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California psychological inventory as a variable for predicting success of public school principals in Montana

Calvin Abner Wahl

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THE CALIFORNIA PSYCHOLOGICAL INVENTORY
AS A VARIABLE FOR PREDICTING SUCCESS OF
PUBLIC SCHOOL PRINCIPALS IN MONTANA

by

CALVIN WAHL
B.S. University of Minnesota, 1961

Presented in Partial Fulfillment
of the Requirements for the Degree of
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Chairman, Board of Examiners

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O.W.
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CHAPTER I

INTRODUCTION

The problem of selecting administrators through testing is not new. In 1927 Strong developed a scale to be used with his Vocational Interest Blank for selecting city superintendents.¹ Soon afterwards, Boynton did research claiming that the key used for selecting city superintendents would not be of any value. One of his most pertinent reasons, according to Boynton, was "that the Strong norms state that which a superintendent did do, not that which the group should do."²

Since this time, many tests and batteries of tests have been experimented with to determine whether or not a certain instrument could be used to describe the administrator with the general purpose of predicting success in administration. With this purpose in mind, an onslaught of research was done to describe both the superintendent and the principal and their actions in the public school of the United States.


A typical study done to describe administrative effectiveness is "Four Criteria of Principal Effectiveness" by Borg, Burr and Silvester. The technique of this study was to code a list of administrative traits from the literature found in this area. Thirty-five studies were coded. Criterion measures of superintendent ranking, teacher rating, principal rating based on faculty meeting observations, and self ratings by the principals were compared with the traits gleaned from the literature. This comparison found nothing statistically significant. The final implication stated that studies cannot be compared with any degree of confidence because administrators are seen differently in different roles.

It was a study such as this that led Lipham to state that "in educational administration there has been a plethora of speculation and a paucity of investigation." Yet Lipham states that there is a need for behavioral research. Griffiths is in full agreement with Lipham on this point.

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5Ibid.
He states that tests aid in selection of the man or woman to fit your situation.6

Some schools are testing prospective administrators to determine if the man in question fits their situation. A school in Ohio sent hypothetical problems in administration along with their general packet of information to candidates who had applied for the school's administrative position.7

With the approach of testing prospective candidates arises another dimension for testing. This dimension is that a school administrator's main function may become that of a business manager. This may be more significant in states such as Montana where the population is comparatively sparse. Thus, the administrator is actually the manager of the "biggest business" in many communities in Montana. With the number of school districts decreasing, there will be fewer superintendents;8 with additional consolidation of school districts, school enrollments will become larger; and larger enrollments mean larger finances. In some cases the budget of the school may equal that of the rest of the en-


tire community. This may lead to more concern with who is capable of administering this large enterprise. If the increase in business managers in school systems from 1958 to 1961 (from 2700 business managers in education in 1958 to over 5000 in 1961)\(^9\) is indicative of a trend, managerial traits may be a new consideration in the field of educational administration.

With these comments and developments in mind, this thesis was designed to study public school principals in the State of Montana by using an objective instrument in an attempt to discover a new variable for predicting administrative success.

CHAPTER II

STATEMENT OF THE PROBLEM

The purpose of this study was to survey, through library research, the testing methods and tests used to describe administrator's behavior and/or traits and to discern which methods of testing and tests would be most useful in selecting administrators for training and for job situations.

It was also the purpose of this study to go outside the field of education to determine whether or not other fields are doing research in the field of selecting administrators through testing, and if so, whether or not the research done in other fields is applicable to the field of education.

A review of the literature pointed out five areas of testing most commonly used: (1) batteries of tests, (2) intelligence tests, (3) interest tests, (4) social attributes tests, and (5) psychological tests.

Of these five areas, one area that looks favorable for development is psychological testing, and the test that appears worthy of development is the California Psychological Inventory developed by Gough. This test was designed to evaluate the positive aspects of personality for social living and social interaction. Although the original key de-
veloped by Gough was not able to discriminate between effective administrators,¹ this test was used on a large industry sample; and a Managerial Key was developed for it by Goodstein and Schrader.²

It is, therefore, the purpose of this study to determine if the California Psychological Inventory can or cannot be used to predict success of administrators when it is scored with the Goodstein and Schrader Managerial Key.


CHAPTER III

ASSUMPTIONS, DELIMITATIONS, LIMITATIONS, DEFINITIONS OF TERMS

I. ASSUMPTIONS

The assumption is made that the California Psychological Inventory is a suitable instrument to measure personality traits of public school administrators. Although many personality tests are designed for mental patients, the California Psychological Inventory was designed by doing research on "normal" subjects, i.e., people not in mental hospitals. This test also uses terms referring to general social activities rather than psychopathic deviate terminology.

It is also assumed that the public school administrators, i.e., principals, taking the California Psychological Inventory will respond to the statements frankly and honestly. Frank and honest responses are the key to the validity of personality testing.

Furthermore, it is assumed that superintendents will use professional judgment in rating their principals on-the-job and that their on-the-job ratings are valid.

II. DELIMITATIONS

This study is restricted to public school principals
who have at least one year of administrative experience and who have served and are serving in an administrative capacity half-time or more. Because principals must be rated by their superintendents, beginning principals and all superintendents including those who serve in the dual role of superintendent-principal will be eliminated from the study. This study is also restricted to the geographical boundaries of the State of Montana.

III. LIMITATIONS

This study is limited because psychological tests leave much to be desired in validity and reliability.

