# THE USE OF SELF-ESTIMATES OF ABILITY AND MEASURES OF ABILITY IN THE PREDICTION OF ACADEMIC PERFORMANCE

By

COLLIN WELDON BOWEN

Bachelor of Arts
Southeastern State College
Durant, Oklahoma
1951

Master of Teaching
Southeastern State College
Durant, Oklahoma
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Thesis Approved:

Wm P. Ewens
Thesis Adviser

Bernard R. Belden

Charles E. Larsen

Clayton A. Morgan

N Durham
Dean of the Graduate College

688219

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# CHAPTER I

# THE PROBLEM

## Introduction

One of the most crucial problems in education is the failure of so many students to fulfill their potentialities for academic achievement. Zeran and Riccio (1962, p. 1) point out the loss to both society and the individual.

> A dynamic society demands an educational environment and a program which affords all boys and girls the opportunity to develop to their optimum. It also demands that they utilize their potentials to the benefit of themselves and of society.

The view that the goal of education is to develop individual potentialities of students, and that potentialities may vary from student to student, is quite pervasive. In fact, the structure of education in the United States seems to have been developed around the concept of individual differences in ability to learn. These differences in ability may be viewed as resulting from innate factors, environmental inadequacies, or some combination or interaction of these causes. Nevertheless, differences in developed ability to learn or readiness for particular educational experiences are viewed as having great significance for the organization of our educational efforts. Homogeneous grouping in elementary school, the track system in secondary education, the development of the comprehensive high school, selective college admission based on examinations, nation-wide searches for talent such as Project Talent and the National Merit Scholarship examinations, and the development of special education classes for the mentally handicapped are all based, at least in part, on the importance attached to individual differences in ability to learn and readiness for learning.

Traditional views about the appropriate handling of individual differences in ability are being challenged by a very significant trend in American society, the demand for higher levels of education. The twentieth century has seen an ever increasing proportion of our young people attending and graduating from high school. The trend in relation to college has been similar. Changes in our society and occupational structure have created a seemingly insatiable demand for well-educated people. Not only a general upgrading of the educational level of the population is demanded. As Brookover (1962) has pointed out, there is a concurrent need to have a larger proportion of the total population educated to a high level, with a smaller proportion educated at lower levels. Much of the pressure upon the American educational system in recent years has been generated by the need to educate all of our people to a relatively higher level and to prepare a greater proportion of our population for high level occupational performance. To this source can be traced campaigns to increase the holding power of high schools, to provide better vocational-technical education, and to overcome the effects of cultural deprivation.

The needs of our society and the structure of our educational system point to the necessity of being able to identify the potentialities of students. If our educational system, as now organized, is to function efficiently, students must be placed for differential educational treatment. If the need of our society for an ever increasing number of highly educated people is to be met, improved methods of identifying and preparing the potentially able must be found. As students face the many choice points in an increasingly complicated educational structure and occupational world, they must have as much understanding of their potentialities as possible. Otherwise, they will not be able to develop realistic aspirations and make wise decisions. To meet the foregoing needs, ability testing has become an important instrumentality.

The widespread use now made of ability testing is phenomenal. On the basis of information provided in an American Textbook Publishers report, Goslin (1963, p. 54) estimated the extent of ability testing. "A conservative estimate based on this report, however, indicates that more than 100 million commercially produced ability tests were administered in 1961." That there is justification for the extensive use of ability tests is pointed out by Cronbach (1960, p. 157).

> Despite the overenthusiasm and occasional errors that have attended its development, the general mental test stands today as the most important single contribution of psychology to the practical guidance of human affairs.

While Cronbach is referring to general ability tests, his statement may be considered as accurately summarizing the present capabilities of all types of ability measurement. McNemar (1964) has assessed the performance of differential ability tests and found them, in general, to not be superior to general ability tests for predicting academic performance.

The crucial characteristic of an ability test is its predictive validity. Ordinarily, the test is used for the purpose of making statements about the predicted future performance of the person taking the test. In his consideration of the social perspective of standardized testing, Goslin (1963, p. 153) states, "The ultimate test of a test, therefore, is its usefulness in predicting behavior at some future point in time." The tribute that Cronbach paid to ability testing would not be deserved if there were no relationship between measured academic aptitude and academic performance. However, the relationship between measured academic aptitude and academic performance is well established. Lavin (1965, p. 56), in a recent extensive review of the literature dealing with the prediction of academic performance, states, "These studies suggest that for the high school level, ability and grades are correlated at about .60." Lavin (p. 57) also identifies the best predictors and statistical procedure at the present time.

> The research shows that the best predictions are obtained from multiple correlations in which a battery of intellective variables is used to predict the overall grade point average.

Lavin concludes, however, that measures of ability account, on the average, for 35 to 45 per cent of the variance in academic performance. Thus more than half of the variance remains unexplained by current ability measures.

Considering the extent of ability testing, the fact that existing ability tests do not have higher validity for predicting academic performance presents a serious problem. Ability test scores are being used in countless administrative decisions when the scores are not highly valid. Of equal seriousness, ability test scores are being interpreted to students when the interpreter does not possess sufficiently accurate knowledge about the student's potentialities. A more adequate model and more effective techniques for predicting academic performance would seem to be urgently needed.

## Nature of the Problem

The traditional conceptualization of the problem of predicting academic performance may need to be reshaped. The usual conceptualization of the problem is as follows: The individual student possesses certain potentialities for academic performance. It is possible to gain fairly reliable and valid information about the potentialities of students by means of measures of academic aptitude. The failure of a student to fulfill the promise indicated by an academic aptitude test indicates that other, less basic, factors have interfered. Reasoning such as this has led to the formation of the concepts of underachievement and overachievement, which are defined by Davis (1964, p. 260) as follows:

> Underachievement is often described as the situation existing when a pupil performs better, relative to the average of his age or grade group, on a test of aptitude or innate capacity to learn than on an achievement test. Overachievement is often described as the situation existing when a pupil performs better, relative to the average of his age group, on a test of achievement than on a test of aptitude or innate capacity to learn.

The preceding quotation suggests the way in which the concepts of underachievement and overachievement developed. Measures of academic aptitude were considered to be tapping, with varying degrees of success, the innate capacity to learn. Thus ability measures were considered the crucial factors insofar as determinants of academic performance were concerned. They set the limits for learning. Other influences, although possibly hypothesized as intervening variables, were considered less basic. The illogical nature of the concept of overachievement should be pointed out. Obviously, one could not learn more than he has the capacity to learn. The possibility for underachievement would also disappear if there existed a perfect predictor of academic performance. The use of the traditional concepts of overachievement and underachievement point to the need for a more careful, empirical approach to the matter of predictive validity.

Cronbach (1967, pp. 23-24) has suggested a reconceptualization of the problem of predicting academic performance. He terms his approach a new psychological theory of aptitude.

> This is the approach that calls for a new psychological theory of aptitude. An aptitude, in this context, is a complex of personal characteristics that accounts for an individual's end state after a particular educational treatment, i.e., that determines what he learns, how much he learns, or how rapidly he learns. . . . Aptitude, pragmatically, includes whatever promotes the pupil's survival in a particular educational environment, and it may have as much to do with styles of thought and personality variables as with the abilities covered in conventional tests.

One advantage of Cronbach's suggested new theory of psychological aptitude is the breaking down of what may well be a false dichotomy between intellective and personality variables. However, the main advantage seems to lie in placing the search for predictors of academic performance on a sound, empirical footing.

In some respects, Cronbach's approach has been presaged by Thorndike and Wechsler. In his discussion of cognitive, conative and non-intellective intelligence, Wechsler (1950) was interested in revising the concept of general intelligence. He endorsed Thorndike's statement that there are several different kinds of intelligence, such as abstract, social and practical, although this description, to Wechsler, seemed to be only a beginning. Wechsler's (p. 651) basic thesis was "that general intelligence cannot be equated with intellectual ability however broadly defined, but must be regarded as a manifestation of the personality as a whole." This thesis, according to Wechsler (p. 652), was actually acknowledged by contemporary definitions of intelligence. "Intelligence according to these is not the ability to learn, to abstract, to profit from experience, but also to adjust and to achieve." There are two threads from the preceding quotations, ("manifestation of the personality as a whole" and "ability . . . to achieve") that seem to be quite provocative within the context of this paper, but which seemed to be largely ignored by Wechsler in his suggested approach to improving the basic validity of intelligence measurement. Wechsler viewed the traditional domain of personality as a potentially fruitful area for finding useful predictors of performance. Being properly impressed by the lessons learned from factor analysis, however, Wechsler (p. 655) pointed out that "in a perfectly factorialized correlation matrix, the sum of the factorial loadings of the extracted factors should be 100 per cent, that is, account for the total test variance." The problem seemed to be, then, a matter of identifying factors other than intellective which could be demonstrated to operate as independent variables. According to Wechsler (p. 660), these "basic components of the mind" needed to be measured and added as sub-tests of all general intelligence tests.

Cronbach's new theory of psychological aptitude agrees with Wechsler's view that factors other than those traditionally considered to be intellective in nature may well be concomitants of academic performance. However, a sharp contrast exists in terms of their respective views as to the most appropriate and fruitful approach to improving the predictive validity of traditional ability measures.

Wechsler suggests a search for basic, independent factors and implies that factor analysis may be the most useful tool. Cronbach takes a more pragmatic, empirical approach. He suggests that aptitude measurement is basically a matter of predicting performance. Cronbach implies that the construction of predictive measures may not be contingent upon the prior identification of independent factors or basic components of the mind. As was pointed out earlier, the quotations from Wechsler hint at the possibility of a holistic approach to personality assessment. In addition, Wechsler points out that a defensible concept of general intelligence must incorporate the notion of prediction of achievement.

The nature of the problem considered in this study may be summarized as follows: There is an urgent need to improve our understanding of the factors associated with academic performance. Present ability tests are useful in predicting academic performance; however, their predictive validity needs to be improved. A greater per cent of the variance in the usual criterion, academic performance, needs to be accounted for. The most fruitful approach to aptitude measurement is likely to be a pragmatic, empirical attempt to account for variance in the criterion. Authorities in the field of ability testing suggest the personality domain as a fruitful area in which to search for predictors of performance. Furthermore, a holistic approach to personality assessment, rather than a search for basic factors, seems possible.

## Statement of the Problem

The purpose of this study is to attempt to improve the prediction of academic performance. Although ability tests have not succeeded in predicting academic performance with perfection, their success has outstripped by far all other approaches. Thus, from a pragmatic standpoint, the problem becomes a matter of adding to the prediction obtained by using ability measures. A practical research strategy would seem to be a multiple correlation technique by means of which the prediction afforded by an ability measure for a specified population can first be determined. Then a measure obtained at the same time under the same conditions for a nonintellective variable can not only be analyzed to see if it possesses predictive validity for academic performance, but by multiple correlation techniques the prediction obtained by using both the ability measure and the additional measure can be determined. A measure of a nonintellective variable which does not extend the prediction obtained by an ability measure, because of overlap or inter-correlation of the intellective and nonintellective measures, would have no practical value for the prediction of academic performance.

The purpose of this study has led to an extensive review of personality theory and research. The most promising area of personality theory seems to be self-concept and social interaction theory, as developed by Mead (1934), Rogers (1951) and Snygg and Combs (1959). A promising line of research, seemingly closely related to a self-concept and social interaction theory of personality, is the use of self-estimates of ability for the prediction of academic performance and for other purposes. A detailed examination of self-concept and social interaction theory and the research on the use of self-estimates of ability will be presented in Chapter II. A scale for obtaining self-estimates of ability to do school work was developed on the basis of self-concept and social interaction theory and an examination of research on the use of self-estimates. A detailed description of the construction, tryout, and use of the self-estimate of ability scale will be presented in Chapter III. Essentially, the purpose of the study evolves into a determination of the validity of the self-estimate of ability scale for predicting academic performance. Similarly, the practical significance of the study becomes a matter of extending the predictive validity now afforded by standard ability tests.

## Hypotheses

1. There is no statistically significant relationship (.05 level, one-tail) between scores obtained on the self-estimate of ability scale and grade point average for the following groups:
    (1) The overall group under study
    (2) Subgroups formed by dividing the overall group in the following ways:
        (a) Sex
        (b) School attended
        (c) Level of academic aptitude (high, average, low)
        (d) Level of self-estimate of ability (high, average, low)
2. When the effect of academic aptitude is controlled, there is no statistically significant relationship (.05 level, one-tail) between scores obtained on the self-estimate of ability scale and grade point average for the overall group and the subgroups listed under Hypothesis No. 1.

