	-.13
15.	Father's Occupation	-.16	.13	.34
16.	Occupational Aspiration	-.55	.66	-.13
	Chi Square	186.02***	53.70*	24.49
	% Variance	65.86	15.46	6.75

Wilks' Lambda = 4.03 Overall F-Ratio = 2.837***

* Significant at .001
*** Significant at .0001

the necessary information to give meaning to the function and facilitate naming of each function. A function can be identified by contrasting the high positive correlations with the high negative correlations. The signs for variables 15 and 16 need to be reversed for this comparison since Roe's classification scheme uses lower numbers to represent higher levels. In naming DF I, it was observed that GATB aptitudes V and N and vocational maturity possessed positive correlations of .64 or higher while occupational aspiration possessed a negative -.55 correlation. It was decided to name DF I, Cognitive - Vocational Maturity. DF II has lower correlations overall because most of the explained variance is accounted for by DF I. The variable occupational aspiration has a high positive correlation of .66 which represents a negative correlation for this variable as explained above. The values prestige and security have a negative correlation of -.32 and -.26 respectively. A variable with a high positive correlation is the value interest and satisfaction with a positive correlation of .49. Considering these four variables it was decided to name DF II, Interest and Satisfaction versus Status and Security. The remaining five DF's were not found to be significant and will not be named.

In order to examine the efficiency of the discriminant function analysis, the percent of each group correctly and incorrectly classified was computed. Table 19 presents the information concerning classification with the diagonal elements representing the percent correctly classified. The successful and unsuccessful academic groups were correctly classified by 69.33 percent and 50.65 percent respectively. The successful and unsuccessful stenographic groups were only 13.52 and 8.11 percent correctly classified while a much higher percent was incorrectly classified as academic. The successful and unsuccessful academic business groups were

Table 19. Percent of Each Group Classified into the Eight Possible Groups

	% Classified in Each Group								
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	TOTAL
Group 1, Successful Academic (N = 76)	69.33	13.33	4.00	4.00	6.67	0.00	0.00	2.67	100%
Group 2, Unsuccessful Academic (N = 77)	20.78	50.65	2.60	3.90	6.49	3.89	2.60	9.09	100%
Group 3, Successful Stenographic (N = 37)	35.13	40.54	13.52	0.00	5.41	2.70	2.70	0.00	100%
Group 4, Unsuccessful Stenographic (N = 37)	16.22	43.24	2.70	8.11	8.11	8.11	8.11	5.40	100%
Group 5, Successful Academic Business (N = 30)	3.33	26.67	3.33	3.33	46.68	3.33	3.33	10.00	100%
Group 6, Unsuccessful Academic Business (N = 34)	2.94	50.00	0.00	0.00	2.94	29.42	2.94	11.76	100%
Group 7, Successful Home Economics (N = 30)	26.67	33.33	0.00	6.67	10.00	10.00	13.33	0.00	100%
Group 8, Unsuccessful Home Economics (N = 31)	3.23	45.48	0.00	3.23	0.00	16.13	0.00	41.93	100%

_____ Diagonal Elements Represent Percent Correctly Classified

Group Centroids

DF I	DF II	Key
18.54	8.42	SA = successful academic
14.83	8.29	UA = unsuccessful academic
16.90	8.60	SS = successful stenographic
14.88	8.57	US = unsuccessful stenographic
14.82	10.15	SB = successful academic business
13.59	8.38	UB = unsuccessful academic business
16.08	9.19	SH = successful home economics
12.70	8.22	UH = unsuccessful home economics

