

JAN 10 1968

THE SCIENCE TEACHER'S INCLUSIVE BEHAVIOR
AS RELATED TO CERTAIN PERSONALITY
CHARACTERISTICS

Thesis Approved:

Kenneth E. Wiggins
Thesis Adviser

Kenneth H. Blair

Jacob G. Blankenship

L. Herbert Buncay

James G. Hunter

O. N. Newham
Dean of the Graduate College

658702

PREFACE

This investigation is one part of a general study of selected characteristics of the science teacher being directed by Dr. Jacob W. Blankenship, Oklahoma State University, Stillwater, Oklahoma.

I take this opportunity to acknowledge the freedom, encouragement and support provided for this work by Dr. Kenneth E. Wiggins; the indispensable guidance, suggestions and physical aid provided by Dr. Jacob W. Blankenship and the constructive comments and suggestions provided by Dr. L. Herbert Bruneau, Dr. Henry P. Johnston, and Dr. James Kenneth St. Clair. I also wish to acknowledge the aid provided by Mrs. Helen Blankenship, Mr. Roy Dick and Mr. Richard Roberts among others in preparing the Pupil Survey materials for mailing. The encouragement, support and aid provided by my wife Imogene and other members of my family during the preparation of this paper was eagerly received and was utilized to continue the effort until completion.

The financial support by the Oklahoma State Research Foundation for Dr. Blankenship's study of the characteristics of science teachers, although not directed to the immediate study, did make it a possibility. Thus it is only fitting that acknowledgement be made of this.

Finally I acknowledge the permission granted me by Dr. Morris L. Cogan to use his "Pupil Survey" in this study.

TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	1
Need for the Study.	3
Specific Statement of the Problem	5
Hypotheses.	5
Definition of Terms	8
II. SELECTIVE REVIEW OF THE LITERATURE	10
The Measurement of Teacher Classroom Behavior	10
The Measurement of Teacher Personality and Characteristics	20
Summary	30
III. RESEARCH DESIGN.	32
Selection of the Science Teacher Sample	32
Characteristics of the Summer Institutes.	34
Description of the Data Gathering Instruments	37
Statistical Procedure	46
IV. FINDINGS OF THE STUDY.	49
A Summary of the Data	49
Preliminary Statistical Procedures.	52
Testing the Hypotheses.	55
V. CONCLUSIONS AND IMPLICATIONS	61
SELECTED BIBLIOGRAPHY	66
APPENDIX.	71

LIST OF TABLES

Table	Page
I. Summary of the Response to the Pupil Survey Packet	50
II. Mean Scores on Personality Variables of 107 Science Teachers Grouped on the Basis of their "Inclusive" Behaviors.	51
III. The Means, the Variances, and the Homogeneity of Variance of Male and Female Survey Scores.	53
IV. The Means, Differences Between the Means, and Significance of the "Inclusive" Behavior Scores Assigned to Teachers by Male and Female Students	54
V. The Means, the Variances, and the Homogeneity of Variance of the Seven Personality Variables for the High and Low "Inclusive" Behavior Groups.	56
VI. The Means, Difference Between the Means, and the Significance of the Seven Personality Variables	57
VII. The Standard Deviations, F Ratios, Critical F Ratios, and the Degrees of Freedom for the Determination of the Homogeneity of Variance of Male and Female Survey Scales	73
VIII. The Variances, t -Values, t -Values Required for Significance and the Degrees of Freedom for Scores Assigned to Teachers by Male and Female Students.	74
IX. The Standard Deviations, the F Ratios, the Critical F Ratios, and the Degrees of Freedom of the Seven Personality Variables for the High and Low "Inclusive" Behavior Groups.	75
X. The Variances, t -Values, t -Values Required for Significance, and the Degrees of Freedom of the Seven Personality Variables	76

CHAPTER I

INTRODUCTION

Part of each classroom learning situation is the teacher and his personality. Children may learn many things without direct teaching, but it is rare that they become educated without a personal teacher. Attitudes, impressions, and ideas are as surely caught as taught. Transformation of learning to wisdom is as much a question of imitation and unconscious absorption as it is of directed action. (16:21)¹.

Personnel relationships are crucial in determining the influence schools have upon the student. The teacher does not only guide and administer the formal educative processes, but also develops affective relationships with the student. These relationships are powerful factors of satisfaction or frustration of personality needs of both the student and the teacher. Upon the establishment of these personal relationships the teacher becomes part of the environment of the student. The student desires affection from him, status with him, and recognition by him. In many situations the intellectual aspects of school activities become of secondary importance to the relationships developed or dissolved. The spectrum of these relationships which the teacher

¹The form of footnote notation adopted by the American Educational Research Association is used hereinafter in this dissertation. The form of notation consists of enclosing in parentheses the number of the reference followed by a colon and then by the appropriate page number. The references are arranged in strict bibliographical style at the end of the study.

has with the various students making up his class constitutes the social climate of the classroom. By establishing the social climate within the classroom through his behavior, the teacher becomes a primary manipulator of the social environment in which the individual student learns. The way the student perceives the behavior of the teacher then should become of great importance in the learning process in that his learning environment is directly affected by this perception.

It is generally accepted that there is great variability in personality among active classroom teachers. It is also generally accepted that there is great variability in the specific behaviors that classroom teachers exhibit. Researchers, however, have been able to isolate some recurring behaviors which teachers exhibit in the classroom which upon categorization constitute distinct patterns. It seems reasonable that the observed behavior patterns that the teacher exhibits in the classroom are closely related to the self reported personality of the teacher. Investigations of some of the possible relationships between various aspects of the personality of the teacher and the behavior patterns of the teacher should be fruitful in a further clarifying of the complex nature of the teacher and his role in the classroom environment. Instruments have been designed to measure or detect certain patterns of behavior of the teacher in the classroom. Instruments are also available which have been designed to describe various aspects of his personality. Since the tools to describe personality and to measure classroom behavior are available--the possibility of an investigation of the relationships existing between them becomes a reality.

Need For The Study

Science, within recent history, has come to play a dominant role in Western culture. The great volume of scientific knowledge available, and the increasing rate of accumulation of new knowledge poses problems for the science educator. Among these are the choosing of the aspects of scientific knowledge which warrant study by the student and the determining of what distinguishing qualities may be attributed to the teacher proficient in facilitating student assimilation of the selected aspects.

At the secondary level several new curricular programs have been offered as tentative solutions to the first problem. It remains to be seen what the final outcomes of the programs will be, but it is obvious that the science teacher through his behavior in the classroom and his distinctiveness of personality will make the final decision as to what aspects of science are taught, how they are taught, and when they are taught. This fact was fully acknowledged in the 1961 Annual Report of the Biological Sciences Curriculum Study Activities by the statement: "The BSCS fully recognizes that merely providing new curricular materials, however good they may be, will not necessarily result in improved biology teaching the secondary schools. It may facilitate improved teaching but the teacher remains the key" (41:14).

Teaching requires the shaping of lives. Science teaching is often considered to be in a class by itself since no human values seem to be involved in an explanation of the various theories of light or the magnetic effect of a flow of electrons. Science deals with facts and the interrelationships of these facts but science teaching also deals with people and the interrelationships between these people. Beck

suggests this when he says, "I maintain that the science teacher affects the values of his students. These values will determine student attitudes as future citizens. In this the science teacher is as important as the teacher of social studies" (3:20).

If the above assertions may be accepted as a fair representation of the place the science teacher holds in the determination of the science curriculum, and the structuring of student values, it would seem desirable that clarification of the relationship between the personality of the science teacher, and his observed classroom behavior be attempted. Watson has stated "What is needed is a careful logical and psychological analysis of the behaviors predictable from the personal traits and value system of the teacher" (18:1056). He further suggested that to some extent "---the personality characteristics of teachers take precedence over whatever instructional techniques, or roles, they have learned" (18:1056).

This empirical study, based upon both logical and psychological premises, is designed to provide data concerning relationships between selected aspects of science teacher personality and a specific observed behavior pattern of the science teacher in the classroom. These relationships may provide a preliminary point of orientation from which further pertinent data may be collected and used to predict classroom behaviors which are consequent of personality characteristics of the science teacher.

Unfortunately little research has been attempted in these areas with reference to the science teacher. Watson pointed this out as he deplored the absence of research on the relations between the behavior

of science teachers and other variables (18:1031) and when he called out for research on personality of the science teacher (18:1056).

Specific Statement of the Problem

This study is an investigation in which science teachers who were participants in four different BSCS 1966 summer institutes are studied concerning the relationships of seven aspects of their personalities to the way their students perceive a certain behavior pattern exhibited by them in the classroom.

The independent variable in this study is:

1. The "inclusive behavior" of the science teacher in the biology classroom as perceived by the students within the class.

The dependent variables in this study are:

1. The science teacher's "capacity for status."
2. The science teacher's "social presence."
3. The science teacher's "responsibility."
4. The science teacher's "tolerance."
5. The science teacher's tendency for "achievement via independence."
6. The science teacher's "intellectual efficiency."
7. The science teacher's "flexibility."

The dependent variables 1, 2, 4, 5, 6, and 7 make up a complex of qualities which have been designated "capacity for independent thought and action." (36:454-455).

Hypotheses

The hypotheses of this study, stated in the null form, are:

1. There is no relationship between the inclusive behavior of the science teacher in the biology classroom as perceived by biology students and the capacity for status of the teacher.
2. There is no relationship between the inclusive behavior of the science teacher in the biology classroom as perceived by biology students and the social presence of the teacher.
3. There is no relationship between the inclusive behavior of the science teacher in the biology classroom as perceived by biology students and the responsibility of the teacher.
4. There is no relationship between the inclusive behavior of the science teacher in the biology classroom as perceived by biology students and the tolerance of the teacher.
5. There is no relationship between the inclusive behavior of the science teacher in the biology classroom as perceived by biology students and the tendency toward achievement via independence of the teacher.
6. There is no relationship between the inclusive behavior of the science teacher in the biology classroom as perceived by biology students and the intellectual efficiency of the teacher.
7. There is no relationship between the inclusive behavior of the science teacher in the biology classroom as perceived by biology students and the flexibility of the teacher.

These hypotheses were designed to answer the following specific questions.

1. Is there a significant difference in the mean score on the Capacity for Status Scale of the California Psychological Inventory between science teachers who have a low mean score

on the Pupil Survey and science teachers who have a high mean score on the Pupil Survey?

2. Is there a significant difference in the mean score on the Social Presence Scale of the California Psychological Inventory between science teachers who have a low mean score on the Pupil Survey and science teachers who have a high mean score on the Pupil Survey?
3. Is there a significant difference in the mean score on the Responsibility Scale of the California Psychological Inventory between science teachers who have a low mean score on the Pupil Survey and science teachers who have a high mean score on the Pupil Survey?
4. Is there a significant difference in the mean score on the Tolerance Scale of the California Psychological Inventory between science teachers who have a low mean score on the Pupil Survey and science teachers who have a high mean score on the Pupil Survey?
5. Is there a significant difference in the mean score on the Achievement via Independence Scale of the California Psychological Inventory between science teachers who have a low mean score on the Pupil Survey and science teachers who have a high mean score on the Pupil Survey?
6. Is there a significant difference in the mean score on the Intellectual Efficiency Scale of the California Psychological Inventory between science teachers who have a low mean score on the Pupil Survey and science teachers who have a high mean score on the Pupil Survey?

7. Is there a significant difference in the mean score on the Flexibility Scale of the California Psychological Inventory between science teachers who have a low mean score on the Pupil Survey and science teachers who have a high mean score on the Pupil Survey?

This study was undertaken in order to answer only the specific questions listed above. It is empirical in nature, thus it is simply an attempt to find out if there are statistically significant relationships between the dependent variables and independent variable. The underlying psychological and social reasons for the existence or non-existence of these relationships are not considered in this investigation. This limitation was necessary in order to keep the study within reasonable bounds of complexity and time.

Definition of Terms

Behaviors: Those overt acts an individual performs which make up the physical patterns of life.

Inclusive behavior: The behavior of a teacher that tends to keep the pupils central to the objectives of teaching and the social interactions of the classroom--identified in this study by the inclusive portion of the "Pupil Survey" (23:315-342).

Pupil Survey: The inclusive portion of the "Pupil Survey" designed by Cogan for use in his study concerning teacher-pupil interaction (9:161-167). In the immediate study the inclusive portion of the "Pupil Survey" was supplemented with statements concerning the classroom activities of the respondents.

Personality: The person as a psychological or unique whole. It refers

to the dynamic organization of motives within the individual (11:507).