# CHAPTER II

# REVIEW OF THE LITERATURE

## Introduction

The basic purpose of this study, as pointed out in Chapter I, is to attempt to improve the prediction of academic performance. To hypothesize that a personality measure could be constructed which would extend the prediction now afforded by intellective measures suggests the existence of knowledge about the nature of personality organization and functioning. Since, as Payne (1962, p. 773) states, "The prediction of achievement criteria with noncognitive variables has generally met with failure," the source of this knowledge must of necessity be basically theoretical. Personality measures with sufficient predictive validity to extend the existing prediction of intellective variables in a normal population have been nonexistent. Guba and Getzels (1955) have demonstrated the importance of theory in assessment. An extensive review of personality theory has suggested the possible utility of one area of theoretical development for the prediction of academic performance. This is the area of self-concept or "self" theory. More specifically, it seems possible that the student's self-concept of his ability as a school learner may influence his performance in the academic role.

A number of theorists have contributed to the development of the framework of self-concept theory. Among the prominent theorists is

George H. Mead (1934), whose symbolic interaction theory of social psychology hypothesizes that a child's self-perception is acquired during interaction with significant others who hold expectations about the nature of behavior which is considered appropriate for the child. Another prominent theorist is Carl Rogers (1951), who noted the significance of self-attitudes while researching his client-centered approach in psychotherapy. Also among the prominent theorists who further developed self-concept theory are Snygg and Combs (1959). They state that behavior is best understood as growing out of the individual subject's frame of reference and that the child learns what he perceives he is able to learn.

A line of research that seems to be closely related to the preceding theoretical framework has utilized self-estimates of ability for various purposes. Often, in these studies, the investigator has failed to make the theoretical tie-in explicit, or else has merely assumed that self-estimates of ability are tapping the self-concept in a significant manner. A major study that utilized self-estimates of ability as measures of the student's self-concept of his ability as a school learner and that was specifically designed upon the framework of self-concept theory was completed by Brookover (1963) and his co-workers. This study, which will be reviewed in detail later in this chapter, had the specific advantage of controlling for differences in measured ability. However, it possessed at least two major methodological flaws which must cause its results to be considered as tentative.

The purpose of this chapter is to present a detailed review of self-concept theory. The nature, development, and dimensions of the self-concept will be explored in the first section. The theoretical basis for the Self-Estimate of Ability to Do School Work Scale utilized in this study will be shown. Such a theoretical discussion should clarify the construct validity of the self-estimate scale. In the second section, the problems connected with utilizing self-estimates of ability will be examined both on a theoretical basis and also by reviewing research utilizing such estimates.

## Theoretical Basis for Studying the Self

The theoretical basis for this study is self-concept theory. Wrenn (1958, p. 108) points out that "there is increasing study of the self-concept in its various expressions," and that "recent self theories are operational in nature and subject to hypothesis testing." Wrenn's evaluation of the state of self theory and research is especially pertinent:

> Some excellent and serious research has been consummated. They present exciting new vistas for study and for the application of the self-concept phenomenon to counseling.

Much of contemporary theorizing about the self derives directly from William James, as Hall and Lindzey (1957, p. 467) point out:

> James defined the self or the Empirical Me in its most general sense as the sum total of all that a man can call his - his body, traits, and abilities; his material possessions; his family, friends, and enemies; his vocation and avocations and much else.

Kinch (1963, p. 481) provides a more contemporary as well as shorter definition of the self-concept as simply "that organization of qualities that the individual attributes to himself."

The terms "self" and "self-concept" are often used interchangeably. Hall and Lindzey (p. 468) state that among self theorists the term "self" has come to have two distinct meanings:

> The first meaning may be called the self-as-object definition since it denotes the person's attitudes, feelings, perceptions, and evaluations of himself as an object. In this sense, the self is what the person thinks of himself. The second meaning may be called the self-as-process definition. The self is a doer, in the sense that it consists of an active group of processes such as thinking, remembering, and perceiving.

It is the self-as-object definition that will be referred to as the self-concept.

Lundholm's useful distinction between a subjective self and an objective self is summarized by Hall and Lindzey (pp. 470-471). The subjective self is "what I think of myself" and the objective self is "what others think of me."

The social philosopher George Herbert Mead (1934) has been the most influential theorist in setting forth a conception of the self. The impact of his theory of the self upon other theorists is obvious. Mead's self is a self-as-object - as an object of awareness - rather than a system of processes. He feels that at first there is no self because a person cannot enter his own experience directly. The person is not innately self-conscious. He experiences other people as objects, but he does not initially regard himself as an object. However, other people react to the person as an object, and reactions are experienced by the person against whom they are directed. Thus, the person learns to think of himself as an object and to have attitudes and feelings about himself. He responds to himself as others respond to him. Therefore, Mead's self is a socially formed self, capable of arising only in a social setting where there is social communication. To Mead (p. 171), the developed ability to take the attitude of another is all important. "He becomes a self in so far as he can take the attitude of another and act toward himself as others act." Mead further suggests that many selves may develop, each of which represents a more or less separate set of responses acquired from different social groups. As an example, the person may develop a family self which represents a structure of attitudes expressed by his family, a school self which represents attitudes expressed by his teachers and fellow pupils, and many other selves.

Mead is well-known for his emphasis on the role that he feels "significant others" play in responding to the child. Typical of the widespread acceptance of the "significant other" concept is Coleman's (1964, p. 133) remark that "the child's self-concept is largely a reflection of the way 'significant others' react to him."

Sarbin's (1952) view of the self-structure bears many similarities to Mead's view. Sarbin looks upon the self as a cognitive structure consisting of ideas about various aspects of one's being. He agrees with Mead that there are several selves, and he regards these as substructures of the total cognitive structure. These selves are acquired through experience, consequently being labeled empirical selves. Sarbin believes that the various selves emerge in a regular developmental sequence; however, he believes that the social self emerges much later than does awareness of the bodily self.

Rogers (1951, p. 498) has placed the social self formed in interaction with others at the center of his self theory.

> As a result of interaction with the environment, and particularly as a result of evaluational interaction with others, the structure of self is formed--an organized, fluid, but consistent conceptual pattern of perceptions of characteristics and relationships of the "I" or the "me," together with values attached to these concepts.

Of particular interest is Rogers' picture of the self as possessing a strain toward organization, consistency, and conceptual patterning, although admittedly possessing a certain fluidity.

One of Rogers' students, Raimy, in his dissertation developed a construct of the self which emphasizes the perceptual frame of reference and demonstrates the significance of self-attitudes. Lowe (1961, p. 325) has summarized the contribution of Raimy:

> What Raimy called the self-concept was both a learned perceptual system functioning as an object in the perceptual field, and a complex organizing principle which schematizes on-going experience. Raimy demonstrated in his dissertation that attitudes toward the self can be found by analyzing counseling protocols, and that these self-perceiving attitudes formed a reliable index for improvement in psychotherapy.

Hilgard (1949, p. 350), who called for research on the self in his 1949 APA presidential address, stated that study of the self is essential to provide a complete understanding of the Freudian ego defense mechanisms. He points out that all of these defense mechanisms imply a self-reference.

> To feel guilty is to conceive of the self as an agent capable of good and bad choices. It thus appears that at the point that anxiety becomes infused with guilt feelings, self-reference enters. If we are to understand a person's defenses against guilt feelings, we must know something about his image of himself.

Similarly, Snygg and Combs (1959), in setting forth their conception of the phenomenal self, assert that the maintenance and enhancement of the self is the prime objective of the individual's existence. The viewpoint of Chein (1944) also largely coincides with that of Hilgard. Chein conceives of the ego as a motivational - cognitive structure which is built around the self and serves the purpose of defending, extending, enhancing and perceiving the self. When the self is endangered, the ego comes to its aid. Finally, a useful point relative to the part that the self plays in defensive behavior is stressed by Symonds (1951). The self-concept may exist in varying levels of awareness, ranging from conscious to unconscious, and conscious and unconscious evaluations do not necessarily agree.

Drawing from the preceding discussion, a theoretical basis for studying the self-concept, the self as Mead's "me," (as distinct from the self-as-process, James' "ego," Mead's "I") may be summarized as follows: There emerges out of interaction with the environment, and especially out of evaluative interaction with others, a socially formed self-as-object, a self-concept. This self-concept is composed of the person's attitudes and feelings toward and perceptions and evaluations of himself as an object. The self-concept emerges through the person's developed ability to take the attitude of another in perceiving himself. The self-concept may be regarded as an overall structure consisting of several substructures possessing a definite organization, consistency, and conceptual patterning as well as a certain fluidity. The self-concept exists in varying levels of awareness, and there is a constraining tendency to enhance or defend the self.

Drawing from the preceding theoretical discussion of the self-concept and from other sources, some observations may be made about the possibilities of studying the self-concept. These observations are listed as follows:

1. The self-as-object or self-concept may be regarded as "a developmental formation in the psychological make-up of the individual consisting of interrelated attitudes which are acquired in relation to his own body, to objects, family,

persons, groups, social values, and institutions and which define and regulate his relatedness to them in concrete situations." (Sherif and Sherif, 1956, p. 581) Therefore, self-attitudes may be studied as readily as are other attitudes.

2. Self-attitudes have all the dimensions of other attitudes, i. e., content, direction, intensity, importance, salience, consistency, stability, and clarity. (Rosenberg, 1965)
3. In addition, self-attitudes have properties that are different from other attitudes, i. e., any study dealing with a number of subjects is dealing with as many objects of attitudes as there are subjects, there is motivation for everyone to hold positive attitudes, and self-attitudes are of universal importance to the subjects, thus emphasizing the motivational-affective components of self-attitudes. (Rosenberg, 1965)
4. The judgmental-evaluational nature of self-attitudes suggests that relevant internal judgmental reference scales must be tapped to provide valid material.
5. The tendency of the self to enhance or defend itself, the tendency toward the use of defense mechanisms, perceptual defense, motivational distortion, etc. (which are ordinarily unconscious) suggest the danger inherent in accepting measures of self-attitudes at face value.
6. The desirability of comparing self-attitudes of one group with those of another group suggests the utility of structured methods of attitude study.

7. Substructures of the self seem to possess utility for studying the self, i. e., Mead's "family self" and "school self," Lundholm's "objective self" and "subjective self," Sarbin's "empirical selves," and Snygg and Combs (1959) suggestions that some perceptions of the self appear to be much more central than do others and that self-concepts vary in sharpness or clarity.
8. The use of perceptions attributed to "significant others" would seem to have distinct possibilities for tapping, in a somewhat disguised manner, relevant substructures of the self.

## Research on the Use of Self-Estimates of Ability

Rosenberg (1965, p. 15) states that "hundreds of self-concept studies have been conducted in recent years." Wylie (1963), who completed an exhaustive review of self-concept studies, points out that most of these studies were based on the assumption that differences exist in an overall or global self-evaluative attitude. While the theoretical review presented in the preceding section certainly does not rule out the possibility of using differences in overall self-evaluative attitudes for certain research purposes, it does suggest the possible utility of tapping a sub-structure of self-evaluative attitudes which might be extremely relevant for a particular purpose. The Self-Estimate of Ability to Do School Work Scale, used in this study, was developed on the premise that self-estimates of ability tap, at least to a useful extent, the student's self-concept of ability as a school learner, which, in turn, is associated with his academic performance. At this point, a review of pertinent theoretical issues and research is presented.

An important aspect of the problem examined in this study concerns the feasibility of obtaining self-estimates of ability. Obviously, the complexity of the problem involved in forming an accurate estimate is enormous. It is implied that the individual has formed some sort of psycho-social judgmental scale on which he can not only rank himself, but on which he can also rank those with whom he interacts and make comparisons of their ability with his own. The complexity of the task notwithstanding, everyone has formed many such scales on which he daily ranks and compares himself and others. Hoppock (1957) expresses confidence that the average person can successfully estimate those aptitudes in connection with which he has had opportunities to gain experience and to observe whether he does better or less well than other people. Keller and Schoenfeld (1950, p. 368) describe the formation of psycho-social judgmental scales in relation to the self as follows: "In the course of growing up, the child comes to 'know' about himself; he becomes at least partially 'aware' of his capacities and weaknesses, his likelihood of winning or losing in given situations." Wylie (1963, p. 210) discusses the process of students making self-estimates in terms of anchorages and the psycho-physical method of constant stimuli. "The child's ability (as he sees it) is analogous to the constant stimulus; and he is asked to judge whether the 'variable stimulus' is larger than the 'standard stimulus'." The somewhat ambiguous nature of the stimuli provides opportunities for motivational distortions, such as wishful thinking or self-depreciation, to affect judgment. Wylie (p. 206) points out the trend in various studies toward a self-favorability bias.

> The group trend in many studies (Green, 1948; Brandt, 1950; Froehlick and Moser, 1954; Torrance, 1954; Arsenian, 1942; Russell, 1953) has been toward self-overestimation rather than self-underestimation on socially desirable traits, and this is what one would expect if there is widespread use of the mechanism of denial.

The likelihood of motivational distortion entering into self-estimates of ability must be recognized.