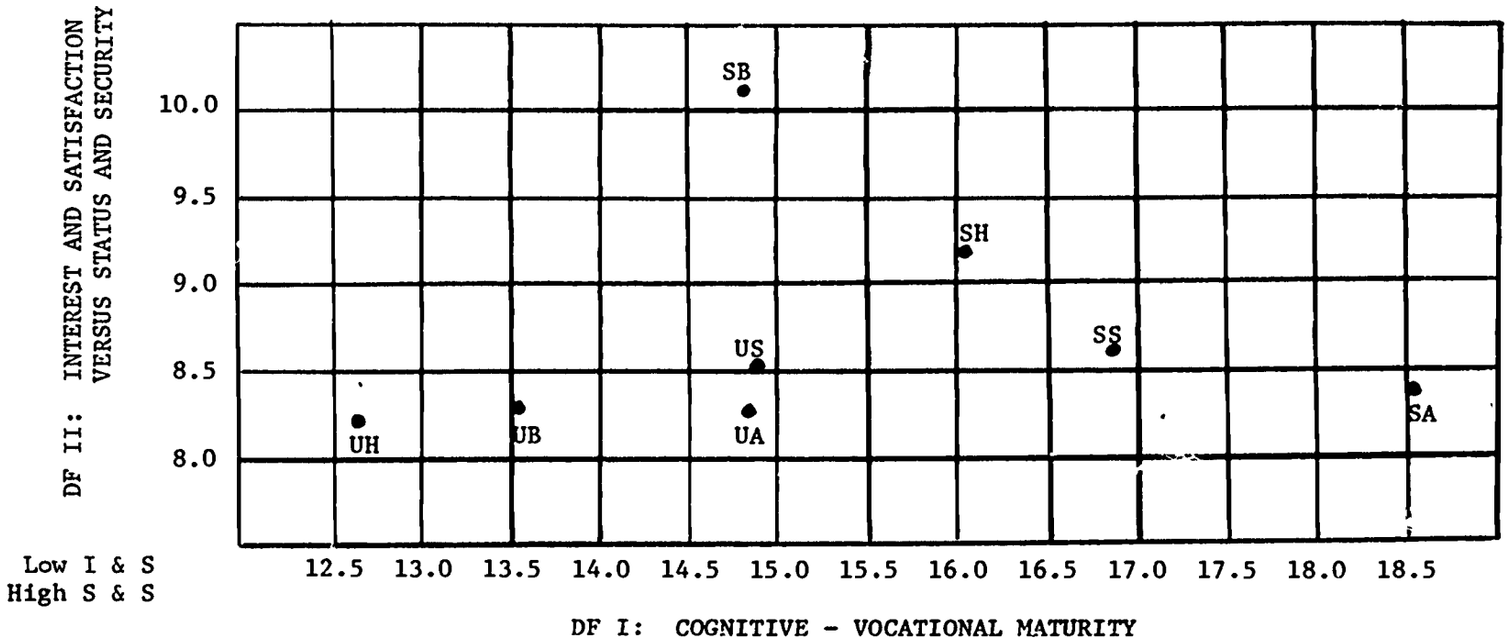


Figure 3. Centroids of Eight Groups in Two Discriminant Space for the Two Significant DF's

46.68 and 29.42 percent correctly classified. The unsuccessful academic business group was 50 percent incorrectly classified as unsuccessful academic The successful and unsuccessful home economics groups were 13.33 and 41.93 percent correctly classified. The successful home economics group was approximately 60 percent incorrectly classified as academic. It is interesting to note that when students in the six groups, other than the two academic groups, are incorrectly classified, the larger percentage of them are classified in one of the two academic groups. However, when the academic students are incorrectly classified, there is no obvious pattern by group. Some of this again is due to the difference in group size (group N) among the eight groups.

In order to more easily visualize the eight groups, they are graphically presented in two discriminant space, as defined by the two significant DF's in Figure 3. From the graph, it can be seen that DF I (Cognitive - Vocational Maturity) separates the successful and unsuccessful groups for each curriculum. The successful academic business, unsuccessful stenographic and unsuccessful academic fall roughly at the same range on this scale. DF II (Interest and Satisfaction versus Status and Security) separates the successful and unsuccessful academic business and home economics groups. However, it does not separate noticeably the two groups of the academic and stenographic curriculums. Although each group is represented as a point on this graph, it must be remembered that the members of each are scattered over the graph around these points. The density of each point can be estimated from the percent correctly classified for each group as presented in Table 20.

V

SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

Chapter V includes a summary of this study, conclusions based on the findings, implications for vocational development theory, and recommendations for further study.