IV. DEFINITIONS OF TERMS

Allport-Vernon-Lindzey Study of Values. The Study of Values is a scale for measuring the theoretical, economic, aesthetic, social, political and religious values in a personality.¹


Batteries of tests. Batteries of tests refers to two or more tests that cover more than one of the following areas: (1) intelligence, (2) interest, (3) social attri-
butes, and (4) psychological traits.

**California Psychological Inventory.** The California Psychological Inventory is an instrument to measure personality characteristics in terms of external references such as social class membership and prominence as a leader rather than internal references such as psychopathic deviate and schizophrenia. In this test external references refer to measured characteristics of the general public, and internal references refer to measured characteristics of patients in mental hospitals.

**Cooperative English Test C2.** The Cooperative English Test C2 measures vocabulary, and speed and level of comprehension in reading from grades eleven to sixteen.

**Edwards Personal Preference Schedule.** This schedule measures the needs variables of an individual.

**Ghiselli Self Description Inventory.** Ghiselli's Self Description Inventory is an adjective check list using adjectives descriptive of personal qualities.

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Graduate Record Examination. The Graduate Record Examination is an achievement test for students from the sophomore year of college through the graduate level.  

Guildford-Zimmerman Temperament Survey. The Temperament Survey is a personality test using such scales as general activity, restraint, friendliness, and thoughtfulness.

Intelligence. Intelligence refers to the common I.Q. (intelligence quotient) measured by testing.

Intelligence tests. Intelligence tests in this study refer to instruments used to assess mental potential in terms of I.Q.

Interest tests. Interest tests refer to instruments used to assess interest in areas such as mechanical, literary, or artistic endeavors.

Kerr-Speroff Empathy Test. The Empathy test measures the abilities of an examinee to predict the behavior of another.

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7 Ibid., pp. 132-34.
other through ranking (1) the popularity of fifteen types of music for a defined type of worker, (2) the circulation of fifteen magazines, and (3) the prevalence of ten types of annoyances.10

**Kuder Preference Record.** The Preference Record is an inventory of interests of an examinee in such areas as farmer, minister, high school counselor, and so on.11

**Managerial Key.** Managerial Key refers to a scoring system developed from the California Psychological Inventory by Goodstein and Schrader to assess managerial potential.12

**Miller Analogies Test.** The Analogies Test is designed to measure scholastic aptitude at the graduate level though complex analogies.13

**Minnesota Teacher Attitude Inventory.** The items on the Teacher Attitude Inventory measure attitudes of teachers

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10Buros, *op. cit.*, pp. 120-21.
11Ibid., pp. 884-92.
toward pupil-teacher relations.\textsuperscript{14}

\textbf{Practices and Procedures Inventory for Educators.} This inventory indicates behaviors of educators in school and near-school situations relative to Spranger's six categories of theoretical, economic, aesthetic, social, political and religious attitudes.\textsuperscript{15}

\textbf{Psychological tests.} Psychological tests refer to instruments used to assess personal traits and characteristics.

\textbf{Spranger Types of Men.} Spranger's Test measures the theoretic, economic, aesthetic, social, political, and religious attitudes of men.\textsuperscript{16}

\textbf{Strong Vocational Interest Blank.} This interest blank measures interests of an examinee in relation to interests of people successful in a certain occupation.\textsuperscript{17}

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Tests of social attributes. Tests of social attributes refer to instruments used to assess social personality and social adjustment.\(^{18}\)

Watson-Glaser Critical Thinking Appraisal. This test measures the critical thinking of students in the areas of inference, assumptions, deduction, interpretation and arguments.\(^{19}\)

Wechsler Adult Intelligence Scale. This intelligence scale is an individual scale to determine an intelligence quotient on the basis of verbal and performance scales.\(^{20}\)

Wonderlic Personnel Test. The Wonderlic Personnel Test is an intelligence test designed for use in industry.\(^{21}\)

\(^{18}\)Campbell and others, *op. cit.*, pp. 328-29.

\(^{19}\)Buros, *op. cit.*, pp. 796-99.

\(^{20}\)Ibid., pp. 548-51.

CHAPTER IV

REVIEW OF RELATED LITERATURE

Although the literature abounds with tests and surveys describing the traits of administrators, only empirical tests directly related to the study will be reviewed.

I. LITERATURE ON THE USE OF BATTERIES OF TESTS

The literature concerned with the selection of administrators through testing shows that most research is done with the use of a number of testing instruments. These may include intelligence, interest, social, or psychological tests. Most of the research is done with a large number of tests, although some researchers use no more than two tests in their battery.

Moore used the battery of tests in an effort to replace self selection in identifying future administrators. He states that many people in education feel that they wish to become administrators and do so. No one tests them to find out whether or not they will be suited for the position.¹ Some, of course, are self-eliminated through the

process of requirements set down by state officials or institutions. These are generally in terms of education. Thus, people who are not able to meet the educational requirements for one reason or another eliminate themselves from the administrative role.

Moore feels, however, that there should be a better method. This method requires the administrative candidate to take a battery of tests. This battery includes the Miller Analogies Test, the Allport-Vernon-Lindzey Study of Values, the Minnesota Teacher Attitude Inventory, a Public Opinion Questionnaire, and the Edwards Personal Preference Schedule.²

When these tests were used to compare candidates who were rejected for an educational administration program with those who were accepted, it was found that the rejected candidates were lower in intelligence, higher in prejudice and authoritarianism, and more rigid in disciplinarian techniques. The candidates who were accepted had more initiative, ambition, confidence, self-assurance and autonomy. They were also willing to move both up and geographically.³ Although no implications were made in this study, the use of

²Ibid.
³Ibid.
a number of testing variables appears to be a worthwhile step in the direction of selecting future administrators.