A landmark study in the use of self-estimates was completed by Arsenian (1942). The rationale for the study was based on the importance of a realistic evaluation of strengths and weaknesses in connection with the decision to embark on a college career. Arsenian compared self-estimates and objective measurements for a group of 125 entering freshmen male students at Springfield (Mass.) College. Characteristics selected for study were scholastic aptitude (as measured by the _A. C. E. Psychological Examination_), achievement in common subjects (as measured by standardized tests), adjustment (as measured by the _Bell Adjustment Inventory_), and vocational interests (as measured by the _Strong Vocational Interest Blank_). Of particular relevance to this study is the comparison of self-estimates of scholastic aptitude and objective measurement results from the _A. C. E. Psychological Examination_. Students were asked to rate themselves in comparison with entering college freshmen nation-wide. Ratings were obtained on a six-point scale as follows: lowest 10%, between 10-25%, between 25-50%, between 50-75%, between 75-90%, and the top 10%. Of interest is the resemblance that such a breakdown bears to the normal curve. However, for analysis the two positions on either end of the scale were combined so that the analysis was actually carried out on the basis of quartiles. The comparison of self-ratings and A. C. E. results is presented below:

### TABLE I

### ARSENIAN'S COMPARISON OF SELF-ESTIMATES OBTAINED BEFORE TESTING AND A. C. E. PSYCHOLOGICAL EXAMINATION RESULTS

| Self-Ratings (Quartiles) | No. of Students | A. C. E. Mean | S. D. |
|---|---|---|---|
| 100-75 | 6 | 100.38 | 19.23 |
| 75-50 | 72 | 78.75 | 18.83 |
| 50-25 | 46 | 72.98 | 15.90 |
| 25-0 | 1 | 73.00 | . . . |
| | 125 | | |

Corrected Contingency Coefficient: .30

Arsenian was interested in the effect that the experience of taking the examination would have on self-ratings. Consequently, self-ratings were obtained again after the test had been administered. The results of the comparison of the second self-rating and A. C. E. Psychological Examination scores are presented below in Table II.

Arsenian concluded that a freshman's estimates of his abilities do not correspond highly with his actual possession of these attributes as measured by objective tests. However, an examination of A. C. E. means by quartiles indicates a trend toward accuracy. Of special significance is the effect of the testing experience. There was a considerable revision of self-estimates downward. As a result, there was somewhat more congruence between self-estimates and objective measurements.

### TABLE II

### ARSENIAN'S COMPARISON OF SELF-ESTIMATES OBTAINED AFTER TESTING AND A. C. E. PSYCHOLOGICAL EXAMINATION RESULTS

| Self-Ratings (Quartiles) | No. of Students | A. C. E. Mean | S. D. |
|---|---|---|---|
| 100-75 | 1 | 108.00 | . . . |
| 75-50 | 38 | 84.37 | 19.35 |
| 50-25 | 82 | 75.21 | 17.01 |
| 25-0 | 4 | 54.50 | 14.36 |
| | 125 | | |

Corrected Contingency Coefficient: .36

In interpreting Arsenian's findings, the nature of psycho-social judgmental scales formed in social interaction seems relevant. His attempt to use a self-rating scale that has some resemblance to the normal curve was not successful, with his population, in securing self-ratings at the extremes of the scale. Even after collapsing the two extreme categories on each end of the scale, practically all self-estimates, on both administrations of the self-estimate form, placed the student in either the category immediately above the 50th percentile or the category immediately below. Although on first examination the method used to analyze the data, computation of a contingency coefficient, appears to require only a gross ordering of data, in actuality a very fine discrimination would be required to obtain a substantial coefficient. To illustrate, the properties of the normal curve show that near the mean a very small change in performance (in this instance, score on the A. C. E.) is sufficient to cause a large change in percentile rank. With Arsenian's group of subjects, a large number who obtained test scores near the mean would have to make an extremely fine discrimination and successfully estimate that they were above or below the mean in order for a high contingency coefficient to be obtained. In addition, Arsenian asked his students to compare themselves with a reference group, entering college freshmen nationwide, that must have been rather nebulous for the subjects.

The implications of Arsenian's findings for the present study are substantial. His conclusion that college freshmen cannot accurately estimate their abilities may be merely an indication that his methodology — self-rating scale, reference group, and statistical methods — was not entirely appropriate. An improved procedure might obtain a higher relationship. However, the major implication for the present study seems to be that objective measures of ability and self-estimates of ability are not likely to agree perfectly. If the student's self-concept of his ability as a school learner is associated with his academic performance, the possibility seems to exist that self-estimates of ability, which presumably tap the self-concept, might contribute to an extension of the predictive validity of intellective measures.

Torrance (1954) completed a study which was evidently modeled after Arsenian's study. However, Torrance discussed the use of self-estimates in terms of self-concept theory and the self-estimates were utilized for counseling and guidance purposes throughout the freshman year. Self-estimates were obtained for 1,215 entering freshmen at Kansas State College at the beginning of the freshman orientation program and a few days later at the end of the program. Students were asked to estimate how they would stand in relation to their classmates on tests of general scholastic ability and achievement (A. C. E. Psychological Examination, Cooperative English Achievement Test, and Cooperative Reading Test). Torrance (p. 122) felt that his findings in relation to the accuracy and nature of self-evaluations essentially confirmed those of Arsenian.

> There was little relationship between self-estimates and achieved standings. For example, over 65 per cent of the total group placed themselves in the upper fourth in scholastic ability and 95 per cent placed themselves in the upper half. Among those who achieved in the bottom fourth, 62 per cent estimated that they would stand in the upper fourth and 92 per cent placed themselves in the upper half.

It should be pointed out that the social situation at the beginning of college is likely to encourage optimism and that there has been little opportunity to develop relevant psycho-social judgmental scales on which the student can compare himself with the reference group. Evidence to confirm this point was found by Torrance. His subjects, similarly to Arsenian's, revised their estimates downward after the testing and orientation period. Obtained *r*'s between self-estimates secured at the end of the orientation period and objective measurements were as follows: English achievement ($r = .349$), reading achievement ($r = .265$), quantitative ability ($r = .264$), linguistic ability ($r = .137$) and general ability ($r = .110$). More accurate evaluations were made by women than by men, but women under-evaluated themselves more frequently. Torrance concluded that the evaluation of "general ability" or "college ability" was more threatening than was the evaluation of achievement in specific areas or more specific abilities.

That entering college freshmen can make self-estimates that correlate more highly with scores obtained on the A. C. E. Psychological Examination than did Arsenian's or Torrance's groups was demonstrated by Berdie (1954). A variety of self-ratings were secured from 180 entering students at the University of Minnesota who were divided into experimental and control groups for the purpose of evaluating the effects of counseling. Only the comparison of self-ratings and objective measurements of scholastic ability is relevant to the present study. In the comparison of the initial self-ratings and the A. C. E. results for the two groups, *r*'s of .50 and .52 were obtained.

Wylie (1963) carried out a study of self-estimates of ability that is of interest, particularly when compared to the preceding studies of entering college freshmen. The students were younger — a complete junior high school population was studied. There should be a more normal distribution of ability in the junior high school population than in the typical class of college freshmen. Also, through social interaction over a period of time the junior high school students had opportunities to develop psycho-social judgmental scales on which they could rank themselves in comparison to the reference group (in this case, students in their home room). Wylie was primarily interested in making use of the self-favorability bias demonstrated in previous studies to test hypotheses concerning the effects of certain socioeconomic backgrounds which, through the process of cultural learning, might influence the student's concept of his ability to do school work. Wylie expressed the view that concepts of abilities are salient for both the culture and the individual. A total of 823 students were included in Wylie's analysis. During May, when the children had been together for a full academic year, students estimated whether or not they were in the top half of their home room class in ability, and the accuracy of their estimates was checked against scores made in the regular school testing program on the S R A Primary Mental Abilities Test. The self-favorability bias was confirmed, and, on the basis of the significance of directions of differences, boys, whites, and students whose fathers were in higher occupational levels were more self-favoring than their counterparts. Wylie felt that, on the basis of the data, the racial difference could be explained plausibly as a function of differences in the occupational levels of parents. As mentioned, the differences were all in the direction predicted, but the amount of the difference in itself was not statistically significant in any comparison. There was a tendency toward accuracy in the self-estimates, the tetrachoric r being .73. Thus, approximately 53% of the variance between test scores and self-estimates was accounted for. Although the self-estimate obtained seems to be a rather gross estimate, i. e., whether or not the student stood in the top half or bottom half of his home room in ability to do school work, the discussion previously presented in relation to Arsenian's group indicates that many of the students must make a rather fine discrimination in order for a substantial correlation to be obtained. That Wylie's young subjects were considerably more successful than Arsenian's entering college freshmen underscores the part that social interaction seems to play in forming relevant psycho-social judgmental scales in terms of a particular reference group. Also, a more normal distribution of ability in a public school population might lessen the difficulty of making accurate discriminations. Wylie (pp. 222-223) summarizes the significance of her findings as follows:

> The main findings are interesting because they support the idea that differences in cultural learning opportunities result in differences in self-concepts concerning one's intellectual abilities. These R-R findings, obtained under reasonably well-controlled conditions, are congruent with the general premise that social learning is important in self-concept development.

A recent and extensive study of self-estimates of intelligence has been carried out by Brim (1966) in connection with the Russell Sage Foundation's series of studies on the social consequences of standardized ability testing. This study has numerous advantages, among which are the following: (1) 10,000 high school students were studied, (2) careful sampling procedures were used in selecting the public school portion of the population, (3) there was an extensive study of the attitudes that students hold toward their own intelligence and intelligence testing (the review of theory presented in the preceding section of this chapter pointed to the possibility of studying self-attitudes in much the same way that other attitudes are studied), and (4) sources of information that students stated that they utilized in arriving at their self-estimates of intelligence were analyzed.

Brim (p. 65) was concerned with not only "the relationship of a person's estimate of his intelligence to his actual intelligence as measured by a standardized test," but also "in the systematic sources of high and low self-estimation." The theoretical basis for Brim's (p. 66) study is of interest:

> The significance of this study comes from the research that has demonstrated that one's level of aspiration and actual performance are influenced by his estimates of his abilities relative to others whom he has taken for comparison. The research on level of aspiration from the late 1930's to the present has demonstrated this in a variety of contexts,

> both experimental and applied, so that there is little doubt that how bright a person thinks he is relative to others competing with him influences both the goals he sets for himself and the actual quality of his performance. Therefore, a better understanding of the differences in self-estimates of intelligence, and of the social and personal sources of these differences, has immediate policy implications for guidance and counseling, and for educational systems generally.

Brim's data were collected from a questionnaire survey of nearly 10,000 tenth and twelfth grade secondary school students carried out in collaboration with Project Talent of the American Institute of Research. However, the data are not drawn from Project Talent, since a new and different survey was undertaken specifically for the purposes of Brim's research. Students participating in the survey were from 59 schools throughout the country. Forty of the schools were general high schools and were selected by quota sampling methods designed by Project Talent to yield a sample representative of varying regions, urban and rural characteristics, and income level. Ten parochial schools and nine private schools were also included in the survey. The public schools provided 5,321 of the respondents. Brim's data were presented separately so that any discrepancies by type of school would be apparent.

Three instruments were utilized in Brim's study. Self-estimates of intelligence were obtained on a six-point scale: "definitely below average," "slightly below average," "just about average," "slightly above average," "definitely above average," and "among the highest." There were two additional categories in which the student could place himself: "I have never thought about how I compare with other high school students in intelligence," and "I have thought about it, but

I really don't know how I compare with others." Six percent and ten percent, respectively, of the public school students placed themselves in these two categories. Self-estimates of intelligence were obtained in regard to two reference groups, "high school students in the United States" and "students in your own grade in your own high school." The second instrument was a 300-item questionnaire to which the student could respond to indicate attitudes, sources of information, etc. The third instrument was the Reading Comprehension Test developed by Project Talent. Norms were available for this test based on the Project Talent Population. To utilize a reading test as the criterion of intelligence seems, at first glance, to be inappropriate. However, validity data on the reading test indicates the following correlations with standard tests: Differential Aptitude Test (.78), General Aptitude Test Battery (.75), Essential High School Content Battery (.82), and Fact Battery (.80). For the purposes of the present study, the use of performance on a reading comprehension test as the criterion of intelligence presents a useful supplement to the studies that have been previously reviewed in which standard intelligence tests have been used.

The portion of Brim's findings which are relevant to the present study are reviewed below. In general, Brim's results are presented in tables in which student responses or performance by deciles are compared to self-estimates or other characteristics. Therefore, only general statements about results can be made. The typical secondary school student estimates his intelligence to be somewhat higher than that of other students in his school. Thus the self-favorability bias is again confirmed. There was a very strong relationship between reading test scores and self-estimates of intelligence. However, in the public schools, of the almost 1,500 students in the top three deciles on reading test scores, 20 percent view themselves as being only average or below average in intelligence. Although performance on the reading test tended to favor girls, boys consistently throughout all deciles gave somewhat higher self-estimations of intelligence. A comparison of tenth and twelfth grade students showed that in the top eight deciles twelfth grade students tended to make higher self-estimates of intelligence than did tenth grade students. Brim's data, on the basis of reading test scores, indicated that there was not a differential dropping-out of school by ability levels. Brim (p. 87) suggests that "one's estimates of his abilities are motivating, leading either to higher aspirations or to withdrawal from competitive situations in which ability is necessary." Although such an interpretation of his findings would seem to point to a fruitful area of research in relation to the dropout problem, Brim (p. 87) discards it and states that "the best conclusion seems to be that older students rate themselves as higher because the frame of reference has changed." Brim (p. 94) also examined self-estimates of intelligence in comparison with the father's level of education. By arranging performance on the reading test in tables by deciles, he could roughly control the ability dimension. He concluded,

> Table 7A makes it evident beyond any doubt that, within each decile grouping of respondents, those from a family where the father has been well educated are more likely to have high estimates of their intelligence.