Capacity for status: An individual's capacity for status (not his actual or achieved status) (45:12).

Social presence: An individual's poise, spontaneity, and self-confidence in personal and social interactions (45:12).

Responsibility: An individual's conscientiousness, responsibility, and dependability of disposition and temperament (45:12).

Tolerance: The degree to which an individual is permissive, accepting, and non-judgmental concerning social beliefs and attitudes (45:12).

Achievement via independence: An individual's achievement, based on the factors of interest and motivation, in any setting where autonomy and independence are positive behavior (45:13).

Intellectual efficiency: An individual's attained degree of personal and intellectual efficiency (45:13).

Flexibility: The degree to which an individual's thinking and social behavior is flexible and adaptable. (45:13).

The California Psychological Inventory: A structured verbal personality inventory containing 18 separate scales which are designed to provide a profile representing the personality pattern of an individual (45:7).

Biology student: A high school student taking a course in biology.

Science teacher: A teacher engaged in teaching biology in the secondary school and a member of the population of this study.

CHAPTER II

SELECTIVE REVIEW OF THE LITERATURE

The purpose of this chapter is two-fold. In one sense it is designed to present a loosely structured rationale for this investigation based upon a treatment of conclusions of earlier researchers, which, when welded together, form a pertinent logical construct steeped in psychological and sociological theory. In another sense it is designed to place this investigation into its proper context within the mainstream of research on teaching. A breakdown of the relevant studies into two categories seems appropriate. These are (1) those relating to attempts to describe the actual behavior of the teacher in the classroom and (2) those concerning attempts to measure teacher personality by means other than observations made within the classroom. Studies of both a purely empirical nature and those carefully developed from supporting psychological and social theory are included.

The Measurement of Teacher Classroom Behavior

Attempts to measure the general "competence" of the classroom teacher has a long history. Because of the supposition that a direct relationship exists between certain patterns of teacher behavior and competent teaching, a great deal of interest has been centered upon the behavior of the teacher in the classroom. The results of the early studies in this area have been contradictory and unsubstantiated (24:89).

In recent years more sophisticated approaches to the problem of measuring the classroom behavior of the teacher have been developed (46:2.01). These are distinguished chiefly by more objectivity in the characterization criteria employed and by a reduction in the subjectiveness of the judgments that are required of the individuals gathering data concerning the criteria. Generally one of two paths has been taken in these investigations. Interest has been directed toward carefully defined behavior patterns of the teacher and the relationships of these patterns to specific achievements or behavior patterns of the pupils. Three types of observers of the classroom behavior of teachers which have been used with some success are (1) trained adults, (2) relatively untrained adults, and (3) the teachers' pupils.

One of the earliest systematic investigations of pupil and teacher behavior are those of Anderson and Brewer (1). The center of interest in these studies was the "integrative" and "dominative" contacts between teacher and pupil and pupil and pupil. Data was collected by observers placed directly in the classroom. These persons used a carefully prepared set of categories of contacts common to the classroom situation which had been classified as "integrative" or "dominative." Twenty-four, 5 minute observations were made of each teacher-class situation included in the study. The ratio of the numbers of "integrative" contacts to the number of "dominative" contacts that the teacher had with the pupils was used as a behavioristic description of the teacher. This ratio was called the I/D Index.

The small N of the sample of teachers involved, 4 at most, made it impossible to measure the reliability of the scores proposed for comparing different teachers. However, the significant differences found

in the behaviors of the teachers included implies that they were reliable (13:266). Significant findings of the studies were that (1) the teacher more than any one other person in the classroom sets the tone of the class and (2) the behaviors of the pupils reflect the behavior of the teacher.

Withall (43:347-360) developed a technique through which the emotional climate of the classroom could be assessed and described by means of categorized teacher-statements. The data were collected by sound recordings made in the classroom during regular class sessions. Afterward, the statements were printed and then categorized by trained judges as either learner-centered or teacher-centered. The tendencies of the teacher-statements were then expressed in terms of a Climate Index similar to the I/D Index developed by Brewer. Withall was able to conclude that the classroom climate can be assessed and described and that several individuals can be trained to use the Climate Index and achieve an adequate measure of agreement among one another in categorizing teacher-statements.

Medley and Mitzel (35:86-92) by drawing heavily upon the experiences of Withall and by revising, with an emphasis upon simplification, the "Code Digest" developed by Cornell (10) constructed the Observation Schedule and Record (OScAR). This technique required only one "relatively untrained observer" to be present within the classroom to gather data. The items making up the OScAR were classified into the three categories: (1) emotional climate or degree of hostility, (2) verbal emphasis, and (3) social structure. The investigators were able to conclude that a relatively untrained observer using an instrument like the OScAR can gather reliable information about the differences in

classrooms of different teachers. This may be done through direct observation of the behaviors of the teachers and pupils engaging in everyday classroom activities.

Ryans (15:92-94), in the most extensive series of teacher characteristics investigations to date, utilized highly trained observers to gather data concerning teacher behaviors. The Classroom Observational Record was developed after an analysis of earlier researches and a series of pilot operations. Incorporated within it were 18 teacher behavior dimensions described as partial-fair, autocratic-democratic, aloof-responsive, restricted-understanding, harsh-kindly, dull-stimulating, stereotyped-original, apathetic-alert, unimpressive-attractive, evading-responsible, erratic-steady, excitable-poised, uncertain-confident, disorganized-systematic, inflexible-adaptable, pessimistic-optimistic, immature-integrated, and narrow-broad (15:86-92). For the secondary teacher sample (N = 1907) the reliability coefficients of all but two of the dimensions ranged from .55 to .67 inclusively. The coefficients for partial-fair and excitable-poised were .43 and .47 respectively. The reliability coefficients of the various dimensions for the elementary sample (N = 1513), but for two, ranged from .51 to .61 inclusively. The dimensions partial-fair and uncertain-confident had coefficients of .43 and .45 respectively (15:107).

After the Classroom Observational Record had been utilized in 3,026 classroom observations of the elementary teacher sample and in 3814 observations of the secondary teacher sample, three major clusters of observable teacher behaviors emerged. For both elementary and secondary teachers the major patterns were (1) Pattern X₀--understanding, friendly versus aloof, egocentric, restricted behavior, (2)

Pattern Y₀--responsible, businesslike, systematic versus evading, unplanned, slipshod behavior, and (3) Pattern Z₀--stimulating, imaginative, surgent or enthusiastic versus dull, routine, behavior (15:103-108). These became the three principal criteria in the efforts of the Study to determine correlates of teacher behavior in the classroom (15:77).

Solomon and Bezcek (39:23-32) conducted an investigation designed to begin the development of a catalogue of teacher behaviors which would have broad applicability to a wide spectrum of teachers. Data concerning the behavior of 24 teachers of evening Introductory American Government courses at 13 colleges and universities were collected by questionnaires completed by students, trained in-class observers, tape recordings of class sessions, and questionnaires completed by the teachers.

A factor analysis of the data resulted in the emergence of the following 8 major factors of teacher behavior: (1) permissiveness versus control; (2) lethargy versus energy; (3) aggressiveness versus protectiveness; (4) obscurity, vagueness versus clarity, expressiveness; (5) encouragement of content-related (factual) student participation versus nonencouragement of participation; (6) dryness versus flamboyance; (7) encouragement of students' expressive participation versus lecturing; and (8) warmth versus coldness. These factors made up a total of 66 per cent of the variance within the sample. As noted by the investigators, the limitations of the sample are obvious but the appearance of factors such as 1, 7, and 8 in this study lends some credibleness to their importance to teacher behavior.

An investigation by Cogan (9:1-167) is of particular interest due

to the fact that science teachers were included in the sample and that the current study has made use of the inclusive portion of the "Pupil Survey" he developed. Cogan described teacher behavior in terms of how the student perceived the teacher. By drawing upon the works of Murray (14); Lewin, Liopitt, and White (33:271-299); Anderson, Brewer, and Reed (2); and Cattell (8), he organized specific teacher behaviors into the three dimensions---"Inclusive," "Preclusive," and "Conjunctive." Teacher behaviors which are integrative, affiliative, nutrient and tend to keep the pupils central to the objectives of teaching and to the social interactions of the classroom were termed "Inclusive." Teacher behaviors which are dominative, aggressive, rejectant, and tend to give the pupils a position on the periphery of these objectives and social interactions were called "Preclusive." Teacher behaviors which indicate (1) ability to communicate with pupils, (2) efficiency in classroom management, (3) command of and creativity in dealing with subject matter, and (4) the level of demands upon the pupils were designated "Conjunctive." These dimensions were the independent variables of the investigation. The two dependent variables were the amount of required work done and the amount of self-initiated work done by the student for a given class and teacher.

The "Pupil Survey" was used to gather data concerning all of the five variables. The Principals of the schools were asked to rate the teachers on the independent variables. The teachers were asked to report on the dependent variables. The Principals' and teachers' reports were used only as substantiative evidence while the "Pupil Survey" provided the primary information for the study. A detailed treatment of the Survey appears in Chapter III.

Each pupil was asked to fill out surveys for his teacher in two of three subjects--arithmetic, English, and science. The sample included 33 teachers and 987 eighth grade pupils in five junior high schools located in communities of contrasting socioeconomic characteristics.

Upon analyzing the responses of the students, Cogan stated that "the relationships between the inclusive variable and the criterion variables appear to be more pronounced than those of any of the other antecedent-consequent variables (24:94)." The t-test of significance showed that 21 out of a total of 33 inclusive-required work coefficients were significant at, or above, the .05 level and that 25 out of 33 inclusive-self initiated work coefficients were significant at, or above, the .05 level. All of the inclusive-consequent coefficients were significant for the 4 science groups. Because of the small number of classes involved, no significance could be attached to this finding but it did bring to Cogan's mind these questions (24:98):

(1) Is the nature of the subject-matter of science such that the behaviors of the teacher become a factor so preponderant as to override the attenuating factors found in the teaching of English and arithmetic? (2) Are there factors in the training or the personality of science teachers that maximize the influence of their behaviors upon the pupils' work? (3) Is the attitude of the pupils so neutral vis a vis the experiences of science classes that the major crystalizing agency becomes the behaviors of the science teacher?

Cogan failed to confirm the hypotheses that preclusive teacher behavior as perceived by pupils is negatively related to the amount of required and self-initiated work performed by the pupils. The hypotheses that the dimensions of inclusive and conjunctive teacher behavior were positively related to the amount of required and self-initiated work performed by the pupils were confirmed. He further concluded that "the teachers' inclusiveness is an observable and measurable trait of

teachers" (22:124). The reliability coefficient for group assessment obtained for this trait was .962 (22:123).

Reed (38:205-229), in a study similar to Cogan's, also used pupils as observers of teachers. Data was collected through the use of a Pupil Inventory which has many similarities to the "Pupil Survey." The Inventory was divided into two parts. Part I consisted of items pertaining to the science interests of the pupils. Part II was made up of randomly ordered items relating to teacher warmth, demand, and utilization of intrinsic motivation.

The sample consisted of 1045 ninth-grade students and their 38 general science teachers from 19 public school systems in eastern Massachusetts. The independent variables were Teacher Warmth, Teacher Demand and Teacher Utilization of Intrinsic Motivation. The dependent variable was pupil interest in science.

Upon analysis of the data supplied by the students, Reed was able to conclude that the pupils' interest in science was not significantly related to the variable of teacher demand and that the pupils' interest in science was positively related to teacher warmth and to teacher utilization of intrinsic motivation. He related further that the "classroom science teacher can expect pupils to agree in general as to how they perceive him; he can also expect some divergence of individual pupil impressions (38:227)."

In another study concerning science teachers, Van Allenstein (17:1-49) used a modified form of Cogan's "Pupil Survey" to investigate the relationships between the variables: teacher competence, teacher warmth, and teacher effectiveness. Teacher competence was defined as the behavior of the teacher which reflects his (1) subject matter

background, (2) communication skills, (3) level of demand placed on the pupils, and (4) classroom management. Teacher warmth was defined as the behavior of the teacher which reflects his attention to interpersonal or affective pupil-teacher relationships. Teacher effectiveness was defined as the changes in behavior of pupils relating to attitude and work habits in accordance with science classroom goals (17:15).

The subjects of the investigation were 32 biology, 13 chemistry, and 17 physics teachers in the 11 public high schools of the City of St. Louis, Missouri. The pupils of these teachers reported on their class associated activities and the behavior of their teachers in much the same way as in Cogan's work.