Gruenfeld did a study similar to Moore's in the field of personnel psychology. His company was sponsoring a Personal Development Program for its executives. Gruenfeld determined that this liberal arts program for management "demands ability to read Plato, understand the theory of evolution, and discuss the function of government and social process." Thus, it was Gruenfeld's purpose to devise a battery of tests to predict a candidate's ability to meet the standards of the program.

Gruenfeld's battery of tests consisted of five intelligence and achievement tests plus the Ghiselli Self Description Inventory. These tests were compared with the ratings of the success of the candidates by the faculty of the Personal Development Program. The Adaptability Test correlated significantly with the faculty rating. But, other combinations of predictors did not increase the efficiency of predicting success in the program.

This study from industry brings out two significant

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5 Ibid.

6 Ibid.
points. First, a wide range of liberal arts is needed by management of industry. This is also current thought of institutions that train school administrators. Thus, there is a similarity in management between the two fields, and tests used in one field might be fruitful in another. Secondly, the use of a battery of tests does not improve the capability to predict.

Moving back to the field of educational administration, Lipham points out explicitly that there are compatible personal variables in the educational role and the executive role in the field of business. To point out these factors, he studied a group of effective and ineffective principals. His battery included the Edwards Personal Preference Schedule, an adjective check list, a sentence completion test, and an individual interview. His findings show that the effective principal has a different personal construct than the ineffective principal. The effective principal liked to engage in strong and purposeful activity, was concerned with achieving success, related well to others, was secure, and had great emotional control. Thus, Lipham implied that the training programs for educational administration need to focus attention on theoretical conceptualizations and include the behavioral sciences such as psychology and sociology.7

A quick glance at the last two studies shows that two men in two separate fields, industry and education, have the same concept as to the training needs of their administrative personnel. If these are similar, can not the methods of selection for training also be similar?

Another relationship, studied by Wagner, should be brought up at this point. Using the variables of education, the Wechsler Adult Intelligence Scale, a Vocational Aptitude Exam, both the Personal and Vocational Forms of the Kuder Preference Record, and the Guilford-Zimmerman Temperament Survey, Wagner correlated the scores with a criterion of on-the-job success in administration as rated by high-ranking company officers. Of all the variables used, only two of thirty-one were correlated significantly at the .01 level of confidence. These were education and preference for familiar and stable situations. Thus, Wagner concluded that one should select from peers rather than from the broad population.8 This would apply to educational administration in the matter of choosing from the educational field rather than a population.

A study that tested peers bears out Wagner's assumption. Mahoney, Jerdee and Nash found eighteen predictive

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measures using a battery of tests including the Wonderlic Personnel Test, the Kerr-Speroff Empathy Test, the Strong Vocational Interest Blank for Men, and the California Psychological Inventory. From this it was inferred that there is a phenomenon of general managerial effectiveness which runs through various managerial assignments and which can be identified regardless of the individual manager's assignment.

Furthermore, a study using only secondary-school principals is related to the previous study in industry. Cyphert used only two variables, the Allport-Vernon-Lindzey Study of Values and the Watson-Glaser Critical Thinking Appraisal. He found that there was a stable and consistent pattern of values of secondary-school principals. Secondly, in critical thinking, the candidate for secondary-school principalship should rank in the fiftieth percentile for college students. Once again it is pointed out that these items can be used for screening and that there is need for research in personalities.

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10 Ibid., p. 162.

Yet, there is criticism in using testing procedures for selecting personnel in administration. Stromberg has the answer to this problem. He found that after a short time all applicants qualified on test batteries. The existence of a testing program simply attracted the better applicants and discouraged the poorer. The testing program itself was a type of selection variable.

Therefore, batteries of tests used with the purpose of selecting administrators show that a wide range of liberal arts is needed by administrators, that there is a similarity in management of schools and management of industry, that industry and education have the same concept of training needs, that administrators should be selected from peers rather than broad population samples, that there are consistent patterns in administrative personnel, and that tests have a place in the selection of administrators.

One salient point is evident in this phase of the review of literature. That point is that in one case two tests were just as effective as a larger battery of tests. Thus, a look into the aspect of individual tests is in order.

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II. LITERATURE ON THE USE OF INTELLIGENCE TESTS

It is often questioned whether or not intelligence tests really measure intelligence. The phrase intelligence test in this study, therefore, refers to an instrument that obtains an I. Q. (intelligence quotient) which is used as a variable to predict success in future academic endeavors.

Intelligence tests are generally considered not very meaningful in assessing administrative potential. When they are used, they are generally a part of a battery of tests. Intelligence tests are a subtle factor in the selection of administrators because an administrator needs credentials from his state in order to obtain a position. To get his credentials, the future administrator needs to enter into a graduate program of education. Many institutions use intelligence tests as screening devices for their respective graduate programs. They may use one of many tests. These may include the Miller Analogies, the Cooperative English C2, the Watson-Glaser Critical Thinking Appraisal, or the Graduate Record Exam.13 (The Graduate Record Exam is many

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times considered more of an ego suppressor than an intelligence test.)

Thus, even though intelligence tests are conspicuously absent from the literature as individual tests of administrative potential, they are conspicuously present in batteries of tests and prerequisites for many graduate programs in administration.

III. LITERATURE ON THE USE OF INTEREST TESTS

Like intelligence tests, interest tests are not abundant in the literature as individual tests used to select administrators. The reason for this is the possibility that interests are readily measured, but extremely difficult to evaluate. Secondly, interest variables tend to be broader than other variables which also adds to the difficulty of assessment.