Summary

Introduction

The assumption that the female's involvement in the world of work is insignificant has been prevalent in our society for some time. In the studies pertaining to career development the females were not given much consideration until Zytowski presented his theory in 1969. Super's theory is one of the most noted and researched of all the theories developed to date. Cooley and Lohnes applied Super's theory in their "Career Development Tree." Kapes extended Cooley and Lohnes application to include a measure of success in addition to the individual's choice. Within the same basic framework, this study of females has attempted to replicate Kapes' work.

Statement of the Problem

This study was an attempted replication of Kapes' study to the extent that the same personality trait measures were used to predict a dichotomous curriculum choice at the end of ninth grade. The degree of belongingness to the chosen group was also tested in the sense of successful or unsuccessful membership in the chosen group.

The purpose of this study was to obtain answers to the following specific questions:

1. What characteristics of ninth grade females are predictive of tenth grade enrollment in a "vocational" versus an "academic" curriculum?
2. What characteristics of ninth grade females who have enrolled in the "vocational" curriculum in tenth grade are predictive of success in tenth grade as measured by grade point average (GPA)?
3. What characteristics of ninth grade females who have enrolled in the "academic" curriculum in tenth grade are predictive of success in tenth grade as measured by grade point average (GPA)?
4. What characteristics of ninth grade females differentiate among the following four tenth grade groups?
   a. successful "vocational" students
   b. unsuccessful "vocational" students
   c. successful "academic" students
   d. unsuccessful "academic" students
5. What characteristics of ninth grade females differentiate among the following four tenth grade groups?
   a. academic
   b. stenographic
   c. academic business
   d. home economics
6. What characteristics of ninth grade females differentiate among the following eight tenth grade groups?

a. successful academic

b. unsuccessful academic

c. successful stenographic

d. unsuccessful stenographic

e. successful academic business

f. unsuccessful academic business

g. successful home economics

h. unsuccessful home economics

Procedure

The sample utilized in this study consisted of 362 female students who had completed tenth grade in the Altoona, Pennsylvania Senior High School and who were enrolled in one of the school's five curriculums. All data was gathered as part of a longitudinal study of vocational development being conducted by the Department of Vocational Education at The Pennsylvania State University and supported by the Pennsylvania Research Coordination Unit (RCU). Preliminary data was collected when the students were enrolled in ninth grade at one of the three public junior high schools in Altoona. Criterion information was collected at the end of tenth grade.

The same 16 student characteristics used by Kapes were included as independent variables in this study. These independent variables include the General Aptitude Test Battery (GATB) aptitudes of verbal, numerical spatial, form perception, clerical perception, motor coordination, finger dexterity, and manual dexterity; the occupational values of interest and satisfaction, salary, prestige, and security; the construct of vocational maturity; the family background measures of father's education and father's

occupational level, and the student's realistic occupational aspiration. The dependent variables used were enrollment in the "vocational" or "academic" curriculum which was used in question numbers 1, 2, 3 and 4, and enrollment in the actual curriculum chosen was used in question numbers 5 and 6. GPA was used as a continuous variable in answering question numbers 2 and 3. Also GPA was divided near the median to form the four groups which were compared in question 4 and the eight groups which were compared in question 6.

Analysis of the data employed two statistical methodologies. Question numbers 1, 2 and 3 were answered using multiple regression analysis (MRA) with both full and restricted models using a step-down technique. Question numbers 4, 5 and 6 used the technique of multiple discriminant function analysis (MDFA) in comparing the various groups.

Findings

Zero-order correlations among the 16 independent variables as well as between the independent variables and the dependent variables were calculated. The intercorrelations among the 16 independent variables were found to be relatively low overall and ranged from .61 to -.42. The correlations between the independent variables and the criteria ranged from .64 to -.31. Only 4 of the 16 independent variables were significantly related to the dependent variables for all three cases at the .05 level or above. All of the 16 independent variables except two were significantly related at the .05 level to at least one of the criteria. The values prestige and security were not significantly related to any of the criteria.

Using MRA, the 16 independent variables in this model yielded a multiple (R) of .22 with the dependent variable curriculum choice. The

adjusted coefficient of determination ($\bar{R}^2$) was equal to .0042 and the overall F-ratio was not found to be significant at the .05 level.