Brim's overall conclusion in regard to social group differences in self-estimates of intelligence is that high and low self-estimates are related systematically to membership in certain groups in our society.

Brim also gathered information to study the important matter of the reliance that students place on various sources of information or feedback in deciding how much intelligence they really have. Although this self-report information might be properly regarded with some skepticism insofar as providing an adequate description of the mechanisms involved in forming self-concepts, it nevertheless is worthy of note. Brim (p. 96) describes the data gathering and classification process as follows:

> More than a dozen alternatives were offered, and in the analysis these were grouped into sources involving test results, namely, intelligence test scores or college entrance scores; marks, or being placed in special classes in schools; interpersonal sources ranging from teachers, guidance counselors, to siblings and friends; and finally, those responses in which the respondent said that he "did not know," or responded "None of these."

The analysis of student responses about preferred sources of information in forming self-estimates is summarized by Brim (pp. 96-97).

> For most students the preferred source of information about their intelligence is school grades or marks, or placement in special classes; other people's advice or appraisals come second, and reliance on tests comes about third, at the same level as does the percentage of "Don't knows" or "Some other source."

Brim's analysis indicated that brighter students did not say that they relied on test results more than did students at other levels of ability. Also, he concluded that, in general, students who stated that their preferred source of information was test scores did not make more accurate self-estimates than did those who said they utilized other sources of information. In this respect, however, the students' statements were contradicted by a further analysis comparing students who said that they had received information about test results in school with a group who said they had not received such information.

The former group tended to make more accurate self-estimates. Brim could not, however, find any indication from his data that any effects of differential feedback of information about test results could account for social group differences in high and low estimation of intelligence.

The research reviewed thus far has dealt with the relationship between self-estimates of ability and objective measurements of ability. The next study to be reviewed was carried out at Michigan State University under a cooperative research contract with the United States Office of Education and represents an attempt to utilize self-estimates of ability in the prediction of academic performance. This study, which closely resembles the present study, was conducted by Brookover, Thomas, and Paterson (1964) and was based specifically on the interactionist theories of self and role performance of G. H. Mead and C. H. Cooley. The general theory underlying the study has been stated formally by Kinch (1963, p. 481) as follows: "The individual's conception of himself emerges from social interaction and, in turn, guides or influences the behavior of the individual." In a vigorous statement setting forth postulates of a social psychological conception of classroom learning, Brookover (1959) has accepted Snygg and Combs' viewpoint that the traditional conception of intelligence has caused arbitrary limitations to be placed on potentialities for learning. Brookover, Thomas, and Paterson (p. 272) point out that "previous studies have not attempted to measure the academic ability segment of self-concept and test its relationship to achievement and to the perception of others' evaluation."

To test three major hypotheses based on their theoretical conceptions, Brookover, Thomas, and Paterson studied 1,050 seventh grade students in an urban school system. To measure self-concept of ability, or how students perceived their ability to perform in the academic setting, an eight-item Guttman scale was administered in parallel forms to measure the student's self-concept of ability in general and to measure his self-concept of ability in each of four specific subject areas — arithmetic, English, social studies, and science. Intelligence scores were obtained by using the average performance on two previous administrations, in the fourth and sixth grades, of the California Test of Mental Maturity.

The first hypothesis tested by Brookover, Thomas, and Paterson (p. 272) was: "Self-concept of ability in school is significantly and positively related to the academic performance of students even with an ability dimension controlled." (p. 272) The findings were that there is a significant and positive correlation between self-concept and grade point average. The correlation between self-concept and grade point average, for both males and females, was .57. Even with the effect of intelligence scores partialled out, self-concept and grade point average remained significantly correlated — $\underline{r}$'s were .42 for males and .39 for females. Correlations of intelligence scores and grade point average were substantial, being .61 for males and .65 for females. In addition, the inter-correlation of self-concept and intelligence scores was significant, being .46 for males and .48 for females. However, multiple correlations of self-concept scores and intelligence scores were significantly higher than any of the correlations of one variable with another. The multiple R was .69 for males and .72 for females. Stated differently, the predictive power of the multiple R, in comparison with the r between intelligence scores and grade point average, is demonstrated by the fact that 10% more variance is accounted for in the case of both males and females. Increases in variance accounted for were from 37.2% to 47.6% for males and 42.3% to 51.8% for females. The conclusion was that there is a significant relationship between self-concept and grade point average even with the "ability" factor controlled.

The second hypothesis tested in the Brookover study was that the specific subject-matter self-concept is a better predictor of achievement in that subject than is the general self-concept. A comparison of obtained correlations showed significantly higher coefficients for the correlation of specific subject matter self-concepts with grades in that subject in four of the eight comparisons. In all subjects, for both males and females, the multiple correlations of specific subject-matter self-concepts and general self-concepts with grade point average accounted for significantly more variance than did the r obtained between general self-concept and grade point average.

The third hypothesis tested in the Brookover (p. 272) study was: "Self-concept of ability is significantly and positively correlated with the evaluation that one perceives significant others to hold of one's ability." This hypothesis was tested on data from a selected sub-sample of 110 over- and under-achievers. Significant others were obtained by administering two open-ended questions and were found to be mother, father, teachers, and peers. The questions asked about the student's perception of the images of significant others were directly parallel to the questions the student had answered earlier about himself. Correlations with self-concept of ability ranged from .47 for peers' image to .55 for teachers' image. The correlation of self-concept with a composite (a sum) of the perceived evaluations of ability of all significant others was .58. In a replication of this portion of the study one year later with normally achieving eighth grade students, the investigators obtained essentially the same results. Brookover, Thomas, and Paterson concluded that their findings indicated that the self-concept may reflect a community of opinion, rather than being a reflection of a specific significant other, thus lending support to Mead's concept of the "generalized other." An overall conclusion of the Brookover study is that the self-concept is in fact a key factor in role performance.

Two basic criticisms of the Brookover study may be made. Both of these criticisms are related to the use of intelligence test scores that were obtained considerably earlier than the self-concept of ability scores. The first basic criticism is concerned with the fact that the complete school population was not studied. An examination of the official report of the research, Brookover, Paterson, and Thomas (1962), indicates that eliminations from the population studied were made for two reasons: "racial identification and incomplete or inadequate data." About 100 Negro students were not included in the study. However, Brookover, Paterson, and Thomas' (p. 19) official report states, "Inadequate school grade records and intelligence test data were the major factors in eliminating students for whom we have other data." Thus the total school population of 1,930 was reduced to the 1,050 students studied. Studies previously reviewed in this chapter indicate the importance of psycho-social judgmental scales formed in social interaction over a period of time for making accurate self-estimates of ability in comparison with a particular reference group. By studying the most stable portion of the student population, in terms of length of school attendance, biased findings might be obtained. The second basic criticism pertains to the use of the average of intelligence test scores obtained in the fourth and sixth grades for the intelligence test score, while the self-concept scores, obtained in the seventh grade, were more current. This procedure has the advantage of providing a more stable intelligence score. However, a common characteristic of ability test scores used for predictive purposes is that the most current scores possess the best predictive validity. Therefore, it seems that more conclusive results could be obtained by using self-estimates of ability and objective measurements of ability obtained concurrently on a population that more closely approximates the current school enrollment. The present study is designed to correct these basic weaknesses of the Brookover study.

The present state of knowledge in regard to the use of self-estimates of ability to predict academic performance may be summarized as follows: The existence of self-attitudes about one's ability has been adequately demonstrated in research with many groups at varying levels of maturity. The development of these self-attitudes seems to be influenced in various ways. Perceived attitudes of significant others, social interaction over a period of time in which psycho-social judgmental scales about one's self in comparison with a reference group may be formed, and feedback in the form of grades and test scores all seem to play a part. A number of personal and social background characteristics are related to the level of the self-estimate. In addition, there is the likelihood of motivational distortion. In fact, at average and below average levels of ability self-favoring estimates may be more normal than abnormal.

Previous research has demonstrated the importance of using an appropriate self-estimate scale if accurate self-estimates are to be obtained. The use of an appropriate reference group is essential. A scale possessing a number of rating positions and suggesting the nature of the normal curve distribution of ability would seem to possess value for promoting accurate discriminations in making self-estimates. Possibilities seem to exist for utilizing self-estimates of specific abilities as well as general ability and for obtaining estimates attributed to significant others as well as self to tap significant and relevant segments of the self-concept of ability.

The research that has been reviewed in this chapter emphasizes the necessity of using a multiple correlation design in research attempting to improve the predictive power now provided by standard ability tests. Empirically, the research problem becomes a matter of finding or developing a measure that correlates significantly and highly with the criterion, academic performance. In addition, the measure must possess a lower intercorrelation with the standard ability test used. To adequately test the value of instruments used in the multiple correlation, scores should be obtained concurrently. It would seem to be desirable to study the entire school population. However, sub-groups could be identified for separate study.

# CHAPTER III

# DESIGN AND METHODOLOGY

## Design of the Study

This study is correlational in design. The purpose of the study is to attempt to extend the prediction now afforded by standard academic aptitude tests. The hypotheses to be tested in the study are: (1) Does the Self-Estimate of Ability to Do School Work Scale have validity for predicting academic performance? and (2) Does this predictive validity, assuming it is found, have the power to extend the predictive validity of a standard test of academic aptitude? In order to test the hypotheses advanced, it was first necessary to determine the predictive validity of a standard academic aptitude test for the subjects of the study. It was considered desirable that the self-estimate of ability scale be administered at the same point in time as was the test of academic aptitude and under circumstances that were as similar as possible. Then not only the relationship existing between scores on the self-estimate of ability scale and academic performance could be determined, but, by multiple correlation procedures, the capacity of the self-estimate of ability scale to extend the prediction afforded by the academic aptitude test could also be determined.

The criterion of academic performance selected for the study is the student's overall grade point average for the full academic year in all non-activity type subjects. The determination of activity type subjects was based on whether or not the Oklahoma State Department of Education allowed the granting of a full unit of credit or one-half unit of credit for an hour spent each school day in the subject. While teachers' grades are often criticized as being imperfect evaluations of achievement, it should be pointed out that, insofar as an average is concerned, there should be a tendency for over-evaluations to be offset by under-evaluations. Also, in considering the school as a social situation, grades indicate the social judgments made by teachers relative to academic performance. Since teachers' grades are the commonly used evaluations of performance in schools, the use of grades as the criterion of academic performance seems justified on the basis of their practical importance.

Ninth grade students were selected as subjects for the study. One reason for the selection of the ninth grade level is that, with one exception, the studies reviewed in Chapter II utilized subjects who were in the seventh, tenth, or twelfth grades, or else were college freshmen. The exception is Wylie's (1963) study, in which an entire junior high school population was studied. The findings of the present study should complement the findings of previous studies. Another advantage of the ninth grade level is that, in Oklahoma, the curriculum at this level is very similar from school to school. Since students from more than one school are included in the study, the presence of a somewhat standardized curriculum in all of the schools is of value in reducing criterion heterogeneity.

The overall group in the study is composed of 389 subjects. These subjects represent all of the ninth grade students in three school systems who were in school on the day the measuring instruments were administered and who also completed the school year in that school. The three school systems included in the study are similar in that each school system serves a county-seat town and surrounding rural area and are located in adjacent counties in southeastern Oklahoma. Each town is the commercial center for a primarily agricultural county; however, each town has some light industry. The most noticeable difference in socio-economic characteristics is that the largest of the three school systems serves a town in which a state college is located.

The design of the study provides for the testing of the hypotheses for the overall group and for subgroups formed by dividing the overall group by sex, by school attended, by measured ability level, and by self-estimate of ability level. The theory and research reviewed in Chapter II points to the importance of making analyses for subgroups. Cultural learning may differentially influence the development of self-concepts of ability in males and females. Reference groups used in making the self-estimates of ability may vary from school to school. Motivation for over- or under-estimation in making self-estimates of ability may vary by ability level.

## Instrumentation

The _Verbal Reasoning_ and _Numerical Ability_ tests, Form A, of the _Differential Aptitude Test Battery_ were selected as the measure of academic aptitude. The combined VR + NA score was utilized. A primary consideration in the choice of a measure of academic aptitude was the predictive validity of the instrument. For the design of the study to be properly carried out, the measure selected needed to be representative of the best tests of academic aptitude available insofar as predictive validity is concerned. Anastasi (1961, p. 350) comments as follows:

> The amount of validity data available on the DAT is overwhelming, including several thousand validity coefficients. Most of these data are concerned with predictive validity in terms of high school and college achievement. Many of the coefficients are high, even with intervals as long as three years between test and criterion data.