Strong's Vocational Interest Blank was not on the market very long before it was attacked as being of no value because the norms stated that which a superintendent did do, not that which a group should do.\(^{14}\) The changing concepts of testing from 1932 to 1965 would state that this is a val-

uable function of a test. But Strong's test, even the re-
vised edition, has not been proved to be a valid variable in
selecting administrators.

McIntyre studied the use of the Strong Vocational In-
terest Blank by comparing the scores of potential adminis-
trators with ratings of judges. It was found that the in-
strument did not discriminate the upper from the lower quar-
tiles as rated by judges. From this, McIntyre implied that
the Strong Blank was of more value as a tool for self-guid-
ance.15

Another interest scale, the Kuder Preference Record,
has been used in industry for management appraisal. But as
in the field of education using the Strong Vocational Inter-
est Blank, the results are inconclusive. The Atlantic Re-
fining Company selected and validated twenty items from Form
C of the Record and formed a supervisory scale. The results
showed that managers had a conscious preference for leader-
ship positions, but that research personnel rejected super-
visory work. It was implied that interest may increase
through training.16

Thus, interest tests used individually to determine
administrative potential are of secondary value in that they

15Campbell and others, op. cit., p. 327.

16John B. Miner, "The Kuder Preference Record in Man-
agement Appraisal," Personnel Psychology, 13:187-96, Summer,
1960.
are most useful in self-appraisal and are not conclusively good predictors of administrative success.

IV. LITERATURE ON THE USE OF TESTS OF SOCIAL ATTRIBUTES

Tests of social attributes differ from psychological tests in that they deal with behavior in social situations whereas psychological tests deal with personal traits. Only a careful perusal of the literature makes this distinction explicit. Again, these tests are more often used in batteries of tests than by themselves.

Kleyensteuber used a battery of social attributes tests. The Allport-Vernon-Lindzey Study of Values was combined with Spranger's Types of Men and the Practices and Procedures Inventory for Educators. The results of this study showed that administrators were more social than teachers and that administrators with a science teaching background were more theoretical.\(^{17}\) Although no scales were given, this study supports the theory that tests should be given to peers and differentiations may be made.

Turning once again to industry, Ghiselli used a Self Description Inventory to determine traits differentiating

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management personnel. The traits of judgment (planning and policy making), initiative (initiates an activity), directing (directing efforts of others), confidence (directly related to decision-making), and occupational level (comfort in a position), were sought in the activities of decision-making, integrating, organizing and directing. Taking four groups, top management, middle management, lower management and line workers, it was found that there were differences in all traits at the .01 level of confidence. There were no differences in I. Q. or initiative between the top management and middle management or between the lower management and line workers. The major difference was between the two groups: top management and middle management versus lower management and line workers. Ghiselli implied that his study showed that personnel occupying positions on the two top levels of management were similar and superior to line supervisors and line workers in intelligence, supervisory ability, initiative, self-assurance and occupational level. It was also inferred that top management personnel were at the top because of self-reliance and individualism. ¹⁸

Therefore, studies show that tests of social attributes can distinguish top personnel from lower personnel in the administrative hierarchy in both education and industry.

V. LITERATURE ON THE USE OF
PSYCHOLOGICAL TESTS

Moving to psychological tests, one finds that the two major tests used in assessment of administrators are the Edwards Personal Preference Scale and the California Psychological Inventory. These tests are considered worthy because they are "designed to be used with normal subjects." Although the Edwards Scale is not considered extremely valid, it is considered a good experimental test. Unlike other tests, psychological tests are used alone just as frequently as they are used in batteries of tests.

Kemp used the Edwards Personal Preference Scale to compare the need structures of administrators, teachers, and counselors. Thus, he implied that school personnel should not assume another role and that need structure should be considered in training programs.

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Merrill used the same scale with education students, successful science teachers and educational administrators. He found that administrators were more deferring, orderly, enduring and less exhibitionistic, autonomous and heterosexual than the norm group of education students. Both studies, therefore, point out traits of administrators determined by the Edwards Personal Preference Scale.

On the other hand, the California Psychological Inventory has not been used extensively in the field of education as an individual test. Only one study could be found using the inventory with educational administrators. This study was done by Pierce-Jones, Mitchell, and King to determine the configurational invariance in the California Psychological Inventory. To determine the factorial composition of the inventory's eighteen scales, 156 superintendents of schools were compared with 258 university women. The two important scales were found to be social poise and adjustment by social conformity. Although this study does not show a direct relationship to selecting administrators, it

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does show trends in the use of the test.

Industry, again, takes the lead in developing a use for the inventory. Goodstein and Schrader used the California Psychological Inventory in a comparison of actual responses of managers and supervisors with nonmanagerial personnel. All items at the .01 level of confidence by chi square were combined into a managerial key. This proved to be 206 of the 480 items. All of these California Psychological Inventory items were significantly different at the .01 level of confidence with the men-in-general sample. Thus, this key fulfills the need to differentiate between management and non-management personnel.24

In conclusion, psychological tests have merit in differentiating between personnel in the role of administration.

VI. SELECTION OF THE AREA FOR TESTING

From this review of literature, it is evident that administrators and potential administrators of schools can be selected by the use of tests. Batteries of tests, however, are not necessarily of more value than single psycho-

logical or social attributes tests. This points out the need for further research in the areas of social attributes tests and/or psychological tests. With this in mind, the area selected for this study is the area of psychological testing.