When GPA for the "vocational" curriculum was used as the dependent variable the multiple (R) was equal to .69 and the ($\bar{R}^2$) was equal to .42 with the F-ratio significant beyond .01 level. The restricted model for "vocational" GPA yielded an ($\bar{R}^2$) of .44 with the variables GATB verbal and numerical, interest and satisfaction, and vocational maturity being the significant unique predictors of "vocational" GPA. The full model for GPA in the "academic" curriculum produced a multiple (R) of .76 with ($\bar{R}^2$) equal to .55 and the F-ratio significant beyond the .01 level. In the restricted model, the ($\bar{R}^2$) was equal to .54 and reflects a slight loss in precision when compared to the full model. The five variables in the restricted model were GATB verbal and numerical, value salary, vocational maturity, and father's education. These variables were found to be unique significant predictors of "academic" GPA. It should be noted that the variable, value salary, has a negative relationship.

Conclusions

Question #1

This question examines the ninth grade student characteristics related to the choice of a "vocational" versus an "academic" curriculum in tenth grade. Only 4 of the 16 student characteristic variables were found to be significant at the .05 level to curriculum choice. As presented in Table 5, these four variables include: GATB aptitude verbal, value interest and satisfaction, father's occupation and the construct occupational aspiration. When MRA was undertaken with the 16 independent

variables, none of the variables possessed enough of a unique contribution to be statistically significant.

The findings for this question (Table 6) may suggest that the artificial grouping of the females into "vocational" and "academic" curriculum groups is not a realistic method for studying curriculum choice for tenth grade females. This result may be contrasted to that of Kapes (1971) who found the method to be effective for predicting curriculum choice of tenth grade boys.

Conclusions concerning the relationship between the 16 independent ninth grade variables in this study and the tenth grade curriculum choice are as follows:

1. None of the 16 independent variables were found to possess enough unique information to be significant predictors of choice between "vocational" and "academic" curriculums in tenth grade.
2. The females in this sample are different from the males in Kapes' (1971) study in that their curriculum choice may not be described by the simple dichotomy "vocational" and "academic."

Question #2

Question #2 examines the relationship between ninth grade student characteristics and tenth grade GPA for the "vocational" curriculum. Using zero-order correlation (Table 5), 14 of the 16 independent variables were found to be significantly related to the criterion "vocational" GPA. The values prestige and security were not found to have a significant relationship to the criterion. The highest zero-order correlation

of .59 was between GATB Verbal and the "vocational" GPA. The total multiple R using all 16 independent variables was equal to .69. This increase in correlation is attributed to the unique information available from the other 15 independent variables. When the restricted model was calculated, four variables were found to have a significant and unique relationship with "vocational" GPA.

A slight increase in the restricted model was noted for the proportion of variance accounted for when corrected for degrees freedom ($\bar{R}^2$). The increase from .42 to .44 is due to elimination of error associated with the variables which were excluded for the restricted model.

The variables contributing a significant amount of unique information in predicting "vocational" GPA in tenth grade were the GATB aptitudes verbal and numerical, the value interest and satisfaction, and vocational maturity. In previous studies, Samuelson (1956), the U.S. Department of Labor (1967), Jacobsen (1965), Ingersol and Peters (1966), Impellitteri and Kapes (1969), the GATB aptitudes have been found to be effective predictors of vocational "shop" success. It should be noted that the aptitudes verbal and numerical are also good predictors of "academic" success. Kapes (1971) found GATB verbal and numerical, and the value prestige to be significant predictors of GPA for vocational boys. The females who value interest and satisfaction in work and who are more vocationally mature are more likely to succeed in the "vocational" program. The males who have a low value of prestige are more likely to succeed in the vocational program (Kapes, 1971). This difference corresponds with Gribbons and Lohnes (1965) findings that boys value prestige more than girls do. The "vocational" female student in this sample may

be more like typical college bound students than noncollege bound students. Stefflre (1959) found college aspirants valued self-realization while noncollege aspirants valued salary and prestige. The "vocational" girls value of interesting and satisfying work over salary and prestige may indicate their similarity to those Stefflre (1959) found who aspired to enter college.