The hypotheses tested by the investigator were: (1) an increase in competence results in an increase in effectiveness, (2) an increase in warmth results in an increase in effectiveness, and (3) an increase in competence increases effectiveness more than does an increase in warmth. Upon analysis of the data hypotheses, 1 and 2 were confirmed while hypothesis 3 was not confirmed. In conclusion, Van Allenstein felt justified in making the statement that "relative to the continuum running from the warm, friendly, and integrative nursery school teacher (who also needs some competence) to the competent college professor (who also needs some warmth) this research suggests that the high school science teacher is a little more akin to the college professor (17:46)."

In an exploratory study, Christensen (21:169-174) used pupils as observers of teachers. The study was designed to test the hypotheses: (1) teacher warmth is positively related to achievement gains, (2) teacher permissiveness is negatively related to achievement gains, (3) the warm and direct teacher will produce the greatest achievement gains,

and (4) the affective needs of pupils interact significantly with teacher warmth and permissiveness.

Ten classes of fourth grade pupils in one New York state suburban school district reported on the permissiveness and warmth of their respective teachers by means of a pupil inventory. The Iowa Tests of Basic Skills was used to measure gains in pupil achievement in vocabulary, reading comprehension, language skills, work-study skills, and arithmetic skills for one academic year.

Two of the findings of the study were that permissiveness and warmth as factors of teacher behavior may be studied as separate entities and that pupils within a class were consistent in describing their teacher. Only 4 significant relationships were obtained. Teacher warmth was significantly related to gain in achievement in vocabulary and arithmetic at the .05 level.

Veldman and Peck (42:346-355) devised a Pupil Observation Survey (POSR) containing 38 items which provided information concerning five descriptive teacher behavior factors designated as (1) friendly, cheerful, admired, (2) knowledgeable, poised, (3) interesting, preferred, (4) strict control, and (5) democratic procedure. Factors 1, 3, and 4 were related by the investigators to Ryans' Patterns X_o , Z_o , and Y_o respectively.

The POSR was administered to the pupils of 554 student teachers. The student teachers completed the California Psychological Inventory (CPI) and a Self-Report Inventory. Correlation coefficients were calculated between the mean scores representing the several factors within the POSR and the student teachers' scores on the 18 scales of the CPI. Because factors 1 and 5 of the POSR were found to be significantly

different for male and female teachers, separate correlations were made for the male sample (N = 106) and the female sample (N = 424).

The CPI predicted successfully only factor 4 for the male sample and factors 1, 2, and 3 for the female sample. Out of the 180 correlations completed only 34 significant ones were found. It is interesting to note, in view of the present study, that 20 of the significant correlations were associated with the scales making up the "Capacity for Independent Thought and Action" factor of the CPI proposed by Mitchell and Pierce-Jones (36:453-456). The investigators were also led to conclude that some minor relationships appear to exist between the paper-and-pencil inventories used and the behavioral evaluations of teachers by the pupils but they were quite indistinct. They further suggested that pupils can provide as much information regarding teacher characteristics as can expert adult judges after 1 or 2 hours of observation.

The Measurement of Teacher Personality and Characteristics

Devices designed to obtain measures of the personality and the characteristics of individuals are plentiful. Some are prepared specifically for use with teachers. These instruments are generally of a "paper and pencil" nature. The teacher is the respondent to a written statement, question, or diagram concerning a given projected situation without the teacher knowing the frame of reference from which it will be judged.

Many criticisms have been directed toward personality inventories. Some of the major ones are: (1) the examinees' lack of self knowledge, (2) the variation in the examinee's responses in test-retest situations, (3) the variation in interpretation of items among examinees, and (4)

the falsification of responses to items by the examinee. Guilford (12:191-201) attempts to meet those criticisms in an objective manner. In summary he suggests that the critic might be helped if he were to take "----a more objective and statistical view" of these instruments while at the same time he acknowledges the existence of many weaknesses associated with them (12:199).

The more established, published personality inventories generally are fairly reliable. The reliability coefficients of such inventories range between .72 and .86 for total scores (5:81). Thus it appears that most individuals do not vary greatly in the general picture they present of themselves when completing a personality inventory in a test-retest situation over a short time period, i.e. several days. As the time interval between the initial test and the retest becomes greater the reliability coefficients become smaller (12:193).

The most serious problems concerning these instruments are related to external validity. The source of the difficulty lies in the process of setting up external criteria of what is "really true" and relating the inventory scores to them. The criteria which are generally used today are ratings by close associates, records of performance, and differences between inventory scores of groups having known characteristics (5:82). The relationships of the scores of the more established inventories to these criteria have been low. External validity correlation coefficients generally fall in the .50's and below. In view of this, the evidence presented by the publishers of personality inventories for their external validity must leave the user with some doubts about what is really being measured.

Internal validity, usually developed through the use of factor

analysis, for most of the currently used personality inventories is satisfactory (5:83). Through the selection of inventory items that have high correlations with total scores or certain trait-syndromes, clusters of items can be discerned which tend to measure a particular personality pattern. This allows the user of the inventory to have some confidence that a particular aspect of personality is being measured. The investigator must be aware, however, that this kind of evidence can only complement, not substitute for external criteria.

Research connected with these devices has centered upon relating the teachers' responses to observed teacher characteristics and the interrelationships among the various instruments themselves. Identification of the "good" or "effective" teacher has also been of prime interest (11:508-570).

Getzels and Jackson (11:508) report that The Minnesota Teacher Attitude Inventory (MTAI) is the most popular instrument for the measurement of teacher attitudes. Cook, Leeds, and Callis (44:3) stated that "it is designed to measure those attitudes of a teacher which predict how well he will get along with people in interpersonal relationships." They further stated that investigations which they completed concerning the MTAI "indicates that the attitudes of teachers toward children and school work can be measured with a high reliability, and that they are significantly correlated with teacher-pupil relations found in the teachers' classrooms."

The validity with which the MTAI predicts teacher-pupil relations was found to vary depending upon the pupils that make up the class. Della, Piana, and Gage (26:169-178) found that those pupils who are cognitively oriented indicated that those characteristics peculiar to

the effective teacher, as measured by the MTAI, did not relate to their feelings toward the teacher, but those pupils with strong affective values preferred teachers who were predicted to be effective by the MTAI. Kerney and Rocchio (31:443-445) have reported that pupils prefer teachers whose attitudes, in terms of the MTAI, are receptive and permissive. Popham and Trimble (37:509-512) found that the MTAI predicted the type of social atmosphere the teacher maintained in the classroom. Supportive attitudes towards children were found to be significantly higher, as measured by the MTAI, for high school seniors choosing teaching as a career than those seniors choosing nonteaching occupations (30:159-160). Leeds (32:333-337) concluded, from a study of the relationships between the MTAI and the Guilford-Zimmerman Temperament Survey, that the teachers who have high rapport with pupils tend to be cooperative, objective, and emotionally stable while those who have low rapport with students tend to be critical, intolerant, hostile, belligerent, hypersensitive, depressed, and emotionally unstable.

One of the major aims of the investigation directed by Ryans, treated earlier in his chapter, was the development of an instrument to predict "the classroom behavior and relevant personal and social characteristics of teachers from symptomatic responses (15:161)." The result of the effort devoted to this end was the Teacher Characteristics Schedule. It is an omnibus self-report type of inventory consisting of 300 items relating to personal preferences, self-judgments, biographical data and the like. The criteria which the Teacher Characteristics Schedule was designed to estimate were the teacher behavior Patterns X_o , Y_o , and Z_o ; favorable versus unfavorable opinions of democratic classroom procedures; favorable versus unfavorable opinions of

administrative and other school personnel; learning centered versus child centered educational viewpoints; superior verbal understanding versus poor verbal understandings; and emotional stability.

In a substudy of the investigation, attention was directed to the comparison of scores obtained on the Teacher Characteristics Schedule by teachers who were assessed by observers as generally high and generally low with regard to classroom behavior Patterns X_o , Y_o , and Z_o . Some exemplary differences which appeared in the two groups were that the high group tended to be interested in the arts, participated in social groups, and preferred permissive classroom procedures, but the low group expressed less favorable opinions of pupils, showed less satisfactory emotional adjustment, and represented older age groups (15: 397-398).

In another aspect of the Study, a highly selective sample of women elementary teachers who were considered outstanding in over-all classroom behavior were respondents to the Guilford-Zimmerman Temperament Survey, the California Psychological Inventory, the Allport-Vernon-Lindzey Study of Values, and the Kuder Preference Record-Vocational. All of these instruments contributed to the characterization of this group of women but the Allport-Vernon Study of Values (15:362-366).

In still another part of the Study an independent elementary teacher sample was divided into high and low groups with respect to the teacher behavior Patterns X_o , Y_o , and Z_o and the pattern of their pupils' behavior. The mean scores of these teacher groups reflecting these patterns were then compared with scores on the Thurston Temperament Schedule, The Minnesota Multiphasic Personality Inventory, and the Allport-Vernon-Lindzey Study of Values. Only the Thurston Temperament

Schedule was found to be sensitive to the Patterns involved.

The Minnesota Multiphasic Personality Inventory (MMPI) has been widely used in the study of teacher personality. That a great mass of research has built up around this instrument is indicated by the fact that The Sixth Mental Measurements Yearbook lists 1394 publications concerning it (7:302-313). The research centered upon the instrument has produced over 200 different scales in addition to the original 9. The MMPI was designed to provide information which would allow a discrimination to be made between "normal" individuals and those with various emotional and adjustment problems in a wide variety of situations (11:534).

The original MMPI does not seem to distinguish between various curriculum groups of college students. Lough (34:437-445), in using the original scales found no significant differences in the responses to the items of the MMPI of college women grouped into those enrolled in a professional nursing program and those enrolled in the general liberal arts program. Blum (20:31-65) obtained substantially the same results when education students, students in law, medicine, mechanical engineering and journalism were compared. Adcock (7:313-316) pointed out that some researchers have thought that the Inventory is useful as a measure of general personality but that it was not designed for this purpose. Lingoes (7:316-317) suggests that the MMPI has a number of weaknesses as general test of personality. Among them are that it is saturated with pathological items and that variables related to present day personality theories are excluded or deemphasized. He also suggested, as did Adcock, that it is useful as a clinical instrument, but for assessing the personality within the normal range of adjustment, it

has many deficiencies.

Of the over 200 scales devised in addition to the original 9 several are of importance in measuring teacher personality. The K Scale and the Teacher Prognosis Scale are probably the most important of these (11:540-545). The K Scale was designed to function as a control score but has proven to be useful as a discriminatory factor. Cook and Medley (25:123-129) found that high scores on the MTAI are associated with high K Scale scores. The K Scale also has been shown to be the only MMPI variable that shows discriminatory power between inferior and superior teachers (40:271-277). Gowan and Gowan (29:1-12) subsequently developed the Teacher Prognosis Scale by extracting 98 items from the Inventory. This scale showed discriminatory power between future teachers and nonteachers and proved to have high correlations with: (1) the K Scale; (2) the Tolerance, Good Impression, Intellectual Efficiency and High School Academic Achievement scales of the California Psychological Inventory; and (3) the Emotional Stability, Objectivity, Friendliness, and Personal Relations scales of the Guilford-Zimmerman Temperament Survey (28:35-37) (27:209-212).

The California Psychological Inventory (CPI) by Gough (45) is a structured verbal personality inventory made up of 18 separate scales which are designed to provide a profile representing the personality pattern of an individual couched in a social context. The guiding principle utilized in its construction was that the items within it should be selected on the basis of their high correlation with socially significant criteria whether they fitted into the current personality theories or not (6:97-98).

Researchers have shown an intensive interest in the Inventory.

Evidence for this is shown by the fact that The Sixth Mental Measurements Yearbook lists 144 publications concerning it (7:168).

Thorndike (6:97-98) noted that the Inventory provided a redundant picture of individual personalities in that there are only 4 of the 18 scales which do not correlate at least .50 with another scale. In the same writing he also pointed out that the validity coefficients reported for it were inflated and were generally low. Kelly (7:168-170) viewed the Inventory differently. He took the position that the CPI is one of the best instruments of its kind available even though the manual accompanying it presents an overstated description of its validity. He further noted that there exists "---convincing evidence that each of the scales has some validity when judged against life performance criteria" (7:170).

Mitchell and Pierce-Jones (36:453-456), upon noting the statement by Thorndike concerning the redundancy of the CPI, proceeded to perform a factor analysis of it. The sample utilized included 213 females and 45 males who were enrolled in a teacher education program. Upon analyzing the data secured from this sample 4 major factors of personality emerged which accounted for 60 per cent of the total variance found.