VII. SELECTION OF THE TEST FOR RESEARCH

With the selection of the area of testing, the test chosen to be used in the area of psychological testing was the California Psychological Inventory. Because the California Psychological Inventory has "external reference variables such as social class membership . . . and prominence as a leader,"25 this test would apply to current thinking and theories in public school administration. The California Psychological Inventory variable of social class membership compares with the theory of Getzels and Guba that a phase in administration is concerned with the "idiographic or personal dimension of activity in a social system."26 And, the California Psychological Inventory variable of social class membership.

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prominence as a leader corresponds with Halpin's leadership theory.27

Furthermore, a previous study by Carleton points out that the original scoring key of the California Psychological Inventory was not effective in discriminating between effective and ineffective administrators.28 Therefore, the Managerial Key developed for the California Psychological Inventory by Goodstein and Schrader would be the most logical place to begin research to determine if this Managerial Key can be effective in predicting success of administrators when the original key was not.

27Andrew W. Halpin, The Leadership Behavior of School Superintendents, (School-Community Development Study, Monograph Series, No. 4. Columbus, Ohio: Ohio State University, 1956), pp. 3-5.

CHAPTER V

PROCEDURES

This study was made to compare public school principals' scores on the California Psychological Inventory with their success ratings as assigned to them by their superintendents. The scores on the California Psychological Inventory were determined by using the Managerial Key of Goodstein and Schrader, and the superintendents rated their principals on a three point scale—outstanding, very good or good.

I. SAMPLE

A paramount problem in securing the sample for this study was to insure the anonymity of the participants. Without anonymity, superintendents were reluctant to publicly rate their subordinates, and principals were skeptical about being rated. It was determined that anonymity could be insured for all participants who worked in school systems which employed four or more principals if one-third of these principals were asked to participate in the study. Therefore, the sample consisted of one-third of all principals in the State of Montana who worked in systems which employed four or more principals.
By consulting the *Montana Educational Directory 1965-1966*, it was found that seventeen schools in the State of Montana employed four or more principals who served in an administrative capacity half-time or more. The sample included the seventeen schools listed in Table III, page 55.

II. COLLECTION OF THE DATA

When the decision of the sample had been made, all superintendents of the schools listed in Table III, page 55, were sent the first letter and the instruction sheet shown in Appendix A, pages 51 and 52, a data sheet, Table IV, page 56, the California Psychological Inventory, and answer sheets.

Three weeks later the first follow-up letter shown in Appendix A, page 53, was sent to all superintendents who had not replied. The second follow-up letter, Appendix A, page 54, was sent five weeks after the initial request to all superintendents who had not submitted their data. By these means seventy-five per cent of the total sample was obtained.

III. TREATMENT AND REPORTING OF DATA

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Treatment of the data. When the data were received, the California Psychological Inventories were scored using only the Managerial Key\(^2\) shown in Table V, page 57. Each item answered in the keyed direction was credited with one point while each item answered opposite the key was scored minus one. To avoid negative scores, 500 was added to the total score of each individual.\(^3\)

When all the tests were scored, the principals were divided into three groups according to the ratings assigned to them by their superintendents. Thus, the principals were grouped, and the test scores were available. For statistical purposes, the tests were then divided into a higher and lower group. The tests of the participants who were rated "outstanding" were assigned to the higher group, and the tests of the participants who were rated "very good" and "good" were assigned to the lower group. To find whether the group with the higher success ratings also contained the higher California Psychological Inventory scores, the Mann-


Whitney U test was selected to analyze the data.

The statistical (null) hypothesis \( (H_0) \) was stated:
The two groups of public school principals, one designated high and one designated low, will have correspondingly high and low scores on the California Psychological Inventory when it is scored with a Managerial Key.

The alternative (operational) hypothesis \( (H_1) \) followed: If public school principals are divided into two groups which may be labeled "High Success" and "Low Success," the principals rated higher will also achieve higher scores on the California Psychological Inventory when it is scored with a Managerial Key.

For the sake of convenience, the higher group was labeled A, and the lower group was labeled B. The two groups, A and B, were then statistically analyzed using the Mann-Whitney U Test. This test is a nonparametric test used to determine whether two independent groups have been drawn from the same population. The test implies that the bulk of one population, in this case A, is higher than the bulk of another population, in this case B.

---


5Ibid., p. 116.

6Ibid.
The Mann-Whitney U Test is considered the most useful alternative to the parametric t test when one cannot assume that the measures upon which the means are based are normally distributed in the population. Because the Mann-Whitney U Test is a nonparametric or distribution-free test, this test enables one to compare two samples "without the necessity of making any assumption about how the measures are distributed in the population" and is a useful and proper test to use in this experiment.

As the Mann-Whitney U Test directs, the scores of both groups were ranked together, assigning the rank of 1 to the score which is the lowest, rank 2 to the next lowest, and so on. In the case of tied ranks each of the tied scores were given the average of the ranks they would have had if no ties had occurred. Each score's group identity of A or B was retained. Each individual's California Psychological Inventory (CPI) score together with his group identification and rank are presented in Table I, page 38. For example, subject number 8 received a California Psychological Inventory score of 604, was in the low group B, and ranked number 6 in a combined ranking of both groups.

---

8Ibid.
Next, the A scores (the higher group) and the B scores (the lower group) were separated and tabulated with their ranks as shown in Table II, page 39. This table also shows that the number of subjects in the smaller group (Group A) was determined and labeled $n_1$, and the number of subjects in the larger group (Group B) was determined and labeled $n_2$. $R_1$, the sum of the ranks assigned to the smaller group, $n_1$, and $R_2$, the sum of the ranks assigned to the larger group, $n_2$, were found.