Conclusions concerning the relationship between the 16 independent ninth grade variables used in the study and tenth grade "vocational" GPA are as follows:

1. While 14 of the variables correlated significantly with the criterion, all of the variables taken together account for 42 percent of the variance associated with "vocational" GPA, and four of the variables possess most of the unique information available from the initial 16 variables.
2. All of the GATB variables are positively related to "vocational" GPA, but the aptitudes verbal and numerical account for most of the information available from the total eight variables.
3. The value interest and satisfaction, and vocational maturity contained enough unique information to warrant selection for use in addition to the GATB variables verbal and numerical.
4. The "vocational" females may be more like college bound students than noncollege bound students.
5. Success in the "vocational" curriculum is much less predictable than success in the "academic" curriculum.

6. The successful vocational males appear to value prestige more than the successful vocational females value prestige.

Question #3

Question #3 is concerned with the relationship between ninth grade student characteristics and tenth grade GPA for the "academic" curriculum. Examining the zero-order correlations in Table 5, it can be seen that 14 of the 16 independent variables are significantly related to the criterion "academic" GPA. The values prestige and security were not found to have a significant relationship to the criterion. The same 14 variables were found to be significantly related to the criterion variable for the "vocational" and "academic" groups. The highest zero-order correlation of .64 was between the GATB aptitude verbal and the variable "academic" GPA. The total multiple R using all 16 independent variables was equal to .76. This increase in correlation is attributed to the unique information available from the other 15 independent variables.

When the restricted model was calculated, five variables possessed a significant and unique relationship with "academic" GPA. The proportion of variance accounted for when corrected for degrees of freedom ($\bar{R}^2$) in the restricted model was equal to .55 which is roughly the same as ($\bar{R}^2$) in the full model.

The variables which were found to contribute a significant amount of unique information in predicting "academic" GPA in tenth grade include the GATB variables verbal and numerical, and vocational maturity which agrees with the findings for the "vocational" curriculum. The value salary and father's education were significant for the "academic" curriculum but not for the "vocational" curriculum. The GATB variables

verbal and numerical have been shown to be good predictors of academic success by Samuelson (1956), U.S. Department of Labor (1967), Jacobsen (1965), Ingersol and Peters (1966), and Kapes (1971). The results of this study agree with Kapes' (1971) findings in that the remaining GATB variables were not found to be good predictors of "academic" GPA.

Kapes (1971) found the variable vocational maturity to be predictive of academic success while Pucel, et al. (1970) found the same true for vocational success. This study of females has found vocational maturity to be predictive of success in both "vocational" and "academic" curriculums.

The variable father's education was retained as a predictor of "academic" GPA. However, this was not the case for the "vocational" curriculum. These findings correspond to those described by Kapes (1971) for his male sample. The value salary was retained as a unique predictor of "academic" GPA. This variable has a negative relationship to the criterion and is unique to the "academic" group. The value of salary and prestige was found among noncollege aspirants by Stefflre (1959). The "academic" students in this sample may resemble more closely those who do not typically aspire to attend college.

Conclusions concerning the relationship between the 16 independent ninth grade variables used in this study and tenth grade "academic" GPA are as follows:

1. Although 14 of the variables correlate significantly with the criterion, only five of the variables are necessary to account for most of the explainable variance and these five variables account for 55 percent of the variance associated with "academic" GPA.

2. While all of the GATB variables are positively related to "academic" GPA, only aptitudes verbal and numerical are necessary to provide most of the unique information contained in all eight variables.
3. Vocational maturity and father's education variables were found to be predictive of "academic" GPA and this finding corresponds to that of Kapes (1971) study for male academic students.
4. The value salary is negatively related to the criterion and has been retained as a predictor of "academic" GPA. This finding may suggest that the "academic" group is more like those not aspiring to attend college as described in Stefflre's (1959) study.
5. Success in the "academic" curriculum is more predictable than success in the "vocational" curriculum.