The choice of the VR + NA score is supported by the following quotation from the _Differential Aptitude Tests Manual_ (Bennett, Seashore and Wesman, 1959, p. 77):

> A large body of experimental evidence substantiates the belief that the _DAT Verbal Reasoning_ and _Numerical Ability_ tests do, in fact, measure what is measured by intelligence and scholastic aptitude tests and are effective predictors of future academic performance. Scores earned by tenth grade students were predictive of twelfth grade performance on the _College Entrance Examination Board Scholastic Aptitude Test_ to the extent indicated by coefficients of .70 to .86; for the total graduating class, correlations with four-year average grades were .73 for boys and .71 for girls.

The reliability of the _DAT_ VR + NA score is discussed in the _Manual_ as follows (Bennett, Seashore and Wesman, 1959, p. 67):

> Estimates of the reliability of VR + NA were obtained for each grade and sex by formula. Reliability coefficients ranged from .90 to .95 and the standard error of measurement for each group was approximately 4 raw score points.

The measure utilized to obtain self-estimates of ability was developed on the basis of the theory and research reviewed in Chapter II. A sample form of the _Self-Estimate of Ability to Do School Work_ is included in the Appendix. This scale was developed in such a way that the percentage distribution of students used to describe the nine-point rating scale actually presents a stanine breakdown of the normal curve. An attempt was made to promote accurate estimates not only by presenting a rating scale with a number of rating positions but also by introducing the concept of a normal distribution of ability. The provision for estimates of numerical and verbal abilities coincides with the format of the measure of academic aptitude chosen and also represents an attempt to obtain self-estimates of ability that may be less threatening than self-estimates of general ability. The provision in the scale for self-estimates attributed to significant others also represents an attempt to reduce threat. However, the primary justification for the use of self-estimates attributed to significant others is the belief that these estimates tap, in a somewhat disguised fashion, relevant segments of the self-concept of ability. The four significant others — mother, father, teacher and friend — identified in the Brookover (1964) study were used. The directions used in administering the Self-Estimate of Ability to Do School Work Scale are included in the Appendix. A tryout of the scale and the directions was conducted using two class-size groups of tenth grade subjects. It was felt that ninth and tenth grade students would not differ greatly in ability to follow the necessary directions in completing the self-estimate form. Only two students experienced difficulty in following the directions. A check of the cumulative records for these two students revealed that they had made rather low scores on previous academic aptitude tests. The reliability of the Self-Estimate of Ability to Do School Work Scale was determined by a test-retest administration for 152 ninth grade students with an interval of four weeks intervening. The test-retest reliability coefficient was .86.

## Data Collection

The two measuring instruments used in this study were administered to the subjects in October. Timing of the administration was based on the desire to obtain the measures early in the school year. However, it was also considered desirable to provide students an opportunity to become settled in school before obtaining the measures. Measures were obtained in large group administrations requiring only two groups for test administration in each school. From two to three teachers served as proctors in each administration. Since only the students in school on the date of test administration were to be used as subjects in the study, absenteeism was checked and found to not exceed five per cent in any group. The _Self-Estimate of Ability to Do School Work Scale_ was administered first and was immediately followed by the tests of academic aptitude.

The _Verbal Reasoning_ and _Numerical Ability_ tests of the _Differential Aptitude Test Battery_ were scored in accordance with the directions in the _Manual_ (Bennett, Seashore and Wesman, 1959, pp. 18-19). These directions provide that the score for the _Verbal Reasoning_ test will be "Rights only" while the score for the _Numerical Ability_ test will be "Rights - ¼ Wrongs." The scores for the two tests were then added together to give the VR + NA score, the measure of academic aptitude used. The _Self-Estimate of Ability to Do School Work Scale_ was scored by adding together the ratings placed in each of the seven blanks for self-estimates. The self-estimates placed in each blank, in accordance with the directions for completing the form, could range from one through nine. The total score thus obtained was utilized in all analyses.

Grades for the full school year were obtained from public school officials the following June. The grade point average for each student was computed using all grades in non-activity type subjects. In accordance with state department of education regulations, each student was required to carry a minimum of four non-activity type subjects. However, many students carried more than four units of such work. Of the students who were in school on the day of the test administration in October, forty were lost from the total group of subjects because they did not complete the school year in that school.

## Statistical Procedures

In all analyses of data and tests of hypotheses, statistical procedures as described by Guilford (1965) were used. Original, ungrouped measurements were used in all statistical computations.

The first series of analyses consisted of the computation of descriptive statistics — means and standard deviations — and the setting up of frequency distributions to study the nature of the distributions obtained for the three variables in the study. These analyses were made for the overall group and the two sets of subgroups formed by dividing the overall group on the basis of sex and school attended.

The basic analyses consisted of the computation of Pearson correlation coefficients to determine the relationships existing between the two independent variables, measured academic aptitude and self-estimates of ability, and the dependent variable, grade point average, for the overall group and the four sets of subgroups. In addition, Pearson $\underline{r}$'s were computed to determine the intercorrelations existing between the two independent variables for the overall group and the four sets of subgroups. The first hypothesis was tested by referring to the table of significance of correlation coefficients at the .05

level for the appropriate degrees of freedom.

Multiple correlation coefficients were computed to determine the prediction afforded by a combination of the two independent variables for the overall group and all subgroups. To test the second hypothesis, F tests, as described by Guilford (1965, p. 403), were made to check whether or not the multiple R accounted for significantly more variance in the dependent variable than did the _r_ between the academic aptitude test and grade point average. This procedure had the effect of controlling for measured academic aptitude while testing the predictive validity of the self-estimate of ability scores. After the F values were computed, the second hypothesis was tested by referring to the F table at the .05 level for the appropriate degrees of freedom.

# CHAPTER IV

# RESULTS

## Introduction

The basic purpose of this study, as stated in Chapter I, is to attempt to improve the prediction of academic performance by extending the prediction now afforded by standard ability tests. This purpose led to the development of a self-estimate of ability scale based on self-concept theory and previous scales used in research on the use of self-estimates of ability. Two hypotheses were advanced for testing in the study: (1) Does the *Self-Estimate of Ability to Do School Work Scale* have validity for predicting academic performance? and (2) Does this predictive validity, assuming it is found, have the power to extend the predictive validity of a standard test of academic aptitude? To test these hypotheses a correlational design was adopted for the study. The hypotheses were tested for the overall group under study and for subgroups formed on the basis of sex, school attended, level of academic aptitude, and level of self-estimate of ability.

Four series of statistical analyses were carried out in accordance with the design of the study to test the hypotheses advanced. The first series of analyses consisted of an examination of the measurements and data obtained for the three variables in the study. The design of the study provided for two independent variables, a measure of academic aptitude and a measure of self-concept of ability as a learner.

The VR + NA score of the *Differential Aptitude Test Battery* was selected as the measure of academic aptitude. The *Self-Estimate of Ability to Do School Work Scale* was used to measure the second independent variable. The dependent variable in the study is academic performance. Overall grade point average for the full academic year in all non-activity type subjects was chosen as the criterion of academic performance. To carry out the examination of the measurements and data obtained for the three variables, frequency distributions were prepared, descriptive statistics were computed, and tests of significance of difference between means were made to study the nature of the distributions obtained from measurements of the two independent variables. In addition, the nature of the distribution for academic performance, as indicated by overall grade point average, was examined.

The second series of statistical analyses consisted of the computation of Pearson $r$'s to find the relationships existing between the two independent variables and the dependent variable for the overall group and the various subgroups. In addition, the inter-correlation existing between the two independent variables was found by the computation of Pearson $r$'s. Tests of significance of differences between correlation coefficients were made for the enumeration subgroups.

The third series of statistical analyses utilized multiple correlation procedures to find the prediction provided by using both independent variables to predict grade point average for the overall group and the various subgroups. To indicate the improvement in the per cent of variance accounted for in the criterion, overall grade point average in non-activity type subjects, the multiple $R^2$ was compared with the $r^2$ for the relationship between the DAT VR + NA score and grade point average.

The fourth series of statistical analyses was carried out to test the two hypotheses advanced in the study. The first hypothesis, Does the Self-Estimate of Ability to Do School Work Scale have validity for predicting academic performance?, was tested by determining whether or not the r's obtained between scores on the scale and grade point average were significantly different from zero at the .05 level. The second hypothesis, Does this predictive validity, assuming it is found, have the power to extend the predictive validity of a standard test of academic aptitude?, was tested by making F tests to determine whether or not the multiple R accounted for significantly more variance (.05 level) in the dependent variable than did the r between the academic aptitude test scores and grade point average.

The presentation of the results of the study will follow the order of the statistical analyses. In the first section, the results obtained from the measurement of the two independent variables and the distribution of grade point averages for the dependent variable will be presented. In the second section, findings provided by the computation of Pearson r's and multiple R's will be presented. The third section will report the results obtained from testing the two hypotheses advanced. The final section of the chapter will consist of a summary of the major findings.

## Measurement of Variables

The initial analyses of data consisted of an examination of the measurements and data obtained for the three variables in the study. The VR + NA score of the Differential Aptitude Test Battery was used to measure academic aptitude, one of the independent variables. The Self-Estimate of Ability to Do School Work Scale was used to measure the second independent variable, self-concept of ability as a learner. The dependent variable in the study is academic performance. Overall grade point average for the full academic year in all non-activity type subjects was chosen as the criterion of academic performance. The data obtained for the three variables are presented in separate tables in the form of frequency distributions. In addition, descriptive statistics are presented for the two independent variables.

The results obtained from the measurement of academic aptitude for the total group and subgroups formed by dividing by sex and by school attended are presented in Table III. For these subjects, the measuring instrument possessed a very satisfactory "ceiling" and a fairly adequate "floor." While the tendency for all groups is toward a normal distribution, there is some tendency for the scores to fall in the lower ranges of the distributions. Tests of the significance of differences between means were made for the male and female subgroups and the subgroups formed on the basis of school attended. The difference between the means of 30.5 for males and 28.9 for females was not significant. Two of the three possible tests between means for school subgroups were significant at the .05 level. The mean of 33.4 for School A was significantly higher than the mean of 25.2 for School B. Also, the mean of 29.9 for School C was significantly higher than the mean of 25.2 for School B. No significant difference was found between the mean of 33.4 for School A and the mean of 29.9 for School C.

## TABLE III

## GROUPED FREQUENCY DISTRIBUTION OF DAT - VR + NA SCORES

| Interval | Total Group | Males | Females | Schools A | Schools B | Schools C |
|---|---|---|---|---|---|---|
| 70 and above | 4 | 4 | - | 4 | - | - |
| 65-69 | 5 | 3 | 2 | 4 | - | 1 |
| 60-64 | 4 | 1 | 3 | 1 | 1 | 2 |
| 55-59 | 17 | 13 | 4 | 8 | 5 | 4 |
| 50-54 | 9 | 5 | 4 | 2 | 3 | 4 |
| 45-49 | 32 | 13 | 19 | 15 | 8 | 9 |
| 40-44 | 32 | 20 | 12 | 16 | 7 | 9 |
| 35-39 | 34 | 14 | 20 | 14 | 11 | 9 |
| 30-34 | 53 | 20 | 33 | 22 | 13 | 18 |
| 25-29 | 44 | 14 | 30 | 16 | 16 | 12 |
| 20-24 | 40 | 19 | 21 | 14 | 13 | 13 |
| 15-19 | 42 | 23 | 19 | 15 | 14 | 13 |
| 10-14 | 40 | 19 | 21 | 6 | 24 | 10 |
| 5-9 | 22 | 10 | 12 | 8 | 10 | 4 |
| 0-4 | 11 | 7 | 4 | 2 | 7 | 2 |
| | 389 | 185 | 204 | 147 | 132 | 110 |
| Mean* | 29.7 | 30.5 | 28.9 | 33.4[a] | 25.2[a] | 29.9[a] |
| S. D.* | 15.4 | 16.9 | 13.9 | 16.2 | 14.4 | 14.2 |

*Computed from ungrouped measurements.

[a] Significant differences (.05 level) were found between the means for Schools A and B and C and B.