With $n_1$, $n_2$, $R_1$, and $R_2$ known, the value of $U$ (the statistic used in this test) could be found. This $U$ statistic has tables of exact probabilities by Mann and Whitney when samples are small, i.e., when the larger $n$ is equal to or less than 20. When one $n$ is equal to or greater than 20, the $z$ deviate is determined after the $U$ statistic is found. Thus, the next step was to find the $U$ statistic by making substitutions in the following formulas.

Formula (a) $U = n_1n_2 + \frac{n_1(n_1 + 1)}{2} - R_1$

$U = (14)(24) + \frac{14(14 + 1)}{2} - 280.5$

$U = 336 + \frac{(14)(15)}{2} - 280.5$

---

3 Siegel, op. cit., pp. 119-20.

10 Ibid., p. 121.

11 Ibid., p. 120.
Formula (a) \[ U = 336 + 105 - 280.5 \]
\[ U_1 = 160.5 \]

Formula (b) \[ U = n_1n_2 + \frac{n_2(n_2 + 1)}{2} - R_2 \]
\[ U = (14)(24) + \frac{24(24 + 1)}{2} - 460.5 \]
\[ U = 336 + \frac{(24)(25)}{2} - 460.5 \]
\[ U = 336 + 300 - 460.5 \]
\[ U_2 = 175.5 \]

Since Formula (a) and Formula (b) yield different U's, \( U_1 \) stands for the smaller value, and \( U_2 \) stands for the larger.

With the values of \( U_1 \) and \( U_2 \) known, the \( z \) deviate value may be computed. The \( z \) deviate values are located on a normal probability distribution that is "employed as a frame of reference, or probability model, in the analysis of empirical distributions of sample results." Following the normal pattern, a \( z \) deviate value having the probability of .05 was assigned, i.e., a \( z \) value of \( +1.64 \) or more will be required to reject the null hypothesis, \( H_0 \). The formula for computing the normal deviate \( z \) with the correction for ties is: \( z \)

\[ z = \frac{x - \mu}{\sigma} \]

---


<table>
<thead>
<tr>
<th>Subject No.</th>
<th>CPI Score</th>
<th>Group</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>528</td>
<td>B</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>580</td>
<td>A</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>582</td>
<td>B</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>584</td>
<td>B</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>590</td>
<td>A</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>594</td>
<td>B</td>
<td>6.5</td>
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<td>7</td>
<td>594</td>
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<td>8</td>
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<tr>
<td>9</td>
<td>610</td>
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<td>9</td>
</tr>
<tr>
<td>10</td>
<td>612</td>
<td>B</td>
<td>10</td>
</tr>
<tr>
<td>11</td>
<td>614</td>
<td>A</td>
<td>11</td>
</tr>
<tr>
<td>12</td>
<td>616</td>
<td>A</td>
<td>12.5</td>
</tr>
<tr>
<td>13</td>
<td>616</td>
<td>B</td>
<td>12.5</td>
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<tr>
<td>14</td>
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<td>A</td>
<td>15.5</td>
</tr>
<tr>
<td>15</td>
<td>620</td>
<td>A</td>
<td>15.5</td>
</tr>
<tr>
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<td>15.5</td>
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<tr>
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<td>626</td>
<td>B</td>
<td>18</td>
</tr>
<tr>
<td>19</td>
<td>632</td>
<td>A</td>
<td>19.5</td>
</tr>
<tr>
<td>20</td>
<td>632</td>
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<td>19.5</td>
</tr>
<tr>
<td>21</td>
<td>633</td>
<td>B</td>
<td>21</td>
</tr>
<tr>
<td>22</td>
<td>634</td>
<td>B</td>
<td>22</td>
</tr>
<tr>
<td>23</td>
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<td>23</td>
</tr>
<tr>
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<td>640</td>
<td>B</td>
<td>25</td>
</tr>
<tr>
<td>25</td>
<td>640</td>
<td>A</td>
<td>25</td>
</tr>
<tr>
<td>26</td>
<td>640</td>
<td>B</td>
<td>25</td>
</tr>
<tr>
<td>27</td>
<td>642</td>
<td>A</td>
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</tr>
<tr>
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</tr>
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<td>35</td>
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<td>B</td>
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</tr>
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<td>663</td>
<td>B</td>
<td>36</td>
</tr>
<tr>
<td>37</td>
<td>666</td>
<td>A</td>
<td>37</td>
</tr>
<tr>
<td>38</td>
<td>678</td>
<td>A</td>
<td>38</td>
</tr>
</tbody>
</table>
TABLE II

A SCORES (HIGH GROUP) AND
B SCORES (LOW GROUP) RANKED SEPARATELY

\[ n_1^* = 14 \quad n_2^{**} = 24 \]

<table>
<thead>
<tr>
<th>Group A</th>
<th>CPI Scores</th>
<th>Rank</th>
<th>Group B</th>
<th>CPI Scores</th>
<th>Rank</th>
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<td>580</td>
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<td></td>
<td>594</td>
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<tr>
<td>616</td>
<td>12.5</td>
<td></td>
<td>594</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>620</td>
<td>15.5</td>
<td></td>
<td>604</td>
<td>8</td>
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</tr>
<tr>
<td>632</td>
<td>19.5</td>
<td></td>
<td>610</td>
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<td>19.5</td>
<td></td>
<td>612</td>
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</tr>
<tr>
<td>636</td>
<td>23</td>
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<td></td>
<td>620</td>
<td>15.5</td>
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</tr>
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<td></td>
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</tr>
<tr>
<td>666</td>
<td>37</td>
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<td>633</td>
<td>21</td>
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</tr>
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<td>678</td>
<td>38</td>
<td></td>
<td>634</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

\[ R_1 = 280.5 \]