Question #4

Question #4 asks what characteristics of ninth grade females differentiate among four tenth grade groups: successful "vocational," unsuccessful "vocational," successful "academic," and unsuccessful "academic." Preliminary computation of a one-way ANOV for each variable indicated that 12 of the 16 independent variables differentiate among the four groups. The four variables excluded are: the GATB aptitudes P-form perception, M-manual dexterity, values prestige and security. MDFA was undertaken and by this method of combining the information about curriculum selection and success one significant DF was found. By examining the correlations between the DF and each of the 16 independent variables,

it was decided to name DF I, Socio-Economic. DF II and III were not found to be significant and were not named.

When the DF's were used to classify the sample into one of the four groups it was found that successful "academics" were most correctly classified (75%) while successful "vocationals" were the least correctly classified (20%). The unsuccessful "academic" group was 59% correctly classified and the unsuccessful "vocational" group was only 25% correctly classified. Those students included in the "academic" curriculum are most often correctly classified. The students included in the "vocational" curriculum were most often incorrectly classified as successful or unsuccessful "academic" students. This finding is somewhat an artifact of the larger N for the academic group.

Conclusions concerning which ninth grade variables differentiate among successful and unsuccessful "vocational" and "academic" students are as follows:

1. Of the 16 independent variables included in this study 12 significantly discriminate among the four groups.
2. Examination of the classification data indicates that approximately 50% of the "vocational" students are incorrectly classified. This finding indicates the ineffectiveness of the dichotomous artificial curriculum grouping.
3. The majority of the "academic" students appear to be correctly classified as academic students.

Question #5

Question #5 asks what characteristics of ninth grade females differentiate among the following four tenth grade groups: academic

stenographic, academic business, and home economics. This item is similar to question #4 except the groups are comprised of students who actually selected the named curriculum with no artificial grouping utilized. Preliminary computation of a one-way ANOV for each variable indicates that 7 of the 16 independent variables significantly differentiate among the four groups. These variables include the GATB aptitudes V, N, S and K, value salary, vocational maturity, and occupational aspiration. MDFA was undertaken and by combining the available information about curriculum selection and success one significant DF was found. By examining the correlations between the DF and each of the independent variables, it was decided to name DF I, Cognitive - Socio-Economic. DF II and III were not found to be significant and were not named.

When the DF's were used to classify the sample into one of the four groups, it was found that Group 1 was 82% correctly classified. Group 2 was 72% incorrectly classified as academics. Groups 3 and 4 were 42% and 46% incorrectly classified as academics respectively. The similarity of the groups is markedly in favor of classification of the majority of the four groups as academic students. These findings correspond very closely to those for question #4 which included the total sample.

Conclusions concerning which ninth grade variables differentiate among academic, stenographic, academic business and home economics students are as follows:

1. Of the 16 independent variables used for this study, 7 significantly discriminate among the four curriculum groups.
2. Examination of the classification data indicates that the majority of the students in all three groups,

excluding academic, are incorrectly classified as academic students.

3. A large majority (82%) of the academic students appear to be correctly classified.

Question #6

Question #6 asks what characteristics of ninth grade females differentiate among the following eight groups: successful academic, unsuccessful academic, successful stenographic, unsuccessful stenographic, successful academic business, unsuccessful academic business, successful home economics, and unsuccessful home economics. Preliminary computation of a one-way ANOV for each variable indicates that 11 of the 16 independent variables differentiate among the eight groups. The GATB variables P, Q, and M, value security, and father's occupational level did not significantly discriminate among the groups. MDFA was undertaken and two significant DF's were found. By examining the correlations between the DF's and each of the 16 independent variables, it was decided to name DF I, Cognitive - Vocational Maturity and DF II was named Interest and Satisfaction versus Status and Security. The remaining DF's were not found to be significant and were not named.

The DF's were used to classify students into one of eight groups. It was found that the four groups having the highest percent correctly classified were: successful academic (69%), unsuccessful academic (51%), successful academic business (47%), and unsuccessful home economics (42%). The remaining four groups had a much smaller percent correctly classified. With the exception of the successful academic business, unsuccessful home economics, and the successful and unsuccessful academic, all groups had

more than 50 percent incorrectly classified into one of the academic groups. The academic students, whether successful or unsuccessful, are at least correctly classified in one of the academic groups. This again, is partly due to unequal N's among groups.