Factor I, accounting for 26 per cent of the total variance and with factor loadings ranging from .58 to .92, was made up of the CPI scales named Self Control, Good Impression, Achievement via Conformance, Sense of Well Being, Tolerance, and Responsibility. The investigators suggested that Factor I might best be named "Adjustment by Social Conformity." Factor II accounted for 15 per cent of the total variance and had factor loadings ranging from .59 to .78. The 5 CPI scales making up this factor were Dominance, Capacity for Status, Sociability,

Social Presence, and Self-Acceptance. Social Poise or, alternatively, Extroversion were suggested by the investigators as possible names for this factor. Factor III was made up of the CPI scales Responsibility, Socialization, Communality, and Femininity. Although this factor was ill defined in that the factor loadings of the 4 scales ranged from .44 to .58 and that only 7 per cent of the total variance was accounted for by it, the investigators tentatively suggested it be called "Super-Ego Strength." The CPI scales called Tolerance, Intellectual Efficiency, Capacity for Status, Flexibility, Social Presence, and Achievement via Independence make up Factor IV. Factor loadings for these scales ranged from .50 to .67 and 12 per cent of the total variance was accounted for by them. The investigators pointed out that "--- this factor suggests a complex of qualities which might augur well for success in a wide range of human activities (36:455)." The name suggested for Factor IV was "Capacity for Independent Thought and Action."

The researchers were able to conclude from this study that "--- the CPI cannot be regarded with real justification as measuring the 18 relatively independent personality dimensions that it is purported to measure (36:455)" and that the "---18 CPI scales represent a much smaller number of personality dimensions (36:456)."

Blankenship (19:54-60), in a pioneering study designed to determine if there were personality differences between science teachers who were favorable to the Biological Science Curriculum Study Program and those who were not, made use of the CPI and the Allport-Vernon-Lindzey Study of Values. The seven scales of the CPI which were used are Social Presence, Capacity for Status, Tolerance, Achievement via Independence, Intellectual Efficiency, Flexibility, and Responsibility.

These are the same scales, excluding the Responsibility Scale, which Mitchell and Pierce-Jones included within their Factor IV and called the "Capacity for Independent Thought and Action."

The sample consisted of 55 science teachers who taught biology on the secondary school level. The members of the sample were divided on the basis of their demonstrated behavior into a group, numbering 24, which was unfavorable toward the Program and a group, numbering 25, which was favorable to the Program. The 7 remaining teachers, who demonstrated neither a favorable or an unfavorable attitude toward the Program, were classified as indeterminate.

The teachers were given the opportunity to respond to the items of the CPI and the Allport-Vernon-Lindzey Study of Values. The differences between the means of the favorable group and the unfavorable group were significant at the .05 or .01 level for all of the CPI scales listed above but the Capacity for Status Scale. No significant differences between the two groups were found for the two scales of the Allport-Vernon-Lindzey Study of Values.

In view of this the investigator was able to state "---that, in general, teachers who ranked higher on measures of capacity for independent thought and action--reacted favorably to the BSCS Program while those who ranked lower on measures of capacity for independent thought and action--reacted unfavorably to the Program (19:59-60)." In a related writing the investigator noted that it was not suggested that the individual scales of the CPI were to be considered of equal value or importance (4:9).

Summary

A review of literature relating to science teacher personality and behaviors reveals a dearth of studies. Only those studies by Reed (38:205-229), Blankenship (19:54-60), and Van Allenstein (17:1-49) deal exclusively with science teachers. A study by Cogan (9:1-167) deals with teachers in several fields including science teachers. Of the above studies only Blankenship considers variables which relate science teacher behavior to science teacher personality.

The behaviors of teachers which have been positively related to a modification in pupil behavior have been variously, among other things, called "integrativeness," "learner-centered," "warmth," "inclusiveness," "competence," "responsibleness," "permissiveness," and "friendliness." Results of the various studies are difficult to compare due to the fact there exists many differences in the behavior variables and criterion variables used. It seems apparent, however, that there exists a pattern suggesting that the teacher who often reacts positively to the needs of pupils within the social context of a given moment in a classroom generally receives positive responses from pupils. It is important to keep in mind, however, that many studies have failed to establish positive relationships between these types of teacher behavior and pupil response.

The only personality variables that have been directly related to a specific demonstrated behavior of science teachers are those within the CPI which Blankenship utilized (19:54-60). These were the same scales, except for a supplemental one, that Mitchell and Pierce-Jones (36:453-456) suggested that as a group comprises a cluster of personal qualities which seem to be indicative of success in a wide range of

life endeavors. Since Blankenship found a statistically significant relationship between 6 of these variables and a behavior of the science teacher, it seems reasonable that this group of variables might be meaningfully related to the classroom behavior of the science teacher. The most productive variable of classroom behavior should be on which has been shown to be measurable and which is related to behavioral changes in pupils. Furthermore, it would be best if these attributes were established previously with science teachers. The "inclusive" behavior of the teacher satisfies these stipulations.

To determine whether the qualities of personality mentioned above and detailed in Chapter I are related to a specific science teacher classroom behavior, it is necessary to design research such that both the classroom behavior of the science teacher and certain aspects of his personality may be studied.

CHAPTER III

RESEARCH DESIGN

The design of this study was so devised that it would enable the guiding hypotheses set forth in Chapter I to be treated in such a manner that the specific questions that arose from them might be considered directly and independently. The variables from which these questions emanated were (1) the science teacher's "inclusive behavior," (2) the science teacher's "capacity for status," (3) the science teacher's "social presence," (4) the science teacher's "responsibility," (5) the science teacher's "tolerance," (6) the science teacher's tendency for "achievement via independence," (7) the science teacher's "intellectual efficiency," and (8) the science teacher's "flexibility." The data concerning variable (1) was gathered through the use of a Pupil Survey while the data concerning the variables (2) through (8) were collected by means of a commercial psychological inventory. In order to make effective use of these instruments, it was necessary to provide an appropriate physical setting for their administration.

Selection of the Science Teacher Sample

The participants in 4 Biological Science Curriculum Study Summer Institutes sponsored by the institution of higher education with the financial support of the National Science Foundation were selected as the subjects of the study. The institutions of higher education at

which the Institutes were held are located in the Rocky Mountain and South Western regions of the United States. The reasons for choosing these Institutes as a source for the sample of this investigation were as follows:

1. The participants were secondary school science teachers preparing to teach or teaching biology in the secondary school.
2. The participants were from widely varying geographical areas within the United States.
3. The total anticipated number of participants were 190, thus providing an adequate sample.
4. The participants taught in schools located in communities with widely varying social and economic characteristics.
5. The Institutes provided a means of gathering the subjects together at a few locations to respond to the appropriate instruments.
6. The Institutes provided initial contacts with the subjects through which data pertaining to the study could be collected during the following school year.
7. The geographical location of the Institutes made them reasonably accessible to the investigator.

In view of the satisfactory conditions for the collection of data that the Institutes (herein after referred to Institutes A, B, C, and D) provided, permission was requested of the respective Directors to involve their participants in this investigation. Permission was secured from the directors during the spring of 1966.

Characteristics of the Summer Institutes

To provide a more detailed insight into the characteristics of the individuals making up the sample of this study, a brief description of the training programs in which they were selected to participate is described below.

Institute A was open to all certified secondary teachers. Preference was given to those applicants with at least 3 years of teaching experience, 18 credit hours in Biology, and definite plans to use the BSCS Yellow Version. These criteria were the sole basis upon which candidates were selected.

The objectives of the Institute were (1) to develop an appreciation and understanding of the BSCS Program materials, (2) to familiarize the participants with the unique features of the Yellow Version of the BSCS Program materials, (3) to improve the biological competency of the participants by introducing them to recent advances in biology and (4) to enable the participants to feel more competent in organizing and supervising laboratory experiments.

Lectures, laboratory experience, seminars and field trips were provided to develop understandings of scientific facts, principles and methods. All of these experiences were oriented toward the Yellow Version of the BSCS Program materials. The laboratory work included specific selected exercises from the Yellow Version laboratory guide. The major topics considered in the lectures were the cell, growth and differentiation, genetics, physiological phenomena of plants, microbiology, ecological relationships, and evolution.

The instructional staff consisted of five members of the regular staff of the college in which the Institute was housed and one head of

a secondary school science department.

The Institute was of 8 weeks duration. The number of participants in the Institute was limited to 50.

The primary criteria for the selection of the participants in Institute B were: (1) possession of a bachelor's degree, (2) indication of satisfactory scholarship and professional competence, (3) currency of teaching biology, and (4) demonstrated ability to benefit from the Institute. The Institute was geared for those with a moderate degree of competence in biology.

Institute B was structured to prepare high school biology teachers to present new concepts contained in the Blue Version of the BSCS Program materials with emphasis on molecular and evolutionary themes. The core of the program was directed toward the attainment of considerable facility in the BSCS Program approach to the teaching of biology. Both theory and laboratory work were designed to develop the rationale of the BSCS Program.

Lectures, field trips and laboratory experiences were provided to incorporate the integrating concepts of evolution and molecular biology and to acquaint the participants with the investigative aspects of biology. The principal subjects covered during the Institute were biochemistry, origin of life, statistics, genetics, ecology, cellular physiology, and plant and animal physiology.

The instructional staff members were selected from various research centers, universities, and colleges in the United States. The Institute was of 6 weeks duration. Space was allocated for 50 participants.

Institute C was primarily designed for biology teachers with weak

backgrounds in the life sciences. Participants were required to have baccalaureate degrees and to be teachers of biology or under contract to teach it. Candidates were selected solely on the basis of their ability to benefit from the training program.

The objectives of the Institute were (1) to prepare secondary science teachers to use the Green Version of the BSCS Program materials, to develop a background in genetics, and to become familiar with the Second Level Course of High School Biology as established by the BSCS; (2) to fully acquaint participants with materials furnished by the AIBS and the BSCS, (3) to encourage scientific inquiry and scientific writing in the field of biology, (4) to help participants in developing a workable program of biological science in their own classrooms, and (5) to improve the techniques and capabilities of the participants in the field and laboratory.

The courses which the participants were enrolled in were Ecological Principles, Basic Genetics, Second Level Course in Biology, and a Seminar in Scientific Inquiry. Supplemental laboratory and field experiences were provided.

The instructional staff was made up of faculty members of the parent institution teamed with professors drawn from institutions of higher learning in the Western United States.

The Institute was of 10 weeks duration. The number of participants was limited to 50.

Institute D was planned for practicing high school biology teachers interested in improving their subject matter competence in biology and the other sciences. Preference was given to applicants who were relatively weak in their biological science background or in allied

sciences and mathematics areas. Participants were required to have a grade point average which would allow them to be enrolled in the graduate school of the parent institution. They also were required to have at least 3 years of teaching experience in high school and have the responsibility for teaching at least 1 course in biology during the 1966-67 academic year.

The primary objective of this Institute was to provide depth in the biological sciences and a more solid understanding of collateral science areas for practicing professional science teachers.

The participants selected, with the approval of the faculty, the most suitable courses for themselves from the usual summer course offerings of the institution providing the Institute. In the biological sciences, the course offerings ranged from General Botany to Comparative Neurophysiology. All participants were required to attend a Natural Science Seminar. In addition, the participants selected to be subjects of this investigation enrolled in Advanced Biology for Teachers. This course was devoted to the study of the philosophy and rational, subject matter, content, and laboratory materials of the BSCS Blue Version.

Members of the instructional staff of the parent institution made up the staff of the Institute. Visiting scientists and lecturers were utilized in the seminar program.

The Institute was of 8 weeks duration. The number of participants was limited to 50.

Description of the Data Gathering Instruments

Three instruments were utilized in collecting the necessary data

for this study. They were The California Psychological Inventory, a Pupil Survey, and a Follow-up Questionnaire. The reasons for the use of these instruments and a description of each is given below.

The California Psychological Inventory: This commercially prepared and standardized psychological Inventory was administered to the science teachers on the first day the participants formally met prior to the summer training programs by this investigator or by others conducting related studies.

The Inventory was selected to be used in this study for the following reasons: (1) Blankenship (4:69-74) found that the means of 6 of the 7 scales of the Inventory he used in his study to be significantly different when science teachers were compared on the basis of a demonstrated behavior, (2) a review of the literature revealed that previous research work relating to teacher characteristics had made use of this instrument with some degree of satisfaction with the instrument being expressed by the investigators, and (3) this instrument has been used in numerous studies, and information concerning its possible strengths and weaknesses was available.