<table>
<thead>
<tr>
<th>Group B</th>
<th>CPI Scores</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>640</td>
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<td></td>
</tr>
<tr>
<td>642</td>
<td>27.5</td>
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<tr>
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</tr>
<tr>
<td>662</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>663</td>
<td>36</td>
<td></td>
</tr>
</tbody>
</table>

\[ R_2 = 460.5 \]

\[ R_1 = \text{sum of the ranks assigned to the smaller group, } n_1 \]
\[ R_2 = \text{sum of the ranks assigned to the larger group, } n_2 \]

* \( n_1 = \text{number of subjects in smaller group} \)

** \( n_2 = \text{number of subjects in larger group} \)
Formula (c) \( z = \frac{40}{\sqrt{\frac{U_1 - \frac{n_1n_2}{2}}{N(N-1)}} - \frac{N^3 - N}{12} - \Sigma T} \)

In this formula \( U_1 \) was used. (Either \( U \) may be used for the \( z \) deviate since "both will be equidistant from the hypothesized mean of the sampling distribution of the \( U \) statistic.")\(^{14}\) The other terms are defined as follows:

- \( n_1 \) = the number of subjects in the smaller group, Group A
- \( n_2 \) = the number of subjects in the larger group, Group B
- \( N = n_1 + n_2 \) (the total number of subjects)
- \( T = \frac{t^3 - t}{12} \) (\( t \) is the number of observations tied for a given rank)

Thus, the only term left to be calculated at this point was \( \Sigma T \). Referring to Table I, page 38, it was found that the following number of observations were tied at the following ranks:

<table>
<thead>
<tr>
<th>No. of Observations Tied (( t ))</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>6.5</td>
</tr>
<tr>
<td>2</td>
<td>12.5</td>
</tr>
<tr>
<td>4</td>
<td>15.5</td>
</tr>
<tr>
<td>2</td>
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<tr>
<td>2</td>
<td>27.5</td>
</tr>
<tr>
<td>2</td>
<td>29.5</td>
</tr>
</tbody>
</table>

\(^{14}\) Peatman, op. cit., p. 370.
The $\xi_T$ was then found by substituting in the formula for $T$ on page 40 and summing the results.

$$\xi_T = \frac{3^2 - 2}{12} + \frac{3^2 - 2}{12} + \frac{4^2 - 4}{12} + \frac{2^3 - 2}{12} + \frac{3^2 - 3}{12} + \frac{2^3 - 2}{12} + \frac{2^3 - 2}{12}$$

$$\xi_T = 9.5$$

With the $\xi_T$ found, all other terms were substituted in the formula for $z$, Formula (c).

$$z = \frac{160.5 - (14)(24)}{\sqrt{(14)(24)(38)\frac{3^2 - 38}{12} - 9.5}}$$

$$z = \frac{160.5 - 168}{\sqrt{\frac{336}{1406}(\frac{54872 - 38}{12}) - 9.5}}$$

$$z = \frac{-7.5}{\sqrt{\frac{336}{1406}(\frac{54834}{12})} - 9.5}$$

$$z = \frac{-7.5}{\sqrt{\frac{767676}{703} - 9.5}}$$

$$z = \frac{-7.5}{\sqrt{1092} - 9.5}$$

$$z = \frac{-7.5}{\sqrt{1082.5}}$$

$$z = \frac{-7.5}{32.90}$$

$$z = -0.23$$

It was found that $z = -0.23$. 

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Since the $z$ deviate value of $-0.23$ is less than the assigned value for rejection ($±1.64$), the null hypothesis is not rejected. It may be stated that there is no indication of a statistical difference in the scores on the California Psychological Inventory scored with the Managerial Key between the group given the higher success ratings and the group given the lower success ratings.
This study was concerned with comparing scores on the California Psychological Inventory of public school principals who were rated high in administrative success with those public school principals who were rated lower in administrative success.

Thirty-eight public school principals were involved in this study. Principals' scores on the California Psychological Inventory were determined by using the Goodstein and Schrader Managerial Key; and principals were rated either "outstanding," "very good," or "good" by their superintendents. The tests were then divided into two groups. The tests of principals rated "outstanding" were placed in a group labeled "Higher Success," and the tests of principals rated "very good" and "good" were assigned to a group labeled "Lower Success."

The higher success group was compared with the lower success group statistically by using the Mann-Whitney U Test. With the basic assumption that the on-the-job ratings of principals by their superintendents are valid, this study gives no evidence that the California Psychological Inventory when scored with the Managerial Key is a proper or
valid instrument to be used to predict success of public school principals or to rate them on-the-job.

II. RECOMMENDATIONS

Because there is no evidence from this study to indicate that the California Psychological Inventory can be used as a tool to distinguish between higher and lower success groups in public school administration using the Managerial Key, and because previous studies gave no indications that the original key to the California Psychological Inventory would discriminate between effective and ineffective administrators, the following recommendation is made:

A. Studies should be conducted to formulate and develop a new Key for the California Psychological Inventory to aid in the prediction of the success of public school administrators.
BIBLIOGRAPHY
BIBLIOGRAPHY

A. BOOKS


B. PERIODICALS


C. PUBLICATIONS OF THE GOVERNMENT AND OTHER ORGANIZATIONS


D. UNPUBLISHED MATERIALS


E. TESTS AND MANUALS


Dear Superintendent

Although there are certainly numerous demands on your time, will you be kind enough to assist me in a task that may be of some significance to public school administration?