A plot (Figure 3) of the eight group centroids illustrates that DF I represents successful academic business, unsuccessful stenographic, and unsuccessful academic as being similar while there is a noticeable difference between all of the other groups for this function. DF II represents unsuccessful home economics, unsuccessful academic business, unsuccessful academic, and successful academic as similar while unsuccessful and successful stenographic are similar for this function. The successful academic business and the successful home economics groups are quite different from each other and from all other groups for DF II. The low group for both DF's was unsuccessful home economics. The high group for DF I was successful academic and for DF II successful academic business.

Transposing DF I into unique and discriminating student characteristics, it appears that successful academic, successful stenographic, and successful home economics students score higher in verbal and numerical aptitudes and are more vocationally mature than the other students in this sample. The successful academic business, unsuccessful stenographic, and unsuccessful academic score lower on verbal and numerical aptitudes and are less vocationally mature than the first three groups just mentioned. Unsuccessful home economics and unsuccessful academic business groups score lowest on verbal and numerical aptitudes and are the least vocationally mature persons in the sample. From DF II it appears that unsuccessful home economics, unsuccessful academic

business, unsuccessful academic, and successful academic students place a low value on interesting and satisfying work while they value status and security quite high. The successful and unsuccessful stenographic students scored only slightly higher on DF II, but not enough to distinguish them from the previous mentioned group. Successful home economics students value interesting and satisfying work, status and security rather moderately. The successful academic business students socred quite high on DF II which is characterized as placing a very low value on status and security and a high value on interest and satisfaction in work.

Considering both DF I and II simultaneously (Figure 3), there are five basic clusters, which include one or more groups. The five clusters include unsuccessful home economics and unsuccessful academic business in one; unsuccessful academic and unsuccessful stenographic in another; a third cluster includes successful home economics and successful stenographic; successful academic may be considered a fourth cluster; and successful academic business is the fifth cluster. Among these clusters there seems to be little if any evidence of the career-marriage dichotomy as researched by many who study females. The three stages suggested by Matthews (1963) may exist if we may assume that all the female students are not experiencing the same stage at the same period of time.

The socialization process is evident in career choice especially the orientation of the mother toward "instrumental" as opposed to "expressive" occupational roles (Risch and Beymer, 1967). The effect of socialization is also evident in curriculum selection and success if we compare loosely the five clusters described above. Those among the unsuccessful home economics - academic business cluster, who come

from an environment which may retard the development of cognitive skills and vocational maturity while emphasizing the importance of status and security as opposed to interesting and satisfying work, may have some difficulty making a rational career choice. Over time these female students may choose the role of wife and homemaker more by default than by preference. The unsuccessful attempt to select and prepare for a career leaves the alternative of wife and mother. By comparison the successful academic cluster may have received a different socialization experience. Cognitive skills and the degree of vocational maturity are very high. The high value of status and security may lead to a motivated effort to select, train, and pursue a career. The choice of a career which would satisfy the demand for status and security certainly seems more realistic for this group than those included in cluster one. The emphasis of this paper is curriculum choice and success in the chosen curriculum. However, these findings may suggest some basic differences in females which affect career choice.

Conclusions concerning which ninth grade variables simultaneously differentiate among successful and unsuccessful academic, stenographic, academic business, and home economics students are as follows:

1. Prediction of group belongingness, in terms of successful and unsuccessful membership, using the student characteristics employed in this study, is possible and perhaps very useful for curriculum planning and career guidance.
2. Of the 16 independent variables used in this study, 11 variables significantly discriminate among the eight groups.

3. There is no apparent pattern of curriculum choice based on the dichotomous notion of career preparation versus wife-homemaker.
4. Females group themselves differently by curriculum other than the artificial dichotomy of "vocational" versus "academic" used by Kapes (1971) and in question numbers 1-4 of this study.