The results obtained from the administration of the Self-Estimate of Ability to Do School Work Scale are presented in Table IV. The modal score for all groups fell in the interval 35-39. The mean for all groups exceeded the modal interval, typically occurring in the next higher interval, 40-44. While the distribution for each group above the modal interval bears a reasonable resemblance to the normal curve, the sparsity of scores falling below the modal interval reduces the symmetry of the distribution. Evidently the scale presented a barrier for many subjects, preventing the making of a large number of below average self-estimates of ability. Reference to the Self-Estimate of Ability to Do School Work Scale, presented in the Appendix, indicates that the modal self-estimate fell slightly above the mid-point of the scale, the interval represented by the number 5. As self-estimates ranged above that point, they declined in frequency in a manner that might be reasonably expected. The sparsity of self-estimates which would place the subject in below average categories, according to the rating scale, prevents the obtaining of a normal distribution. However, the review of research presented in Chapter II indicates that a normal distribution should not be expected. A more tenable assumption would seem to be that for normal subjects, possessing adequate self-esteem, self-estimates might be expected to range from average to various positions stated on the rating scale as above average. The results presented in Table IV indicate that the rating scale used was effective in obtaining self-estimates which dispersed subjects along the rating scale to a considerable extent. Tests of significance of differences between means were made for the male and female subgroups and the subgroups formed on the basis of school attended. The difference between

## TABLE IV

## GROUPED FREQUENCY DISTRIBUTION OF SELF-ESTIMATE OF ABILITY SCORES

| Interval | Total Group | Males | Females | Schools A | Schools B | Schools C |
|---|---|---|---|---|---|---|
| 60 and above | 16 | 7 | 9 | 12 | 4 | - |
| 55-59 | 27 | 10 | 17 | 16 | 7 | 4 |
| 50-54 | 54 | 27 | 27 | 29 | 13 | 12 |
| 45-49 | 61 | 29 | 32 | 17 | 23 | 21 |
| 40-44 | 57 | 23 | 34 | 24 | 14 | 19 |
| 35-39 | 103 | 52 | 51 | 33 | 38 | 32 |
| 30-34 | 41 | 21 | 20 | 8 | 18 | 15 |
| 25-29 | 15 | 9 | 6 | 4 | 7 | 4 |
| 20-24 | 6 | 3 | 3 | 3 | 3 | - |
| 15-19 | 5 | 2 | 3 | - | 3 | 2 |
| 14 and below | 4 | 2 | 2 | 1 | 2 | 1 |
|  | 389 | 185 | 204 | 147 | 132 | 110 |
| Mean* | 42.1 | 41.6 | 42.6 | 45.0[a] | 40.2 | 40.5 |
| S. D.* | 9.9 | 9.7 | 10.0 | 10.0 | 10.1 | 8.5 |

*Computed from ungrouped measurements.

[a] Significantly higher (.05 level) than the means for Schools B and C.

the mean of 41.6 for males and 42.6 for females was not significant. Two of the three possible tests between means for school subgroups were significant at the .05 level. The mean of 45.0 for School A was significantly higher than the mean of 40.2 for School B and the mean of

40.5 for School C. The means of 40.2 for School B and 40.5 for School C were not significantly different.

A distribution of subjects in terms of overall grade point average, the criterion of academic performance, is presented in Table V. The distribution for the total group, males and females is rather rectangular in shape. Only in the case of Schools B and C does the distribution bear a considerable resemblance to the normal curve. This frequency distribution indicates that the criterion to be predicted, academic performance as indicated by overall grade point average, is distributed in a way that is not closely similar to a normal distribution or the distributions obtained for either of the independent variables. However, similarly to the distribution observed for scores on the Self-Estimate of Ability to Do School Work Scale, the results obtained for academic performance are distributed to a considerable extent along a scale.

## Presentation of Findings

To find the relationships existing between the two independent variables and the dependent variable as well as the inter-relationship between the two independent variables, Pearson *r*'s were computed for the total group and the various subgroups. The *r*'s obtained for the overall group and the subgroups formed on the basis of enumeration data are presented in Table VI.

The *r*'s presented in the first column of Table VI indicate the relationship between the VR + NA score of the Differential Aptitude Test Battery and overall grade point average. The *r* for the relationship between academic aptitude and grade point average is .724 for the

## TABLE V

## GROUPED FREQUENCY DISTRIBUTION OF GRADE POINT AVERAGES

| Interval | Total Group | Males | Females | Schools A | Schools B | Schools C |
|---|---|---|---|---|---|---|
| 3.5-4.0 | 59 | 24 | 35 | 37 | 14 | 8 |
| 3.0-3.4 | 56 | 19 | 37 | 36 | 8 | 12 |
| 2.5-2.9 | 48 | 22 | 26 | 17 | 17 | 14 |
| 2.0-2.4 | 73 | 33 | 40 | 20 | 23 | 30 |
| 1.5-1.9 | 79 | 44 | 35 | 21 | 32 | 26 |
| 1.0-1.4 | 57 | 34 | 23 | 14 | 28 | 15 |
| .5-.9 | 11 | 6 | 5 | 2 | 5 | 4 |
| .0-.4 | 6 | 3 | 3 | - | 5 | 1 |
|  | 389 | 185 | 204 | 147 | 132 | 110 |

## TABLE VI

## CORRELATIONS BETWEEN GPA, DAT VR + NA AND SELF-ESTIMATES OF ABILITY FOR ENUMERATION GROUPS

|  | Variables Correlated |  |  |
|---|---|---|---|
|  | GPA to DAT | GPA to Self-Est. | DAT to Self-Est. |
| Total Group (N=389) | .724 | .641 | .509 |
| Males (N=185) | .752 | .697 | .590 |
| Females (N=204) | .745 | .596 | .438 |
| School A (N=147) | .739 | .718 | .625 |
| School B (N=132) | .691 | .591 | .457 |
| School C (N=110) | .710 | .468 | .293 |

total group. The *r*'s obtained for subgroups formed by dividing by sex are almost identical, being .752 for males and .745 for females. The *r*'s obtained for subgroups formed on the basis of school attended are very similar in size, being .739 for School A, .691 for School B, and .710 for School C. Tests for significance of difference between correlation coefficients found no significant differences in the *r*'s from school to school. By referring to preceding quotations in Chapters I and III (See Lavin, p. 5, and Bennett, Seashore and Wesman, p. 51), it can be determined that the *Verbal Reasoning and Numerical Ability* tests of the *Differential Aptitude Test Battery* fulfilled well the function assigned by the design of the study. For the subjects in this study, the predictive validity demonstrated by these tests can fairly safely be assumed to be representative of the best in current ability tests.

In the second column of Table VI *r*'s are presented indicating the relationship between scores obtained on the *Self-Estimate of Ability to Do School Work Scale* and overall grade point average. The *r* for the relationship between self-estimates of ability and grade point average is .641 for the total group. An *r* of .697 was obtained for the male subgroup, while the *r* for the female subgroup was .596. The difference between *r*'s obtained for the male and female subgroups was found to be significant at the .05 level. The *r*'s obtained for subgroups formed on the basis of school attended manifested a great deal of fluctuation in size. The *r* for School A was .718. The *r* for School B was lower, .591. The *r* for School C was still lower, .468. Tests for significance of difference found the *r* for each school differing significantly (.05 level) from the *r*'s for each of the other schools. With the exception of the r for School C, the relationships between self-estimates of ability and grade point average found for the total group and the various subgroups are within the range of validity coefficients reported for many tests of academic aptitude and intelligence.

The third column of Table VI presents r's indicating the inter-correlation existing between the two independent variables. For the total group, the inter-correlation is indicated by an r of .509. The inter-correlation for the male subgroup was .590, while an r of .438 was found for the female subgroup. The difference between the correlations for the male and female subgroups is significant at the .05 level. The inter-correlation for the school subgroups is represented by r's of .625 for School A, .457 for School B, and .293 for School C. Tests for significance of difference found the r for each school differing significantly (.05 level) from the r's for each of the other schools. Although the r's indicating inter-correlation fluctuate considerably from group to group, two important generalizations can be made. First, for each group the inter-correlation is smaller than the correlation between either independent variable and grade point average. Thus, the addition of either independent variable to the other in multiple correlation assures an improvement in the prediction of grade point average. The second generalization is that the magnitude of the r indicating inter-correlation varies in almost direct relation to the magnitude of the r between self-estimates of ability and grade point average. Therefore, the contribution that the correlation between self-estimates of ability and grade point average can make when added to a measure of academic aptitude in multiple correlation is not accurately reflected by the magnitude of the r between self-estimates and grade point average.

The r's obtained when the total group was divided on the basis of measurement levels for the two independent variables are presented in Table VII. The total group was first divided into three subgroups, as nearly equal in number as possible, on the basis of the DAT VR + NA score: the high DAT subgroup, the average DAT subgroup and the low DAT subgroup. The total group was next divided into subgroups, as nearly equal in number as possible, on the basis of the score obtained on the Self-Estimate of Ability to Do School Work Scale: the high self-estimate subgroup, the average self-estimate subgroup and the low self-estimate subgroup. An important limitation which reduced the size of the r's presented in Table VII is the restricted range of scores used in their computation. To indicate the extent of this restriction, the range of DAT VR + NA scores and self-estimate of ability scores applicable to each subgroup is shown in the first column of Table VII. An additional restriction is imposed by the inter-correlation of the two independent variables, which is indicated by the r of .509 shown in Table VI for the total group. The relationships found between the DAT VR + NA score and grade point average for the subgroups formed on the basis of the level of performance on the measure of academic aptitude are indicated by r's of .414 for the high DAT subgroup, .235 for the average DAT subgroup, and .296 for the low DAT subgroup. The relationship between academic aptitude and grade point average for subgroups formed on the basis of measurement level on the self-estimate of ability scale is represented by r's of .703 for the high self-estimate subgroup, .622 for the average self-estimate subgroup, and .508 for the low self-estimate subgroup. The relationships between self-estimates of ability and grade point average are indicated by r's of .612 for the high DAT subgroup, .521 for the average DAT subgroup, .362 for the low DAT subgroup, .352 for the high self-estimate subgroup, .074 for the average self-estimate subgroup, and .321 for the low self-estimate subgroup.

TABLE VII

CORRELATIONS BETWEEN GPA, DAT VR + NA AND SELF-ESTIMATES OF ABILITY FOR MEASUREMENT GROUPS

| | Range of Scores | Variables Correlated | |
|---|---|---|---|
| | | GPA to DAT | GPA to Self-Est. |
| High DAT (N=125) | 36-83 | .414 | .612 |
| Average DAT (N=138) | 21-35 | .235 | .521 |
| Low DAT (N=126) | 1-20 | .296 | .362 |
| High Self-Est. (N=132) | 47-63 | .703 | .352 |
| Avg. Self-Est. (N=125) | 38-46 | .622 | .074 |
| Low Self-Est. (N=132) | 10-37 | .508 | .321 |

To determine the extent of the relationship between the measure of academic aptitude plus self-estimates of ability and grade point average, multiple correlations were computed. The multiple R's obtained are presented for enumeration groups in Table VIII and for measurement groups in Table IX. The first column presents the $R^2$ values, which may be interpreted as the percentage of variance accounted for in the criterion, grade point averages, by the two independent variables, academic aptitude scores and self-estimate of ability scores. From 57% to 67% of the variance was accounted for in the various groups listed in Table VIII. For the total group, 62.5% of the variance was accounted for. The lower multiple R's obtained for Schools B and C had very little effect on the size of the multiple R's obtained for the total group and the male and female subgroups.

### TABLE VIII

### MULTIPLE CORRELATIONS OF GPA WITH DAT VR + NA AND SELF-ESTIMATES OF ABILITY FOR ENUMERATION GROUPS

| | $R^2$ | R |
|---|---|---|
| Total Group (N=389) | .625 | .791 |
| Males (N=185) | .666 | .816 |
| Females (N=204) | .646 | .804 |
| School A (N=147) | .654 | .809 |
| School B (N=132) | .574 | .758 |
| School C (N=110) | .579 | .761 |

The multiple correlations presented in Table IX indicate that the restrictions imposed upon the computation of r's because of restricted range did not prevent obtaining sizable multiple R's in most instances for the various measurement subgroups. In general, multiple R's are higher than the highest r for a particular subgroup in Table VII. However, it is also obvious that the categorizing on one variable, by being placed in a measurement subgroup such as high, average, or low, has almost as much effect on the size of the coefficient obtained as does the use of the actual measurements on that variable. The findings presented in Table IX also provide some insight into the interaction of the two independent variables in that higher multiple R's were

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obtained when subjects were categorized into the three self-estimate of ability subgroups than were obtained for the counterparts of these subgroups among the three DAT subgroups.

### TABLE IX

### MULTIPLE CORRELATIONS OF GPA WITH DAT VR + NA AND SELF-ESTIMATES OF ABILITY FOR MEASUREMENT GROUPS

| | $R^2$ | R |
|---|---|---|
| High DAT (N=125) | .426 | .653 |
| Average DAT (N=138) | .313 | .559 |
| Low DAT (N=126) | .198 | .445 |
| High Self-Est. (N=132) | .520 | .721 |
| Average Self-Est. (N=125) | .400 | .632 |
| Low Self-Est. (N=132) | .280 | .529 |

From a practical standpoint, the basic question to be answered in this study is: Does the use of self-estimates of ability in multiple correlation together with a standard test of academic aptitude provide more capacity for the prediction of academic performance than does the test of academic aptitude alone? The findings necessary to answer this question are presented in Table X.