The California Psychological Inventory was conducted to develop descriptive concepts of personality which have broad personal and social relevance and to devise brief, accurate, and dependable subscales for the variables that were chosen to be included in it. The characteristics of personality, were of central interest throughout its development (45:7).

The Inventory was intended primarily for use with "normal" subjects and scales are keyed principally to personality characteristics important to social living and social interactions. It was designed to

be used primarily with subjects that are socially-functioning individuals (45:7).

The Inventory was constructed so as to be largely self-administering. No rigorous conditions are needed in order to achieve valid test results. During its development it was used in research testing with groups ranging in age from 12 to 70 years. If the respondees were of high school age or above, problems with the difficulty level and irrelevance of items were rarely encountered (45:8).

There were 480 randomized items, most of which are transparent, in the Inventory. The items are subdivided for analysis into 18 separate scales (45:7). Of these 18 scales, 7 were used in this investigation. These 7 scales were selected because they measured those personality characteristics which are likely to be related to a specific classroom behavior of the science teacher which in turn has shown relationships to pupil behavior. The scales selected were:

1. Capacity for Status (Cs)--The purpose of the scale is "to serve as an index of an individual's capacity for status (not his actual or achieved Status). The scale attempts to measure the personal qualities and attributes which underlie and lead to status (45:12)." Individuals obtaining high scores on this scale tend to be seen as being ambitious, active, forceful, insightful, resourceful, versatile, accendant, and self-seeking. Individuals obtaining low scores on this scale tend to be seen as being apathetic, conventional, stereotyped in thinking, and restricted in outlook and interests. The analyses in this investigation were designed to determine whether or not these science teachers who are scored high by their

pupils on their "inclusive" behavior also score significantly higher on this scale than those science teachers who are scored low by their pupils on their "inclusive" behavior.

2. Social Presence (Sp)--The purpose of the scale is "to assess factors such as poise, spontaneity, and self-confidence in personal and social interaction (45:12)." Individuals obtaining high scores on this scale tend to be seen as being clever, enthusiastic, imaginative, informal, spontaneous, active, and vigorous. Individuals obtaining low scores tend to be seen as being moderate, self-restrained, uncertain in decisions, deliberate, and unoriginal in thinking and judging. The analyses in this investigation were designed to determine whether or not those science teachers who are scored high by their pupils on their "inclusive" behavior also score significantly higher on this scale than those science teachers who are scored low by their pupils on their "inclusive" behavior.
3. Responsibility (Re)--The purpose of this scale is "to identify individuals of conscientious, responsible, and dependable disposition and temperament (45:12)." Individuals obtaining high scores on this scale tend to be seen as being responsible, thorough, progressive, conscientious, dependable, and efficient. Individuals obtaining low scores on this scale tend to be seen as being immature, changeable, disbelieving, impulsive in behavior, and influenced by personal bias and dogmatism. The analyses in this investigation were designed to determine whether or not those science teachers who are scored high by their pupils on their "inclusive" behavior also significantly

higher on this scale than those science teachers who are scored low by their pupils on their "inclusive" behavior.

4. Tolerance (To)--The purpose of this scale is "to identify persons with permissive, accepting, and non-judgmental social beliefs and attitudes (45:12)." Individuals obtaining high scores on this scale tend to be seen as being enterprising, informal, tolerant, clear thinking, resourceful, and having broad and varied interests. Individuals obtaining low scores on this scale tend to be seen as being suspicious, aloof, wary, passive and overly judgmental in attitude. The analyses in this investigation were designed to determine whether or not those science teachers who are scored high by their pupils on their "inclusive" behavior also score significantly higher on this scale than those science teachers who are scored low by their pupils on their "inclusive" behavior.
5. Achievement Via Independence (Ai)--The purpose of this scale is "to identify those factors of interest and motivation which facilitate achievement in any setting where autonomy and independence are positive behavior (45:13)." Individuals obtaining high scores on this scale tend to be seen as being mature, forceful, foresighted, independent, self-reliant, dominant, and possessing superior intellectual ability and judgment. Individuals obtaining low scores on this scale tend to be seen as being inhibited, cautious, dissatisfied, and lacking in self-insight and self understanding. The analyses in this investigation were designed to determine whether or not those science teachers who are scored high by their pupils

on their "inclusive" behavior also score significantly higher on this scale than those science teachers who are scored low by their pupils on their "inclusive" behavior.

6. Intellectual Efficiently (Ie)--The purpose of this scale is "to indicate the degree of personal and intellectual efficiency which the individual has attained (45:13)." Individuals obtaining high scores on this scale tend to be seen as being efficient, capable, clear thinking, intelligent, progressive, thorough, and as being alert and well informed. Individuals obtaining low scores on this scale are seen as being cautious, confused, defensive, conventional and stereotyped in thinking, and as lacking in self-direction and self-discipline. The analyses in this investigation were designed to determine whether or not those science teachers who are scored high by their pupils on their "inclusive" behavior also score significantly higher on this scale than those science teachers who are scored low by their pupils on their "inclusive" behavior.
7. Flexibility (Fx)--The purpose of this scale is "to indicate the degree of flexibility and adaptability of a person's thinking and social behavior (45:13)." Individuals obtaining high scores on this scale tend to be seen as being insightful, informal, adventurous, confident and rebellious. Individuals obtaining low scores on this scale tend to be seen as being deliberate, cautious, worrying, methodical, rigid, and being differential to authority, custom, and tradition. The analyses of this investigation were designed to determine whether or not those science teachers who are scored high by their

pupils on their "inclusive" behavior also score significantly higher on this scale than those science teachers who are scored low by their pupils on their "inclusive" behavior.

The Pupil Survey: The Pupil Survey used in this study to measure the "inclusive" behavior of the science teacher was a modified form of the "Pupil Survey" developed by Cogan (9:161-166). Cogan's "Survey" was divided into 3 parts. Part I was used to gather information concerning the amount of required work students completed. Part II was used to measure the amount of self-initiated work students did. Part III of the "Survey" was used to obtain students' perceptions of the teacher's "inclusive," "preclusive," and "conjunctive" classroom behavior. Because this study is concerned only with the "inclusive" behavior of the science teacher only Part III will be discussed in detail.

In the first phase of the development of Part III of the "Survey" a questionnaire was drawn up and sent out to 34 persons competent to judge the included items as to their consistency with the previously defined "inclusive" and "preclusive" criteria. The questionnaire provided each judge with a brief description of "preclusive" and "inclusive" teacher behavior. Each judge was to indicate which items he felt were clearly indicative of "inclusive" and "preclusive" behavior. There were 23 usable replies to the questionnaire. All of the respondents were qualified educators and psychologists.

A preliminary form of the "Survey" was then drafted. No item was included in the preliminary form to which more than 13 per cent of the judges rated non-discriminating. Of the 67 items submitted to the judges 13 were discarded. Upon the suggestion of the judges, others were altered in form.

The preliminary form of Cogan's "Survey" was then administered to 170 pupils in two communities. In this pretest, the pupils accepted the guarantee of anonymity and confidentiality without question. They also comprehended the meaning and intent of the items and were able to respond to them in terms of multiple-choice answers provided. After analysis of the information received through this administration Cogan made a final revision.

The "inclusive" portion of Cogan's "Pupil Survey" was used in the present study. In Cogan's "Survey" the "inclusive" items were interspersed with the "preclusive" items. The "preclusive" items included in the original "Survey" were deleted and 12 dummy items were substituted in the same relative positions. The resulting instrument used in this study contains a total of 35 items. The possible student responses to the items in the "modified" Pupil Survey and their numerical equivalents are Almost never-1, Few times-2, Sometimes-3, Often-4, and Very often-5, or Almost never-1, Few times-2, Sometimes-3, Many times-4, Almost always-5. Each pupil was requested to respond by writing the number of the answer nearest to his opinion in the space to the right of the item.

The teacher's "inclusive" score on each Pupil Survey was determined by summing the responses to items 1, 3, 4, 5, 6, 7, 9, 11, 13, 14, 15, 17, 18, 20, 22, 23, 25, 27, 29, 30, 32, 33, and 35. The teacher's "inclusive" behavior score for the class was arrived at by summing all of the scores on each Pupil Survey completed by the pupils in the class and dividing the result by the number of responding pupils. A high average score indicates a high degree of "inclusive" classroom behavior while a low average score indicates a low degree of "inclusive"

classroom behavior.

The reasons the "inclusive" portion of the "Pupil Survey" was chosen as a data gathering instrument are (1) upon review of the literature it appears that it measures a classroom behavior of teachers considered likely to be exhibited by science teachers possessing certain personality characteristics, (2) it provides a means to indirectly enter the classroom to gather data, (3) it is purported to measure a relevant pupil perceived classroom behavior of teachers in communities of contrasting socioeconomic characteristics, (4) it is very simple to administer to a "normal" class, (5) it requires simple responses by the students to simply expressed statements, and (6) it requires only about 20 minutes of class time for administration.

Since the science teachers in the sample were spread throughout the United States, it was necessary that a person in the local school be entrusted to administer the Pupil Survey to the pupils. Packets of materials were sent to the Principals of the schools in which the participants taught. In each packet, there was 1 set of instructions for the administrator of the Survey, 1 letter of explanation and instructions for the Principal, 1 letter of explanation for the Superintendent of Schools, 1 letter of instructions and explanation for the science teacher, 1 banded packet of 35 pupil surveys, and the necessary postage-paid return envelopes. Much attention was given to the construction and reproduction of these materials in order that they would have a high face validity. Much emphasis was also placed upon assuring the pupils and teachers involved that their responses to the Pupil Survey would be kept confidential and that no person in their school system would see them.

The Principal of each school was requested to give the Pupil Survey packet and teacher's envelope to the member of his supervisory or guidance staff that he felt most appropriate to administer the instrument. It was emphasized to the administrator of the Survey that the science teacher should not be in the classroom during the time the pupils were responding to it. To aid in removing the teacher from the classroom an instrument was given to the teacher to fill out during this time period. The administrator was also cautioned not to expose the Survey to the science teacher before it was administered. The Survey was to be completed by the members of the first class of tenth grade biology the teacher met in the day. It was to be completed during the week of November 14, 1966. Immediately after the pupils in the class were finished working on the Survey a responsible member was to take the sealed return envelope, with the completed Surveys in it, to the mailing room in the school. The last usable packet of Surveys, which was returned, arrived at Oklahoma State University, Stillwater, Oklahoma, on December 15, 1966. A copy of the Pupil Survey and the auxilliary materials accompanying it are included in Appendix B.

The Follow-up Questionnaire: This instrument, prepared by Blankenship (19:52), was utilized in this investigation to collect data relevant to this and other studies and to aid in occupying the teachers' time while his students completed the Pupil Survey. A copy of the Follow-up Questionnaire is included in Appendix B.

Statistical Procedure

Because of the possibility that the teacher's "inclusive" behavior as perceived by his students may be dependent upon the number of

students in the class the data collected from classes consisting of less than 14 students was discarded prior to the performance of any statistical test. This procedure eliminated from the sample those teachers who may have been forced into a high level of "inclusive" behavior due to the smallness of the class they taught. The cut off point of "less than 14 students" was determined on the basis of the past experience of the investigator.

It was also recognized that there was a distinct possibility that a difference existed in the way boys perceive "inclusive" behavior of the science teacher and the way girls perceive "inclusive" behavior of the science teacher. Because of this possibility it was considered necessary to determine if the mean score for "inclusive" behavior the girls assigned to the science teacher was significantly different from the mean score for "inclusive" behavior the boys assigned to the science teacher. If a significant difference did exist, the data collected from the boys and girls would necessarily be treated separately. If the mean scores were not significantly different the data could be combined.

The science teachers were classified into 2 categories. One category contained those teachers that were perceived by their students as exhibiting a high level of "inclusive" behavior. The second category contained those science teachers that were perceived by their students as exhibiting a low level of "inclusive" behavior. The criterion used to place the teachers into the categories was the mean score they received on the Pupil Surveys completed by their students. If a teacher received a score in the upper half of the "inclusive" behavior scores received by science teachers making up the sample, he was placed in the

category. If a teacher received a score in the lower half of the "inclusive" behavior scores received by the science teachers making up the sample, he was placed in the low category.

The high and low groups formed by the above categorization were then compared on the basis of the differences in the means of each of the seven dependent variables. This comparison was made by means of a t-test for independent samples. Prior to the final selection of the most appropriate form of the t-test to be used, a test for the homogeneity of variance was made for each of the 7 variables.