At present I am working on a research problem concerning anonymous ratings of principals by their superintendents and scores on a test used to select managers in industry. This study is being made in connection with graduate work in Education at the University of Montana and has been approved by the Dean of the School of Education, Dr. James M. Thrasher.

I am enclosing an instruction sheet by which this experiment will be run along with test booklets and answer sheets. Following these instructions will assure the anonymity of the subject taking the test.

Please return the answer sheets and test booklets in the self-addressed stamped envelope. Some time during the next school year, when the data have been analyzed, I shall send you a summary of results.

Thank you for your assistance.

Sincerely,

Calvin Wahl
INSTRUCTIONS FOR PUBLIC SCHOOL PRINCIPAL STUDY

1. The test being used can be completed in approximately 20 minutes and is self-administered.

2. As superintendent, please select ___ principals to take this test. (no.)

3. Distribute the tests to your principals in the following manner. (This will assure an anonymous rating together with an anonymous answer sheet to the test.)

   a. If you rate your principal outstanding, give him a test booklet and an answer sheet marked "Test #3" on the data sheet attached to the answer sheet.

   b. If you rate your principal very good, give him a test booklet and an answer sheet marked "Test #2" on the data sheet attached to the answer sheet.

   c. If you rate your principal good, give him a test booklet and an answer sheet marked "Test #1" on the data sheet attached to the answer sheet.

   d. If you are short of any answer sheets for any one rating you wish to assign, you may change the test number by simply crossing out the old number, placing the number rating you wish to assign, and initializing it.

4. Place any comments you wish to make on the back of this sheet and return with the test booklets and completed answer sheets and extra answer sheets in the self-addressed, stamped envelope provided.

   (You may explain to your principals that this test is used in industry to select managers and that this study is to determine whether or not this test is applicable to education after they have taken this test.)

Thank you.
Dear Superintendent

Three weeks ago I sent your school a number of tests to be taken by principals for a Public School Principal Study. I feel that this is a worthy project to pursue because it may be of value to practicing and potential administrators. But as of this date, I have not received the data from your school.

I realize that there are many administrative pressures during the school year, and I am certain that you realize the difficulties in collecting data for any research project. It will be only through your assistance that I will be able to complete this project.

I shall appreciate your assistance in collecting this data.

Thank you.

Sincerely,

Calvin Wahl
Dear Superintendent

Five weeks ago I sent your school a number of tests to be taken by principals for a Public School Principal Study. As of this date, I have not received an answer from your school.

I realize that this is a very busy time of year and appreciate the fact that only through your assistance will I be able to complete this project.

Will you be able to assist me in this matter?

Thank you again.

Sincerely,

Calvin Wahl
## TABLE III

SCHOOLS IN MONTANA WITH 4 OR MORE PRINCIPALS  
1965-66

<table>
<thead>
<tr>
<th>School</th>
<th>Number of Principals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaconda</td>
<td>7</td>
</tr>
<tr>
<td>Billings</td>
<td>26</td>
</tr>
<tr>
<td>Bozeman</td>
<td>7</td>
</tr>
<tr>
<td>Butte</td>
<td>19</td>
</tr>
<tr>
<td>Cut Bank</td>
<td>4</td>
</tr>
<tr>
<td>Glasgow</td>
<td>6</td>
</tr>
<tr>
<td>Great Falls</td>
<td>25</td>
</tr>
<tr>
<td>Hardin</td>
<td>6</td>
</tr>
<tr>
<td>Havre</td>
<td>7</td>
</tr>
<tr>
<td>Helena</td>
<td>7</td>
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<tr>
<td>Lewistown</td>
<td>4</td>
</tr>
<tr>
<td>Libby</td>
<td>6</td>
</tr>
<tr>
<td>Livingston</td>
<td>4</td>
</tr>
<tr>
<td>Miles City</td>
<td>6</td>
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<td>Missoula</td>
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<td>Data Sheet - Test #</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td></td>
</tr>
</tbody>
</table>

Please check one of the following in each group.

1. Elem. Principal__  Jr. High Principal__  H. S. Principal__

2. No. of Years Admin. Experience: 1-5__  6-10__  Over 10__

3. Male__.  Female__

4. Age:  Below 30__  30-35__  36-40__  41-45__  Over 45__
<table>
<thead>
<tr>
<th>Item Numbers</th>
<th>Items Scored</th>
<th>Items Scored</th>
</tr>
</thead>
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<td>&quot;False&quot;</td>
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TABLE VI
ADDITIONAL DATA ON PRINCIPALS PARTICIPATING IN STUDY*

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<thead>
<tr>
<th>Item</th>
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<tr>
<td>Junior High Principals</td>
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<tr>
<td>High School Principals</td>
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</table>

Number of years of administrative experience

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</tr>
<tr>
<td>6 - 10</td>
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<td>38</td>
</tr>
<tr>
<td>Over 10</td>
<td>25</td>
<td>38</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
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</thead>
<tbody>
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</tr>
<tr>
<td>Female</td>
<td>5</td>
<td>38</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Number</th>
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</tr>
<tr>
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<tr>
<td>41-45</td>
<td>8</td>
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</tr>
<tr>
<td>Over 45</td>
<td>20</td>
<td>38</td>
</tr>
</tbody>
</table>

*This table should read that of the 38 principals who participated in this study 30 were elementary principals, 8 were junior high principals, and there were no high school principals. This data was received from the data sheet shown in Table IV, page 55.