Implications

Super's Theory

The findings of this study are supportive of Super's theory as presented in his basic propositions (Super, et al., 1957). The females in this study do differ by interest, abilities, and personality. These differences and the general nature of the preparation and training resulting from the nonvocational curriculum choices of the females may equip each person for a number of low skill occupations. The proposition that each occupation can accommodate a variety of individuals may be supported if one considers the nontechnical nature of the occupations available to the females. Choice and adjustment, as is the concept of life stages, seems evident for the females in this study. The influences on the career pattern seems valid, however, the pattern for females and males may be quite different. The aid to vocational development by motivation, reality testing, and self-concept development is evident. The problem of self-concept development for females was observed by Komarovski as early as 1942. The compromise concept must be evident if the change or dual role of the female is considered. Work and life satisfaction are dependent upon congruency of the individual and her

circumstances seems a reasonable explanation of satisfaction. There may be more dissatisfaction among the females than males because of the choices available and the lack of preparation for careers.

Due to the vagueness of the tie between the findings of this study and Super's theory, the major contribution toward his work may be the suggestion that a special theory is required for females. This point has been made by Roe (1956), Holland (1966), Cooley and Lohnes (1968), and Zytowsky (1969).

Cooley and Lohnes

The dichotomous choice described by Cooley and Lohnes (1968) "Career Development Tree" is not supported by this study in the curriculum choice dichotomy of "academic" versus "vocational." The same variables were used in this female study as were used in Kapes' (1971) study of males and the dichotomous choice of vocational versus academic curriculum appears to be descriptive of the males.

For the females, when analysis was made for the actual curriculum, it was found that the various curriculum groups differ and the concept presented by Cooley and Lohnes (1968) and also by Kapes (1971) was not valid for the females in this sample.

Zytowski's Theory

In March, 1969, Zytowski published his theory dealing with the career development of women. The nine postulates as he presented them are included in Chapter II of this paper and will not be reproduced here. Implications for Zytowski's theory of career development for women are evident in the finding of this study, but are not all supportive in nature.

No implications may be drawn from this study concerning the model role of women (I). The static nature of the female role is questioned (II). The findings for the females in this study do not indicate that the females curriculum choice, based on the ninth grade student characteristic variables, is approaching similarity with those in Kapes' (1971) study of ninth grade males. The orderly and developmental concept (III) may exist for females but may not be as orderly and predictable for females as for males. No support is available from the findings concerning the exclusiveness of the homemaker versus the vocational roles (IV). This may be due to the nature of the curriculums available to the females in the sample. No implications may be drawn for postulates V, VI, and VII. The motivational factor of vocational choice (VIII) may affect curriculum choice assuming that there are reasonable alternatives among the curriculums available. An example of choice involving motivation may exist for the successful academic group as evidenced by their high value of status and security accompanied by high cognitive ability and vocational maturity. It seems that the factors of ability, environment and preference (IX) may have some effect on curriculum choice and success. These outcomes obviously will affect vocational participation.

Recommendations

This investigation has provided some answers to a number of specific questions in addition to other findings of interest to vocational development researchers, educators, and career guidance personnel. Based on the findings of this research, a number of implications have emerged which suggest a possible change in current educational practices as well as leading to recommendations for further research.

1. It is recommended that a similar study be replicated with another group of ninth grade females in another school and community setting where the curriculum choices available to the females include more vocational oriented options. Only in this way will the difference in female and male curriculum choice and success presented in this paper be adequately examined.
2. The relationship between the student's ninth grade characteristics and group membership and success should be investigated for possible affect on future choice, success and satisfaction. Possible times may include: ninth grade, during high school, one year after high school, and five years after high school.
3. The socialization effect should be accounted for in future research dealing with females. This would perhaps provide explanation for the basic differences in the five clusters of the eight groups presented in Figure 3.
4. Presently, female high school students appear to differ from male high school students in terms of the characteristics which are related to their curriculum choice. Also, the manner in which female curriculum choices are made appear to differ from the male choice pattern with the simple dichotomy of academic versus vocational being inadequate to describe female choices.
5. The investigation of these findings to detect elements applicable to curriculum improvement and career planning should be undertaken. A study of the career

advising practices for females should be made. The complex nature of the decision for the female may warrant special information and techniques.

6. Additional research should be initiated to test postulate II in Zytowski's theory. It should be determined if the nature of the woman's role is changing such that it will ultimately bear no distinction from that of men.

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