Previous to the collection of the data, the confidence level required for the rejection of the null hypotheses set forth in this study was set at the 5 per cent level.

CHAPTER IV

FINDINGS OF THE STUDY

A Summary of the Data

The administration of the California Psychological Inventory resulted in the collection of useful data concerning the relevant personality variables for 170 science teachers. After determining that the number of the teachers who would be engaged in teaching high school biology during the academic year 1966-67 was approximately 160, the Pupil Survey packet was forwarded to the Principals of the schools in which they taught. The final size and usefulness of the sample utilized in this study depended upon the response of the personnel of the local schools to the Pupil Survey packet. The response to the packet is summarized in Table I. The number of usable packets returned to the investigator represented 107 science teachers. Thus a sample considered adequate in number was obtained. This number represented 70.9 per cent of the total usable returns possible and therefore provide a statistically useful sample.

The data collected for this study are summarized in Table II. This table shows the mean scores on 7 personality variables of 107 science teachers grouped on the basis of their "inclusive" behavior. Each of the 107 teachers were grouped on the basis of his "inclusive" behavior score into the high "inclusive" behavior group or the low "inclusive" behavior group. The teacher whose score fell on the median

TABLE I
 SUMMARY OF THE RESPONSE TO THE
 PUPIL SURVEY PACKET

Institute	Number Mailed	Number Returned	Percentage Returned	Number of Usable Surveys Returned	Percentage of Usable Returns
A	39	33	84.6	31	83.8
B	50	29	58.0	27	56.3
C	52	41	78.8	37	77.1
D	19	13	68.4	12	66.6
Combined	160	116	72.5	107	70.9

TABLE II

MEAN SCORES ON PERSONALITY VARIABLES OF 107 SCIENCE
TEACHERS GROUPED ON THE BASIS OF THEIR
"INCLUSIVE" BEHAVIORS

"Inclusive" Behavior	Number of Teachers	Mean Scores on Personality Variables						
		Cs	Sp	Re	To	Ai	Ie	Fx
High	54	19.444	34.814	32.037	23.555	20.148	29.351	9.037
Low	53	20.056	35.113	31.339	23.320	19.792	28.547	9.150

was randomly (by the flip of a coin) placed in the high "inclusive" behavior group.

Preliminary Statistical Procedures

The first statistical test necessary was that to ascertain the most appropriate form of the t-test to use in determining if a significant difference existed between the mean score for the "inclusive" behavior of the female students assigned to the science teacher and the mean score for the "inclusive" behavior of the male students assigned to the science teacher. Table III shows the means, the variances and the homogeneity of variance of the responses by the male and female students to the Pupil Survey for the teachers in each institute and for the institutes combined. The most obvious fact is that for the institutes, considered individually or combined, there is no significant differences in the variances. Therefore it may be concluded that the scores represent a single homogeneous population. Thus, the most appropriate t-test for independent means becomes that for sample groups which represent a single homogeneous population. This statistical model is detailed in Appendix A.

Table IV summarizes the results of the application of this statistical model to the scores assigned by the female students and male students to the teachers. It shows the means, the difference between the means, and the significance of the "inclusive" behavior scores assigned to teachers by the male and female students for each institute and for the institutes combined. The most obvious fact is that there was no significant differences between the female and male scores for the teachers whether considered by institutes or by the institutes combined.

TABLE III
 THE MEANS, THE VARIANCES, AND THE HOMOGENEITY OF
 VARIANCE OF MALE AND FEMALE SURVEY SCORES

Institute	Mean Female	Mean Male	Variance Female	Variance Male	Significance
A	84.483	83.776	91.657	57.611	N.S.
B	90.270	86.911	73.912	53.659	N.S.
C	86.200	83.576	58.472	71.127	N.S.
D	89.345	89.518	35.436	74.741	N.S.
Combined	86.768	84.968	72.239	66.201	N.S.

TABLE IV

THE MEANS, DIFFERENCE BETWEEN THE MEANS, AND SIGNIFICANCE
OF THE "INCLUSIVE" BEHAVIOR SCORES ASSIGNED
TO TEACHERS BY MALE AND FEMALE STUDENTS

Institute	Mean Female	Mean Male	Difference Between Means	Significance
A	84.483	83.776	.706	N.S.
B	90.270	86.911	3.358	N.S.
C	86.200	83.576	2.623	N.S.
D	89.345	89.518	-.172	N.S.
Combined	86.768	84.968	1.800	N.S.

The t-values, found in Appendix A, for the combined institutes indicates that there is a rather large probability that a difference does exist but this probability does not approach the 95 per cent level. Therefore it must be concluded that the boys and girls perceive the "inclusive" behavior of the science teacher in a similar manner. Thus, their scores may be combined to form a representative score for the science teacher. This combined score becomes the criterion upon which the teacher is placed into the high or low "inclusive" behavior group for testing the 7 hypotheses of this study.

Prior to the testing of the hypotheses, it was necessary to determine the most appropriate form of the t-test for independent means to use. Table V shows the means, the variances, and the results of the test for homogeneity of variance of the 7 personality variables for the high and low "inclusive" behavior groups. The most outstanding fact is that the variances of the personality variables for the high and low "inclusive" behavior groups are not significantly different. Therefore the t-test for independent means that is most appropriate to test the hypotheses of this study is that for which the sample groups represent a single homogeneous population. This statistical model is detailed in Appendix A.

Testing the Hypotheses

Table VI shows the results of testing the seven hypotheses of this study. The outstanding fact is that no significant differences exist between science teachers whom pupils perceived to have a high level of "inclusive" behavior and science teachers whom pupils perceived to have a low level of "inclusive" behavior for any of the relevant personality

TABLE V

THE MEANS, THE VARIANCES, AND THE HOMOGENEITY OF VARIANCE
OF THE SEVEN PERSONALITY VARIABLES FOR THE HIGH
AND LOW "INCLUSIVE" BEHAVIOR GROUPS

Variable	Mean Score High "Inclusive" Group	Mean Score Low "Inclusive" Group	Variance High "Inclusive"	Variance Low "Inclusive"	Significance
1. Cs	19.944	20.056	13.261	11.977	N.S.
2. Sp	34.814	35.113	35.361	45.333	N.S.
3. Re	32.037	31.339	16.866	17.074	N.S.
4. To	23.555	23.320	20.893	19.260	N.S.
5. Ai	20.148	19.792	16.770	15.667	N.S.
6. Ie	29.351	38.547	22.798	16.521	N.S.
7. Fx	9.037	9.150	13.168	14.784	N.S.

TABLE VI

THE MEANS, DIFFERENCE BETWEEN THE MEANS, AND THE
SIGNIFICANCE OF THE SEVEN PERSONALITY VARIABLES

Variable	Mean High "Inclusive"	Mean Low "Inclusive"	Difference Between Means	Significance
1. Cs	19.944	20.056	-.112	N.S.
2. Sp	34.814	35.113	-.298	N.S.
3. Re	32.037	31.339	.697	N.S.
4. To	23.555	23.320	.234	N.S.
5. Ai	20.148	19.792	.355	N.S.
6. Ie	29.351	28.547	.804	N.S.
7. Fx	9.037	9.150	-.113	N.S.

variables.

The first hypothesis tested was

There is no relationship between the inclusive behavior of the science teacher in the biology classroom as perceived by biology students and the capacity for status of the teacher.

The t -value obtained as a result of the t -test for independent means for this hypothesis was $-.163$. The value required for significance at the $.05$ level was 1.980 . The magnitude of the t -value is less than the required value and therefore the first null hypothesis failed to be rejected.

The second hypothesis to be tested was

There is no relationship between the inclusive behavior of the science teacher in the biology classroom as perceived by biology students and the social presence of the teacher.

The t -value obtained as a result of the t -test for independent means for this hypothesis was $-.242$. The value required for significance at the $.05$ level was 1.980 . The magnitude of the t -value is less than the required value and therefore the second null hypothesis failed to be rejected.

The third hypothesis to be tested was

There is no relationship between the inclusive behavior of the science teacher in the biology classroom as perceived by biology students and the responsibility of the teacher.

The t -value obtained as a result of the t -test for independent

means for this hypothesis was .875. The value required for significance at the .05 level was 1.980. The magnitude of the t -value is less than the required value and therefore the third null hypothesis failed to be rejected.

The fourth hypothesis to be tested was

There is no relationship between the inclusive behavior of the science teacher in the biology classroom as perceived by biology students and the tolerance of the teacher.

The t -value obtained as a result of the t -test for independent means for this hypothesis was .271. The value required for significance at the .05 level was 1.980. The magnitude of the t -value is less than the required value and therefore the fourth null hypothesis failed to be rejected.

The fifth hypothesis to be tested was

There is no relationship between the inclusive behavior of the science teacher in the biology classroom as perceived by biology students and the tendency toward achievement via independence of the teacher.

The t -value obtained as a result of the t -test for independent means for this hypothesis was .456. The value required for significance at the .05 level was 1.980. The magnitude of the t -value is less than the required value and therefore the fifth null hypothesis failed to be rejected.

The sixth hypothesis to be tested was

There is no relationship between the inclusive behavior of the science teacher in the biology classroom as per-

ceived by biology students and the intellectual efficiency of the teacher.

The t -value obtained as a result of the t -test for independent means for this hypothesis was .939. The value required for significance at the .05 level was 1.980. The magnitude of the t -value is less than the required value and therefore the sixth null hypothesis failed to be rejected.

The seventh hypothesis tested was

There is no relationship between the inclusive behavior of the science teacher in the biology classroom as perceived by biology students and the flexibility of the teacher.

The t -value obtained as a result of the t -test for independent means for this hypothesis was -.157. The value required for significance at the .05 level was 1.980. The magnitude of the t -value is less than the required value and therefore the seventh null hypothesis failed to be rejected.

CHAPTER V

CONCLUSIONS AND IMPLICATIONS

The purpose of this investigation was to test the hypothesis that there were no significant differences in certain personality characteristics between science teachers who were perceived by their students as exhibiting a high level of "inclusive" behavior and science teachers who were perceived by their students as exhibiting a low level of "inclusive" behavior. In order to reduce this hypothesis to manageable terms, 7 specific personality variables were selected to be studied with regard to their relationship to the science teachers "inclusive" behavior. None of these variables were found to be statistically significant at the .05 level of confidence.

The conclusions to be drawn from the findings of this study are made in terms of the 7 specific questions posed in Chapter I.

1. There is no significant difference in the mean score on the Capacity for Status Scale of the California Psychological Inventory between science teachers who have a low mean score on the Pupil Survey and science teachers who have a high mean score on the Pupil Survey.
2. There is no significant difference in the mean score on the Social Presence Scale of the California Psychological Inventory between science teachers who have a low mean score on the Pupil Survey and science teachers who have a high mean score

on the Pupil Survey.

3. There is no significant difference in the mean score on the Responsibility Scale of the California Psychological Inventory between science teachers who have a low mean score on the Pupil Survey and science teachers who have a high mean score on the Pupil Survey.
4. There is no significant difference in the mean score on the Tolerance Scale of the California Psychological Inventory between science teachers who have a low mean score on the Pupil Survey and science teachers who have a high mean score on the Pupil Survey.
5. There is no significant difference in the mean score on the Achievement via Independence Scale of the California Psychological Inventory between science teachers who have a low mean score on the Pupil Survey and science teachers who have a high mean score on the Pupil Survey.
6. There is no significant difference in the mean score on the Intellectual Efficiency Scale of the California Psychological Inventory between science teachers who have a low mean score on the Pupil Survey and science teachers who have a high mean score on the Pupil Survey.
7. There is no significant difference in the mean score on the Flexibility Scale of the California Psychological Inventory between science teachers who have a low mean score on the Pupil Survey and science teachers who have a high mean score on the Pupil Survey.

Within the limitations of this study it may be stated that there

appears to be no significant relationship between the selected scales of the CPI and a behavioral evaluation of the science teacher by his students. Upon investigating the t-values in Appendix A, this statement may be extended to include the fact that no recognizable trends appear to exist between the scores on the selected scales of the CPI and the "inclusive" behavior of the science teacher in the classroom as perceived by his pupils.