The first column in Table X lists the Pearson $r$ obtained for the relationship of the DAT VR + NA score to grade point average for the total group and the various subgroups. In the second column, the $r$ in the first column has been squared to indicate the per cent of variance accounted for in the criterion, grade point average. A comparison of

## TABLE X

## IMPROVEMENT IN VARIANCE ACCOUNTED FOR BY USING SELF-ESTIMATES OF ABILITY IN MULTIPLE CORRELATION

| | *r* of GPA to DAT | $r^2$ | $R^2$ |
|---|---|---|---|
| Total Group (N=389) | .724 | .524 | .625 |
| Males (N=185) | .752 | .566 | .666 |
| Females (N=204) | .745 | .555 | .646 |
| School A (N=147) | .739 | .546 | .654 |
| School B (N=132) | .691 | .477 | .574 |
| School C (N=110) | .710 | .504 | .579 |
| High DAT (N=125) | .414 | .171 | .426 |
| Average DAT (N=138) | .235 | .055 | .313 |
| Low DAT (N=126) | .296 | .088 | .198 |
| High Self-Est. (N=132) | .703 | .494 | .520 |
| Avg. Self-Est. (N=125) | .622 | .387 | .400 |
| Low Self-Est. (N=132) | .508 | .258 | .280 |

the $r^2$ and the multiple $R^2$ listed in the third column shows the improvement in accounting for variance in the criterion in each group or subgroup afforded by using both independent variables in multiple correlation instead of using only the first independent variable, the scores obtained from the test of academic aptitude. The use of self-estimates of ability in multiple correlation provided a significant improvement (.05 level) in accounting for variance in the criterion for the overall group and all subgroups. The findings listed for the measurement subgroups in the bottom portion of the table are of value in showing relationships existing at various measurement levels for the two independent variables, although the size of the correlation coefficients has been affected by the restrictions previously discussed. The crucial findings, however, are presented in the upper portion of Table X. These findings can be summarized simply: For the overall group and for the subgroups for males, females, School A, and School B, the increase in variance accounted for is approximately 10 per cent. For School C, the increase in variance accounted for is 7.5%. The measure of academic aptitude used alone accounted for variance in the criterion ranging from approximately 48 per cent to approximately 57 per cent in the various enumeration groups. The two measures used together in multiple correlation accounted for variance in the criterion ranging from approximately 57 per cent to approximately 67 per cent in the various enumeration groups.

## Testing of Hypotheses

Two hypotheses were formulated for testing in this study and presented in Chapter I. The first hypothesis was: There is no statistically significant relationship (.05 level, one-tail) between scores obtained on the self-estimate of ability scale and grade point average for the following groups:

(1) The overall group under study

(2) Subgroups formed by dividing the overall group in the following ways:

  (a) Sex

  (b) School attended

(c) Level of academic aptitude (high, average, low)

(d) Level of self-estimate of ability (high, average, low)

To test this hypothesis, the correlation coefficients obtained between scores on the Self-Estimate of Ability to Do School Work Scale and grade point average for the overall group and the various subgroups listed above were compared with the tabled values for significance of correlation coefficients at the .05 level for the appropriate degrees of freedom. These correlation coefficients were presented in Tables VI and VII. All r's were found to be significantly different from zero at the .05 level with the exception of the average self-estimate of ability subgroup. Therefore, for the overall group and all subgroups except the average self-estimate of ability subgroup, the null hypothesis was rejected. For the average self-estimate of ability subgroup, the null hypothesis was accepted. However, the negligible correlation for the average self-estimate of ability subgroup can be attributed to the extreme restriction in the range of self-estimate of ability scores imposed by the formation of the subgroup.

The second hypothesis formulated for testing was: When the effect of academic aptitude is controlled, there is no statistically significant relationship (.05 level, one-tail) between scores obtained on the self-estimate of ability scale and grade point average for the overall group and the subgroups listed under Hypothesis No. 1. As was pointed out in Chapter III, the procedure of checking to determine whether or not the multiple R accounts for significantly more variance in the dependent variable than did the r between the academic aptitude test and grade point average has the effect of controlling for measured academic aptitude. A comparison of $R^2$ values obtained in multiple correlation and $\underline{r}^2$ values for the relationship between the DAT VR + NA score and grade point average was presented in Table X. F tests were made to test the significance of improvement in accounting for variance in the criterion for the overall group and all subgroups. Since all F tests were significant at or beyond the .05 level, the second null hypothesis was rejected for the overall group and all subgroups.

## Summary of Findings

The major findings of the study are summarized as follows:

1. The Verbal Reasoning and Numerical Ability tests of the Differential Aptitude Test Battery were an effective predictor of academic performance for the overall group and the enumeration subgroups in this study. The design of the study required a test of academic aptitude representative of the best such tests insofar as predictive validity is concerned. That requirement seems to have been met. The quotation from Lavin presented in Chapter I indicated that at the high school level ability and grades are usually correlated at about .60. The correlation between the DAT VR + NA score and grade point average was .72 for the overall group and ranged from .75 for males to .69 for School B. Variance accounted for in the criterion ranged from 57% for males to 48% for School B.
2. Scores on the Self-Estimate of Ability to Do School Work Scale were significantly and substantially correlated with academic performance. The $\underline{r}$ for the total group was .64. However, a significant difference was found between the $\underline{r}$'s for the sex subgroups: .70 for males and .60 for females. In addition,

tests for significance of differences between r's for the three school subgroups found the r for each school differing significantly from the r's for each of the other schools. The r's for schools ranged from .72 for School A to .47 for School C.

3. The inter-correlation of the two independent variables was lower for the overall group and all enumeration subgroups than was the correlation between either independent variable and grade point average. Inter-correlation for the total group was .51. There was a significant difference in inter-correlation for the two sex groups: .59 for males and .44 for females. Significant differences were found between the r obtained for each school and the r's obtained for each of the other schools. Inter-correlation for school subgroups ranged from .63 for School A to .29 for School C. There was a tendency for inter-correlation to vary in almost direct relationship with the magnitude of the correlation between scores on the self-estimate of ability scale and grade point average.

4. The multiple correlations obtained by using both independent variables to predict academic performance were a significant improvement over using only the measure of academic aptitude. The multiple R for the total group was .79. Multiple R's ranged from .76 for Schools B and C to .82 for males, accounting for from 57% to 67% of the variance in the criterion. For all groups except School C, the improvement in variance accounted for was approximately 10 per cent. For School C, there was an improvement of 7.5% in variance accounted for.

5. Correlations computed for the subgroups formed on the basis of divisions by measurement level for the two independent variables were restricted in magnitude by the restriction imposed on the range of scores and by the inter-correlation of the two independent variables. Despite these restrictions, an _r_ of .70 was obtained between the measure of academic aptitude and grade point average for the high self-estimate of ability subgroup.

# CHAPTER V

# INTERPRETATION OF RESULTS

## Summary and Conclusions

This study was developed as an attempt to improve the understanding of the concomitants of academic performance. In Chapter I, concern was expressed about the seeming failure of many students to fulfill their potentialities for academic performance. It was noted that the concept of individual differences in ability to learn was implicit in many of the structures developed in the organization of American education. However, the demands and pressures upon the educational system brought about by a complex and changing society were viewed as a challenge to the traditional conceptualization of individual differences. In order to provide well educated people in the numbers and quality demanded by our society, human resources cannot be neglected.

A society that needs to utilize its human resources efficiently needs to be able to identify the potentialities of its individual members. Similarly, individuals in a free society need to be able to make wise choices from among the educational and occupational opportunities available. In Chapter I, the use of ability testing to provide information about the potentialities of individuals was discussed. While the widespread use of ability testing seems to be justified, the desirability of improving the predictive validity of ability tests used in an educational setting was noted. In general, ability tests fail to account for slightly more than one half of the variance in a criterion of academic performance. The dangers inherent in using ability test results without an explicit statement of their limitations, due to their possessing less than perfect predictive validity, was illustrated by a review of the development of the concepts of underachievement and overachievement. Factors tapped by ability tests, since they can be measured, are likely to be viewed as the basic determinants of academic performance.

In this study, an attempt has been made to examine a concomitant of academic performance other than the factors tapped by standard ability tests. The approach toward a psychological theory of aptitude suggested by Cronbach (1967) was adopted. Cronbach's approach calls for an empirical, pragmatic attempt to account for variance in the criterion by measuring a complex of personal characteristics which can be used to predict an individual's end state after an educational treatment. In this study, overall grade point average in non-activity type subjects was adopted as a practical, socially significant criterion of academic performance.

A review of personality theory and the research on the use of self-estimates of ability suggested the possible utility of a measure which would presumably tap the subject's self-concept as a learner. Such a scale, based on a review of self-concept theory and previous research utilizing self-estimates of ability, was developed and tried out. To determine the value of the _Self-Estimate of Ability to Do School Work Scale_ for extending the validity of ability tests for the prediction of academic performance, the following research design was adopted: The _Self-Estimate of Ability to Do School Work Scale_ and a representative test of academic aptitude, the Verbal Reasoning and Numerical Ability tests of the Differential Aptitude Test Battery, were administered early in the school year to all ninth grade students in school on the testing date in three school systems. At the end of the school year, grades were obtained and the predictive capacity of each instrument was determined. In addition, the inter-correlation of the scores obtained for the two instruments was determined. Finally, multiple correlation procedures were used to determine whether or not the self-estimate of ability scale possessed the capacity to extend the predictive validity of the measure of academic aptitude.

Conclusions are based on the results obtained from testing the hypotheses advanced in the study. For the subjects included in this study, scores on the Self-Estimate of Ability to Do School Work Scale were significantly and substantially related to academic performance. However, the extent of the relationship differed significantly between the male and female subgroups. Also, there were significant differences in the extent of the relationship from school to school. The inter-correlation of the two independent variables was lower for all groups than was the correlation between either independent variable and the criterion of academic performance. Inter-correlation was significantly different for the male and female subgroups. In addition, inter-correlation was significantly different from school to school. However, inter-correlation was lower in groups in which the relationship between scores on the self-estimate of ability scale and academic performance was lower. Because of the patterning exhibited for inter-correlation, the use of scores on the Self-Estimate of Ability to Do School Work Scale together with the VR + NA scores on the Differential Aptitude

Test Battery in multiple correlation accounted for significantly more variance in the criterion than did the scores on the test of academic aptitude used alone. Variance accounted for in multiple correlation ranged from 57% to 67% in the various groups. The use of self-estimate of ability scores in multiple correlation provided an improvement in accounting for variance in the criterion of approximately 10 per cent for the total group, the male and female subgroups, and subgroups for Schools A and B. For School C, there was an improvement of 7.5% in variance accounted for. On the basis of these results, the conclusion was reached that for subjects and schools such as those used in this study, the Self-Estimate of Ability to Do School Work Scale possesses the capacity to extend the predictive validity of a standard test of academic aptitude.

Before consideration is given to the question of whether or not the conclusion reached on the basis of data collected for the subjects and schools used in this study can be generalized to other schools and other grade levels, the relationship that the findings of this study bear to previous research will be examined. Studies such as those completed by Arsenian (1942), Torrance (1954), Berdie (1954) and Wylie (1963) examined the relationship between self-estimates of ability and objective measures of ability. The conclusions reached in these studies did not agree as to the success with which students could make self-estimates of ability that closely coincide with measures of ability. They did suggest, when reviewed in connection with self-concept theory, that this lack of congruence could be used to advantage in the prediction of academic performance. The results of this study indicate the inter-correlation of self-estimates of ability and measurements obtained from a test of academic aptitude. However, the inter-correlation was low enough and varied in such a pattern that the self-estimates in each group extended the predictive validity of the measure of academic aptitude.

Wylie (1963) pointed out the trend in a number of studies toward a self-favorability bias in the making of self-estimates. This bias was again confirmed in this study by the tendency of scores to bunch above the objective mid-point of the rating scale and by the sparsity of self-estimate scores which would place the subject below the objective mid-point of the rating scale. However, the rating scale did succeed in obtaining scores that were dispersed to a considerable extent and that correlated with academic performance. Perhaps it is illogical to expect a normal distribution for such scores. However, it is not necessary from a standpoint of measuring self-attitudes to obtain a distribution of scores in which the mean coincides with the objective mid-point of the rating scale.

In Chapter III, the nature of psycho-social judgmental scales formed in social interaction was discussed extensively. Wylie (1963) found a substantial relationship between ability test scores and self-estimates of ability after junior high school students had been together in a home room for a full year. Brim (1966) found that students who had received information about test results made more accurate self-estimates of ability, in comparison to objective measurements, than did students who had not received test results. Perhaps these findings have some value for interpreting the wide fluctuations found in the inter-correlation of the two independent variables from school to school. These inter-correlations were found to vary almost directly with the size of the correlation coefficient between self-estimates of ability and grade point average. Therefore, their variation did not appreciably affect the contribution that self-estimates of ability made in multiple correlation to the prediction of academic performance.

Torrance (1954) found his female subjects making more objectively accurate evaluations than did the males. Wylie (1963) found her male subjects more self-favoring than females. In the present study, the inter-correlations between self-estimates of ability and the academic aptitude test scores were .59 for males and .44 for females. Therefore, the results of the present study contradict the findings of Torrance and Wylie. In addition, the highest multiple R, .82, was found for the male group in this study.