The above conclusions are substantially in agreement with a statement made by Veldman and Peck (42:352) pointing out the fact, ascertained from evidence gathered in their study, that although there appeared to be some minor relationships between the individual scales of the CPI and behavioral evaluations of the teacher by his pupils, they were quite indistinct at best. Blankenship (19:54-60), however, was able to show a strong relationship between selected specific scales of the CPI and a science teacher behavior. An explanation of these seemingly contradictory results may rest in the fact that while the study by Veldman and Peck and the present study dealt with patterns of behavior, the study by Blankenship dealt with a specific behavior. In the latter case the teachers involved were confronted with a specific choice. A pattern of behavior, however, is constituted by a continuous series of choices made in varying environmental circumstances. The possibility exists that the set of needs which results in a given behavior pattern for the individual is quite variable among individuals. If the set of needs is itself a variable, then individuals of varying specific aspects of personality may exhibit similar behavior patterns. Thus, as noted by Veldman and Peck, self report inventories such as the CPI may not provide a sufficient degree of differentiation to yield anything but

slight indications of behavior patterns for highly selected sample of individuals. It should be noted that all of the subjects in the present study were professional science teachers who for the most part had demonstrated their effectiveness in the classroom, had shown a definite interest in continuing to teach science, and had demonstrated a desire to attain a greater proficiency in their profession.

Another important difference exists in the studies under consideration. The data on science teacher behavior considered by Blankenship was accumulated by means of self reports, peer ratings, and supervisor ratings. Veldman and Peck, and the present investigator utilized the teachers' pupils for collection of data. It is possible that the relationship between the responses of the teacher on the individual scales of the CPI and the observations pupils make concerning behavior patterns of the teacher are too indistinct to be useful. In contrast to this, the reports of the teacher's peers, reports of the supervisor, and the teacher's self-report combined may provide measures of behavior more directly related to the teacher's responses on the individual scales of CPI, thereupon successfully relating a behavior to personality characteristics. It should also be noted that the sample utilized by the present investigator appeared to be somewhat different from Blankenship's sample with regard to the mean scores obtained by the subjects on the CPI scales of interest.

In light of the present study and others it would seem that research should be designed to answer the following questions:

1. Is the relationship of science teacher responses on attitude inventories to his pupils' perceptions of the teacher's classroom behavior patterns distinct enough to be of significance?

2. Is the relationship of science teacher responses on attitude inventories to a given pattern of classroom behavior distinct enough to be of significance?
3. Is it more fruitful to relate aspects of personality of the science teacher to specific classroom behaviors of the teacher or to classroom behavior patterns of the teacher?

Answers to these questions should provide a firm basis for the search for personality variables which are related to the classroom behaviors of the science teacher which, in turn, are related to behavioral changes in pupils. A further clarifying of the role of the science teacher in the classroom environment should result.

SELECTED BIBLIOGRAPHY

Books

1. Anderson, Harold, H., and Brewer, Joseph E. "Studies of Teachers' Classroom Personalities, II," Applied Psychology Monographs, No. 8, Stanford: Stanford University Press, 1946.
2. Anderson, H. H., Brewer, J. E. & Reed, Mary F. "Studies of Teachers' Classroom Personalities. III. Follow-up Studies of the Effects of Dominative and Integrative Contacts on Children's Behavior," Applied Psychology Monographs, No. 11, Stanford: Stanford University Press, 1946.
3. Beck, Curt W. "So Great...So Little Understood...", 20-28, A Basis for Creative Science Teaching. A Current Science and Science and Math Weekly Unit Book, ed. by A. H. Drummond, Jr., Middletown, Conn.: American Education Publications, Inc., 1966.
4. Blankenship, Jacob W. An Analysis of Certain Characteristics of Biology Teachers in Relation to Their Reactions to the BSCS Biology Program. An Unpublished Doctoral Dissertation, University of Texas, 1963.
5. Benney, Merl E., and Hampleman, Richard S. Personal-Social Evaluation Techniques. Washington, D. C.: The Center for Applied Research in Education, Inc., 1962.
6. Buros, Oscar K., ed. The Fifth Mental Measurements Yearbook. Highland Park, New Jersey: The Gryphen Press, 1959.
7. Buros, Oscar K., ed. The Sixth Mental Measurements Yearbook. Highland Park, New Jersey: The Gryphen Press, 1965.
8. Cattell, Raymond B. Description and Measurement of Personality. New York: World Book Co., 1946.
9. Cogan, Morris L. The Relation of the Behavior of Teachers to the Productive Behavior of Their Pupils. An Unpublished Doctoral Dissertation, Harvard University, 1954.
10. Cornell, F. G., Lindvall, C. M., and Saupe, J. L. An Exploratory Measurement of Individualities of Schools and Classrooms. University of Illinois, 1953.

11. Getzels, J. W., and Jackson, P. W. "The Teacher's Personality and Characteristics," Chapter 11, Handbook of Research on Teaching. A project of the American Educational Research Association, ed. by N. L. Gage, Chicago: Rand McNally & Company, 1963.
12. Guilford, J. P. Personality. New York: McGraw-Hill Book Co., Inc., 1959.
13. Medley, Donald A. and Mitzel, Harold E., "Measuring Classroom Behavior by Systematic Observation," Chapter 6, Handbook of Research on Teaching. A project of the American Educational Research Association, ed. by N. L. Gage, Chicago: Rand McNally & Company, 1963.
14. Murray, H. A. Explorations in Personality. New York: Oxford University Press, 1938.
15. Ryans, David G. Characteristics of Teachers. Washington, D. C.: American Council on Education, 1960.
16. Scarfe, N. V. Conflicting Ideas in Teacher Education. Columbus: College of Education, The Ohio State University, 1960.
17. Van Allenstein, Richard. Warmth and Technical Competence of Teachers and the Concomitant Variation in Teacher Effectiveness, A Perceptual Study. An Unpublished Doctoral Dissertation, Washington University, 1961.
18. Watson, Fletcher G. "Research on Teaching Science," Chapter 20, Handbook of Research on Teaching. A project of the American Educational Research Association, ed. by N. L. Gage, Chicago: Rand McNally & Company, 1963.

Articles

19. Blankenship, Jacob W. "Biology Teachers and Their Attitudes Concerning BSCS," Journal of Research in Science Teaching, III (March, 1965), 54-60.
20. Blum, L. P. "A Comparative Study of Students Preparing for Five Selected Professions Including Teaching," The Journal of Experimental Education, XVI (September, 1947), 31-65.
21. Christensen, C. M. "Relationships Between Pupil Achievement, Pupil Affect-Need, Teacher Warmth, and Teacher Permissiveness," The Journal of Educational Psychology, LI (June, 1960), 169-173.
22. Cogan, Morris L. "The Behavior of Teachers and the Productive Behavior of Their Pupils: II. "Trait" Analysis," The Journal of Experimental Education, XXVII (December, 1958), 107-124.

23. Cogan, Morris L. "Theory and Design of a Study of Teacher-Pupil Interaction," Harvard Educational Review, XXVI (Fall, 1956), 315-342.
24. Cogan, Morris L. "The Behavior of Teachers and the Productive Behavior of Their Pupils: I. "Perception" Analysis," The Journal of Experimental Education, XXVII (December, 1958), 89-105.
25. Cook, Walter W., and Medley, Donald M. "The Relationship Between Minnesota Teacher Attitude Inventory Scores and Scores on Certain Scales of the Minnesota Multiphasic Personality Inventory," The Journal of Applied Psychology, XXXIX (April, 1955), 123-219.
26. Della Piana, G. M., and Gage, N. L. "Pupils' Values and the Validity of the Minnesota Teacher Attitude Inventory," The Journal of Educational Psychology, XLVI (March, 1955), 167-178.
27. Gowan, J. C. "Relation of the "K" Scale of the MMPI to the Teaching Personality," California Journal of Educational Research, VI, (November, 1955), 208-212.
28. Gowan, J. C. and Gowan, May S., "The Guilford-Zimmerman and the California Psychological Inventory in the Measurement of Teaching Candidates," California Journal of Educational Research, VI (January, 1955), 35-37.
29. Gowan, J. C. and Gowan, May S. "A Teacher Prognosis Scale for the MMPI," The Journal of Educational Research, XLIX (September, 1955), 1-12.
30. Kearney, Nolan C. and Rocchie, Patrick D. "Using the Minnesota Teacher Attitude Inventory in Counseling Prospective Teachers," Personnel and Guidance Journal, XXXIV (November, 1955), 159-160.
31. Kearney, Nolan C. and Rocchie, Patrick D. "Relation Between a Teacher Attitude Inventory and Pupils' Ratings of Teachers," The School Review, LXIII (November, 1955), 443-445.
32. Leeds, Carrol H. "Teacher Attitudes and Temperament as a Measure of Teacher-Pupil Rapport," The Journal of Applied Psychology, XL (August, 1956), 333-337.
33. Lewin, Kurt, Lippitt, Ronald, and White, Ralph K., "Patterns of Aggressive Behavior in Experimentally Created "Social Cli-mates," The Journal of Social Psychology, X (May, 1939), 271-299.
34. Lough, Orpha M. "Women Students in Liberal Arts, Nursing, and Teacher Training Curricula and the Minnesota Multiphasic Personality Inventory," The Journal of Applied Psychology,

XXXI (August, 1947), 437-445.

35. Medley, Donald M., and Mitzel, Harold E. "A Technique for Measuring Classroom Behavior," The Journal of Educational Psychology, XLIX (April, 1958), 86-92.
36. Mitchell, James V., Jr., and Pierce-Jones, John. "A Factor Analysis of Gough's California Psychological Inventory," Journal of Consulting Psychology, XXIV (October, 1960), 453-456.
37. Popham, W. James, and Trimble, Robert R. "The MTAI As An Index of General Teaching Competence," Educational and Psychological Measurement, XX (Autumn, 1960), 509-512.
38. Reed, Horace B., Jr. "Teacher Variables of Warmth, Demand and Utilization of Intrinsic Motivation Related to Pupils' Science Interests: A Study Illustrating Several Potentials of Variance-Covariance," The Journal of Experimental Education, XXIX (March, 1961), 205-229.
39. Solomon, Daniel, Bezdek, W. E. and Rosenberg, Larry, "Dimensions of Teacher Behavior," The Journal of Experimental Education, XXXIII (Fall, 1964), 23-34.
40. Tanner, William C., Jr. "Personality Bases in Teacher Selection," Phi Delta Kappan, XXXV (April, 1954), 271-277.
41. "Teacher Preparation for BSCS Biology," Biological Sciences Curriculum Study Newsletter, Bulletin No. 12 (February, 1962), 14.
42. Veldman, Donald N., and Peck, Robert F. "Student Characteristics from the Pupils' Viewpoints," The Journal of Educational Psychology, LIV (December, 1963), 346-355.
43. Withall, John. "The Development of a Technique for the Measurement of Social-Emotional Climate in Classrooms," The Journal of Experimental Education, XVII, (March, 1949), 347-361.

Psychological Inventories

44. Cook, W. W., Leeds, C. H., and Callis R. The Minnesota Teacher Attitude Inventory. New York: Psychological Corp., 1951.
45. Gough, Harrison G. California Psychological Inventory. Palo Alto, California: Consulting Psychologists Press, Inc., 1957.

Reports

46. Wallen, Norman E., and Wodtke, Kenneth H. Relationship Between Teacher Characteristics and Student Behavior--Part I. A

final report for the U. S. Department of Health, Education,
and Welfare, Cooperative Research No. 1217, November, 1963.

APPENDIX A
STATISTICAL DETAILS

APPENDIX A

The t-test for independent means for sample groups which represent a single homogeneous population is

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{s^2 \left(\frac{1}{k_1} + \frac{1}{k_2} \right)}}$$

where s^2 is the within variance, \bar{x}_1 is the mean score for group 1, \bar{x}_2 is the mean score for group 2, k_1 is the number of scores in group 1, and k_2 is the number of scores in group 2.