The relationship between the findings of the present study and the findings of the study completed by Brookover, Thomas, and Paterson (1964) are of special significance. As was pointed out in Chapter II, the two studies are similar in design. However, the present study was designed to overcome what were considered to be two basic flaws in the Brookover study: (1) the use as subjects of only slightly more than one-half of the seventh grade students in the schools included in the study and (2) the use of an average of intelligence test scores obtained at a point in time considerably earlier, when the subjects were in the fourth and sixth grades, than were the self-estimates of ability. The Brookover study found a correlation between self-concept of ability and grade point average of .57 for both males and females. The present study found a correlation between self-estimates of ability and grade point average of .70 for males and .60 for females, with the correlation for the total group being .64. The Brookover study found a correlation between intelligence test scores and grade point average of .61 for males and .65 for females. The present study found a correlation between academic aptitude test scores and grade point average of .75 for both males and females, with the correlation for the total group being .72. The Brookover study found that the inter-correlation between self-concept of ability and intelligence scores was .46 for males and .48 for females. In comparison, the findings in the present study for the inter-correlation of academic aptitude test scores and self-estimates of ability were .59 for males and .44 for females, with the inter-correlation for the total group being .51. An important result of the Brookover study was that multiple correlations of self-concept scores and intelligence scores with grade point average obtained a multiple R of .69 for males and .72 for females. In the present study, multiple R's for the two independent variables correlated with grade point average were .82 for males, .80 for females, and .79 for the total group. The multiple R's in the Brookover study accounted for approximately 10 per cent more variance in the criterion for both males and females than did intelligence test scores alone. Increases in variance accounted for were from 37.2% to 47.6% for males and 42.3% to 51.8% for females. Comparable findings from the present study indicate approximately 10 per cent of additional variance was accounted for in the criterion for the total group and for males and females. Increases in variance accounted for were from 52.4% to 62.5% for the total group, from 56.6% to 66.6% for males, and from 55.5% to 64.6% for females. To summarize the comparison of findings from the Brookover study and the present study, the following points are listed:

1. A somewhat higher relationship was found between self-estimates of ability and grade point average in the present study.
2. A considerably higher relationship was found between academic aptitude scores and grade point average in the present study. In fact, the _r_'s found for this relationship were equal to or higher than the multiple R's obtained in the Brookover study. This higher predictive validity might be attributable to either the superiority of the test of academic aptitude used in this study or the fact that the scores were more current.
3. The two studies found the increases in variance accounted for in multiple correlation about the same--approximately 10 per cent in each study.

The study completed by Brim (1966), in which the Project Talent sampling procedures were used, indicated a relationship in his national sample between self-estimates of ability and performance on the _Reading Comprehension Test_ developed by Project Talent similar to that found in other studies reviewed in Chapter II. There was a tendency for high self-estimates of ability to be associated with high performance on the reading test; however, this relationship was far from perfect. Thus, the possibility seems to exist that results similar to those found in this study could be found for other groups of subjects.

The fact that the use of self-estimates of ability led to significant improvement in the prediction of academic performance in all three schools in this study supports the possible generality of the findings. This possibility receives additional support from the compatibility of the findings in this study and the Brookover study. Despite the higher predictive validity exhibited by the measure of academic aptitude used in this study, in both studies the use of self-estimates in multiple correlation accounted for approximately 10 per cent more variance in the criterion. The compatibility of the findings between the Brookover study, in which seventh grade students were subjects, and the present study, in which ninth grade students were subjects, suggests the possibility that similar results might be found at varying grade levels.

## Implications of the Study

The implications to be drawn from the findings of this study must be closely related to the theory reviewed in previous chapters. An important implication pertains to Cronbach's approach to the measurement of psychological aptitude. The findings of this study point to the utility of a pragmatic, empirical attempt to account for variance in the criterion.

A major implication is the support given by the findings of this study to a self-concept and social interaction theory of personality. Using a scale that bears a close, logical relationship to self-concept theory, attitudes toward the self were measured and their validity for predicting academic performance was demonstrated. Wylie (1963) and Brookover, Thomas, and Paterson (1964) have suggested the utility of attempting to measure a specific segment of the self-concept that may be particularly relevant to performance in a certain role. Among self theorists such as Mead (1934) and Sarbin (1952), the idea that the self system is made up of a number of substructures has received support. The results obtained with the measure of self-estimates of ability used in this study support this theoretical viewpoint. The instrument used in this study made use of self-estimates which were attributed to "significant others". The reliability and predictive validity demonstrated by the overall self-estimate scale tends to support Mead's (1934) concept of "significant others". The use of self-estimates attributed to "significant others" may have played an important role in tapping certain aspects of the self-concept of ability in a somewhat disguised manner.

That one's self-concept of his ability as a learner may play a crucial role in academic performance has been stressed by Snygg and Combs (1959) and Brookover, Thomas, and Paterson (1964). The findings of this study tend to support such a viewpoint. However, they also point to the need for retaining within a theory of aptitude the more traditional concepts of ability. A complete acceptance of self-concept theory pursued to its logical conclusion would entail discarding the more traditional theories of ability. The present state of knowledge would suggest that more would be lost than gained by such an exchange. Rather, an integration of a self-concept theory of ability into traditional theories of ability would seem to be more in accord with the findings. A satisfactory conceptualization of individual differences would seem to require a flexible and complex model. The sources of high or low self-estimations of ability may be as complex as are the sources of performance on standard intelligence tests.

The dangers inherent in attempting to literally interpret self-estimates of ability are abundantly stressed in self-concept theory. The ever-present self-favorability bias suggests the need for cautious interpretation. Hilgard (1949) pointed out that the Freudian ego defense mechanisms imply a self-reference. Snygg and Combs (1959) stressed that maintenance and enhancement of the self is a central motivation. Symonds (1951) emphasized the likelihood of unconscious evaluations of the self. Rosenberg (1965) pointed out that there is motivation for everyone to hold positive self-attitudes. Self-estimates of ability are likely to be influenced by perceptual defense and motivational distortion. All that can be established in a study such as the present study is the relationship that exists between self-estimates as obtained and performance on the criterion.

## Limitations and Recommendations

The principal limitation applicable to an interpretation of the present study is related to its correlational design. Correlational studies can only study relationships. Any cause and effect explanations growing out of such studies must of necessity be extremely tentative in nature. In addition, to have value, these explanations must be carefully and logically related to other findings on a theoretical basis.

The results of the present study must be regarded as tentative until they are found in replications with a variety of subjects and in different settings. Therefore, it is recommended that this study be replicated in other schools and at other grade levels. Replications need to include in their design provisions for studying the differences between sex groups.

Another recommendation for future research is that additional items derived from self-concept theory be tried out for use in the self-estimate of ability scale. By utilizing repeated testings together with item analysis procedures, both the reliability of the self-estimate of ability scale and its validity for predicting academic performance might be improved.

A possible area for future research is pointed out by the significant differences found from school to school in the relationship between self-estimates of ability and academic performance and the intercorrelation of the two independent variables. Differences in characteristics of the schools, the student body, and guidance programs could be studied. In addition, effects of experimental manipulation of variables such as test interpretation and counseling interviews could be examined.

A final recommendation is that continued study be given to the use of self-estimates of ability in the prediction of academic performance. The practical advantages to be derived from the use of a short, inexpensive scale are obvious. However, of greater ultimate importance is the desirability of learning more about the role that self-attitudes play as concomitants of academic performance.

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# APPENDIX

## SELF-ESTIMATE OF ABILITY TO DO SCHOOL WORK SCALE

## SELF-ESTIMATE OF ABILITY TO DO SCHOOL WORK SCALE

Name______________________________ School____________ Sex ______
(Last), (First) (Middle) M or F

Directions: Place the appropriate number from the following rating scale in the blanks at the bottom of the page.

### Rating Scale for Your Ability to Do School Work
(As Compared to Other Students)

| Distribution of Students | Rating Scale |
|---|---|
| Top 4% | 9 |
| Next 7% | 8 |
| Next 12% | 7 |
| Next 17% | 6 |
| Middle 20% | 5 |
| Next 17% | 4 |
| Next 12% | 3 |
| Next 7% | 2 |
| Bottom 4% | 1 |

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1. Your ability to do school work in which math is used . . . . ______
2. Your ability to do school work in which reading, writing, and language are used primarily . . . . . . . . . . . . . . . ______
3. Your general ability to do school work . . . . . . . . . . . ______
4. How you think your mother would rate your general ability to do school work . . . . . . . . . . . . . . . . . . ______
5. How you think your father would rate your general ability to do school work . . . . . . . . . . . . . . . . . . ______
6. How you think a teacher would rate your general ability to do school work . . . . . . . . . . . . . . . . . . ______
7. How you think a friend would rate your general ability to do school work . . . . . . . . . . . . . . . . . . ______

## Directions for Administering the Self-Estimate of Ability to Do School Work Scale

On the form now being distributed you will make estimates of your ability to do school work. Do not fill in any blanks until you are instructed to do so. (When each student has a form.) First, fill in the three blanks at the top of the form. Write your last name first, place a comma after it, and then write your first name and middle name or initial. In the blank by school, write the name of your school. In the blank by sex, place "M" or "F" to indicate your sex.

Now read the directions and glance over the rating scale. (Pause) Notice the column headed Rating Scale. You will place one of the numbers, one through nine, in each blank at the bottom of the form. When you place the number in the blank, you will be making a self-rating of your ability to do school work as compared to other students. Notice the column headed Distribution of Students. You will decide which number to use in each blank by looking at this column. For example, if you decide that you are in the bottom 4% in ability, or among the bottom 4 in 100 students, you will use the number 1 from the Rating Scale column. If you decide you are in the middle 20% in ability, or if there are as many students who are above you in ability as below you in ability, you will use the number 5 from the Rating Scale column. If you decide that you are in the top 4% in ability, or among the top 4 in 100 students, you will use the number 9 from the Rating Scale column. Before filling in each blank at the bottom of the form, you will look at the column headed Distribution of Students and decide how you stand in ability in comparison to other students. Then use the number in the Rating Scale column straight across from the group you selected. Any number from 1 through 9 may be used in each blank. Are there any questions about the way the Rating Scale works? (Pause and answer questions)

Now look at the statements at the bottom of the form. In the first blank, you will give a self-rating of your mathematical ability. In the second blank, you will give a self-rating of your reading, writing, and language ability. In the third blank, you will give a self-rating of your general or overall ability to do school work. In the last four blanks, statements Nos. 4 through 7, you will give the rating that you think other people who are important in your life would give. If your mother or father is not living, choose another adult who, in your opinion, would be most likely to fill this position in relationship to you. In making the last two ratings, think of teachers or friends in general. Are there any questions about the way ratings will be made? (Pause and answer questions)

Be as honest, accurate, and frank as possible in making the ratings. Do not discuss your ratings with anyone. Your ratings will be treated as confidential information. Take time to read each statement carefully and refer to the Rating Scale at the top of the form. However, you do not need to take a great deal of time to decide on the rating. Remember than any number from 1 through 9 may be used in any blank. As soon as you have completed all blanks, turn your form over and remain quiet. You may begin.

(When all students have stopped work) Please turn your forms over and check to see that you have a number, 1 through 9, in each blank. (Pause) Turn your forms face down and pass them in.

# VITA

Collin Weldon Bowen

Candidate for the Degree of

Doctor of Education

Thesis: THE USE OF SELF-ESTIMATES OF ABILITY AND MEASURES OF ABILITY IN THE PREDICTION OF ACADEMIC PERFORMANCE

Major Field: Student Personnel and Guidance

Biographical:

Personal Data: Born near Hendrix, Oklahoma, August 8, 1929, the son of Berlie E. and Ethel Bowen.

Education: Attended grade school and high school in Cobb, Oklahoma; graduated from Cobb High School in 1947; received the Bachelor of Arts degree from Southeastern State College, with a major in history, in May, 1951; received the Master of Teaching degree from Southeastern State College in May, 1962; completed requirements for the Doctor of Education degree at Oklahoma State University in May, 1968.

Professional Experience: Employed in administrative work by the Pure Oil Company and the Gulf Oil Corporation from 1950 through 1958; served as a unit supervisor in the Personnel Department of the Gulf Oil Corporation from 1955 through 1958; employed as a junior and senior high school teacher in the Calera Public Schools, Calera, Oklahoma from 1959 to 1961; employed as an English teacher at Durant High School, Durant, Oklahoma from 1961 to 1964; attended the 1964-65 academic year N.D.E.A. Counseling Institute at Oklahoma State University; employed as a counselor at Durant High School, Durant, Oklahoma from June, 1965 to January, 1966; served as a research assistant with the Research Foundation, School Dropout Project, Oklahoma State University, from February to June, 1966; employed as a teacher in the Department of Education and Psychology, Southeastern State College, Durant, Oklahoma since September, 1966.

Professional Organizations: American Personnel and Guidance Association, Association for Student Teaching, Oklahoma Education Association, and National Education Association.