TABLE VII

THE STANDARD DEVIATIONS, F RATIOS, CRITICAL F RATIOS, AND THE DEGREES
OF FREEDOM FOR THE DETERMINATION OF THE HOMOGENEITY OF
VARIANCE OF MALE AND FEMALE SURVEY SCALES

Institutes	Standard Deviation Female	Standard Deviation Male	F Ratio	Critical F Ratio	Degrees of Freedom
A	9.573	7.590	1.591	2.10	29
B	8.597	7.325	1.377	2.82	16
C	7.646	8.433	1.216	2.01	33
D	5.952	8.645	2.109	3.72	10
Combined	8.499	8.136	1.091	1.55	91

TABLE VIII

THE VARIANCES, \bar{t} -VALUES, \bar{t} -VALUES REQUIRED FOR SIGNIFICANCE,
AND THE DEGREES OF FREEDOM FOR SCORES ASSIGNED TO
TEACHERS BY MALE AND FEMALE STUDENTS

Institute	Variance Female	Variance Male	\bar{t} -Value	Significant \bar{t} -Value	Degrees of Freedom
A	91.657	57.611	.316	2.00	58
B	73.912	53.659	1.226	2.04	32
C	58.472	71.127	1.343	2.00	66
D	35.436	74.741	-.054	2.09	20
Combined	72.239	66.201	1.467	1.97	182

TABLE IX

THE STANDARD DEVIATIONS, THE F RATIOS, THE CRITICAL F RATIOS, AND THE DEGREES OF FREEDOM OF THE SEVEN PERSONALITY VARIABLES FOR THE HIGH AND LOW "INCLUSIVE" BEHAVIOR GROUPS

Variable	Standard Deviation High "Inclusive" Group	Standard Deviation Low "Inclusive" Group	F Ratio	Critical F Ratio	Degrees of Freedom High "Inclusive"	Degrees of Freedom Low "Inclusive"
1. Cs	3.641	3.460	1.107	1.73	53	52
2. Sp	5.946	6.732	1.282	1.73	53	52
3. Re	4.106	4.132	1.012	1.73	53	52
4. To	4.570	4.388	1.085	1.73	53	52
5. Ai	4.095	3.958	1.070	1.73	53	52
6. Ie	4.774	4.064	1.380	1.73	53	52
7. Fx	3.628	3.845	1.123	1.73	53	52

TABLE X

THE VARIANCES, t-VALUES, t-VALUES REQUIRED FOR SIGNIFICANCE,
AND THE DEGREES OF FREEDOM OF THE SEVEN
PERSONALITY VARIABLES

Variable	Variance High "Inclusive"	Variance Low "Inclusive"	<u>t</u> -Value	Significant <u>t</u> -Value	Degrees of Freedom
1. Cs	13.261	11.977	-.163	1.980	105
2. Sp	35.361	45.333	-.242	1.980	105
3. Re	16.866	17.074	.875	1.980	105
4. To	20.893	19.260	.271	1.980	105
5. Ai	16.770	15.667	.456	1.980	105
6. Ie	22.798	16.521	.939	1.980	105
7. Fx	13.168	14.784	-.157	1.980	105

APPENDIX B

THE PUPIL SURVEY AND AUXILIARY MATERIALS

LETTER FOR SUPERINTENDENT

Science Teacher Characteristics Study

Director: Dr. J. W. Blankenship Gundersen Hall
Oklahoma State University
Project Associate: Robert D. Earl Stillwater, Oklahoma 74074

Dear Sir:

While attending a National Science Foundation institute for biology teachers this past summer, _____ of your school system participated in the first phase of a two phase, nationwide study of science teachers. This study, under the sponsorship of the Oklahoma State University Research Foundation, is attempting to gain insight into what types of individuals make the most effective science teachers. We are pleased to inform you that _____, because of exhibited teacher qualities, has been selected to take part in the second phase of this project.

Because your cooperation in this matter will involve the valuable time of both your students and faculty, we feel that you are entitled to know what has already been done in Phase I and what will be done in Phase II with your help.

Science educators are currently conducting research into two key factors related to science instruction: (1) the teacher; and (2) the learning situation. Phase I of our current study involved 170 high school biology teachers who studied BSCS Biology during the summer of 1966, in four different colleges and universities. IBM Data Card Processing of the information supplied by these 170 teachers is allowing us to extend our knowledge concerning the science teacher, his background and interests. Phase II of this study is designed to gain information concerning the second factor: the learning situation. Following a period of analysis of data obtained in Phase II, the relationship of data obtained in Phase I and Phase II will be investigated. The primary relationship being investigated is that of teacher characteristics and reactions to changes in philosophy, content, and methods of science teaching.

A copy of the Pupil Survey Booklet is enclosed for your files. Letters and supplemental information have been sent to the principals and teachers involved.

Your cooperation in this endeavor is appreciated.

Sincerely yours,

J. W. Blankenship
Director

LETTER FOR PRINCIPAL

Science Teacher Characteristics Study

Director: Dr. J. W. Blankenship Gundersen Hall
 Oklahoma State University
 Project Associate: Robert D. Earl Stillwater, Oklahoma 74074

Dear Sir:

While attending a National Science Foundation institute for biology teachers this past summer, of your school participated in the first phase of a two phase, nation-wide study of science teachers. This study, under the sponsorship of the Oklahoma State University Research Foundation, is attempting to gain insight into what types of individuals make the most effective science teachers. We are pleased to inform you that because of exhibited teacher qualities, has been selected to take part in the second phase of this project. This participation will require approximately twenty minutes on the part of one of biology classes and about thirty minutes on the part of and one member of your supervisory or guidance staff.

Because your cooperation in this matter will involve the valuable time of both your students and faculty, we feel that you are entitled to know what has already been done in Phase I and what will be done in Phase II with your help.

Science educators are currently conducting research into two key factors related to science instruction: (1) the teacher; and (2) the learning situation. Phase I of our current study involved 170 high school biology teachers who studied BSCS Biology during the summer of 1966, in four different colleges and universities. IBM Data Card Processing of the information supplied by these 170 teachers is allowing us to extend our knowledge concerning the science teacher, his background and interests. Phase II of this study is designed to gain information concerning the second factor: the learning situation. Following a period of analysis of data obtained in Phase II, the relationship of data obtained in Phase I and Phase II will be investigated. The primary relationship being investigated is that of teacher characteristics and reactions to changes in philosophy, content, and methods of science teaching.

Enclosed you will find the following materials:

1. A copy of the Pupil Survey booklet and the necessary supplemental information for your files.
2. An envelope marked "Superintendent" which contains a letter explaining this study and a sample of the Pupil Survey booklet.

-2-

Please forward this to your superintendent through office distribution channels.

3. An envelope to be given to at the same time the students are completing the Pupil Survey. This envelope contains a letter of explanation and a follow-up questionnaire to keep our teacher records up-to-date.
4. A packet of 35 Pupil Survey booklets with attached directions for administration, and a postage-paid return envelope.

Please give the Pupil Survey Packet and Teacher's Envelope to the member of your supervisory or guidance staff you feel most appropriate to administer the instrument. The directions contained within the packet should answer all questions as to the administrative procedures desired.

Thank you very much for your participation in the final phase of this study. Your assistance will measurably aid in a more effective definition of effective teacher characteristics.

Sincerely yours,

J. W. Blankenship
Director

JWB:ds

Enclosures

SCIENCE TEACHER CHARACTERISTIC STUDY

Director: Dr. J. W. Blankenship

TO THE ADMINISTRATOR OF THE PUPIL SURVEY:

Some important points to remember:

1. Name of teacher involved:
2. The class involved: THE TEACHER'S FIRST CLASS OF 10TH GRADE BIOLOGY IN THE SCHOOL DAY.
3. There are two instruments to be administered. The Follow-up Questionnaire is for the teacher. The Pupil Survey is for the students of the designated biology class of the teacher.
4. The Survey and Questionnaire are to be administered during the week of November 14 through 18.
5. Confer with the teacher concerning the time of administration of the instruments in order that he or she may plan class work around it.
6. The time required for the students to complete the Survey is approximately 20 minutes. The time required for the teacher to complete the Questionnaire is approximately 20 minutes.
7. Do not expose the teacher to the Survey before you administer it. This may cause the teacher to unconsciously influence the students' responses.
8. After the pupils have all completed the Survey, seal the used and unused copies in the envelope provided and request a responsible member of the class to take it to the mailing room.
9. Ask the teacher to fill out the Follow-up Questionnaire during the same time the students are working on the Survey. The teacher should not be in the room during the administration of the Survey. Ask him or her to find another convenient place to fill out the Questionnaire. The presence of the teacher in the room may influence the pupils' responses.

DIRECTIONS FOR ADMINISTERING "PUPIL SURVEY"

Read Aloud:

"WE ARE TRYING TO GET SOME INFORMATION ON WHAT PUPILS DO AND THINK, AND WE NEED YOUR COOPERATION.

BEFORE WE START, LET ME MAKE A FEW THINGS VERY CLEAR.

FIRST: THIS IS NOT A TEST. THERE WILL BE NO MARKS OR GRADES OF ANY KIND.

SECOND: NO ONE IN THIS SCHOOL, NEITHER PUPIL NOR TEACHER NOR PRINCIPAL NOR ANYONE CONNECTED WITH YOU, WILL EVER SEE THESE PAPERS OR KNOW HOW YOU MARKED THEM. WHEN YOU FINISH, I SHALL SEAL THESE BOOKLETS IN THIS LARGE ENVELOPE AND REQUEST A MEMBER OF YOUR CLASS TO PUT THEM IN THE MAIL.

IT'S VERY IMPORTANT FOR YOU TO ANSWER CAREFULLY AND HONESTLY. READ THE DIRECTIONS AND FOLLOW INSTRUCTIONS CAREFULLY.

I'M GOING TO DISTRIBUTE ONE OF THESE BOOKLETS TO EACH OF YOU NOW. PLEASE DO NOT WRITE ANYTHING YET. DON'T OPEN THE BOOKLET UNTIL I TELL YOU TO. WE'LL ALL DO THIS TOGETHER."

I. Distribute on (1) booklet to each pupil.

Read Aloud:

"EACH BOOKLET IS NUMBERED, AND NO PUPIL'S NAME WILL EVER APPEAR ANYWHERE. REMEMBER, THIS WORK WE ARE DOING HAS NOTHING TO DO WITH THIS SCHOOL. YOUR PRINCIPAL AND TEACHER HAVE BEEN KIND ENOUGH TO ALLOW THIS INFORMATION TO BE COLLECTED. THIS SCHOOL WILL NEVER KNOW WHAT ANY BOY OR GIRL WRITES.

WHERE THE BOOKLET SAYS 'AGE,' WRITE YOUR AGE IN YEARS. EVEN IF YOU HAVE A BIRTHDAY TOMORROW OR NEXT WEEK, PUT YOUR AGE AT YOUR LAST BIRTHDAY.

CHECK 'BOY' OR 'GIRL' FOR GRADE, PUT THE GRADE YOU ARE IN NOW.

DON'T OPEN THE BOOKLET YET. READ WITH ME THE 'MESSAGE TO YOU' AND 'DIRECTIONS'."

II. Read these aloud from Pupil Survey.

Read Aloud:

"DON'T WORRY IF SOME QUESTIONS SEEM TO BE PRETTY NEARLY LIKE OTHERS. JUST ANSWER THEM ALL. RAISE YOUR HAND IF YOU HAVE ANY QUESTIONS."

III. Walk around room; observe whether pupils are answering questions

correctly.

IV. As pupils complete the survey, ask them to look over their answers; ask them to be sure they have filled out the face sheet and answered every question. Do this individually and for entire class. Ask them not to talk after they are through.

V. When all have completed the survey, collect them, and place them in the return envelope provided. While collecting the surveys, quickly check the face sheet of each to make certain all of the required information is filled in.

VI. Send a pupil for the regular teacher or dismiss the class when you hear other classes passing to the next period. Thank pupils again.

VII. Send a responsible member of the class to the mailing desk with the sealed return envelope.

For taking your and the pupils' valuable time in participating in this research project, we wish to sincerely thank you again. You have helped to better our profession.

SCIENCE TEACHER CHARACTERISTICS STUDY

Director: Dr. J. W. Blankenship Gundersen Hall
 Oklahoma State University
 Project Associate: Robert D. Earl Stillwater, Oklahoma 74074

Re: STUDY OF TEACHER REACTIONS TO BSCS BIOLOGY

Dear Colleague:

Please accept our sincere thanks for your continuing participation in this important study. In order to evaluate this phase of the study we would like to ask that you complete the following questionnaire and return it immediately in the enclosed envelope.

At the same time that you are completing this questionnaire, students in one of your biology classes are to fill out a questionnaire designed to gain information concerning student perceptions of science classes.

The information supplied by you is considered confidential and will be seen only by the researchers. We are continuing the use of IBM Data Card Processing which further makes the information supplied by you statistical rather than personal.

Please feel free to correspond with me if I can be of any assistance to you with regard to the study. The results of the initial phase of the study have been well received and suggestions for uses and modification of the Program and Institutes are being considered.

REMEMBER THAT ALL REPLIES ARE CONSIDERED CONFIDENTIAL
 AND WILL BE SEEN ONLY BY THE RESEARCHER

PLEASE CHECK ALL THE APPROPRIATE ANSWERS

1. I have taught BSCS Biology prior to this school year.
 yes no
2. I am currently teaching BSCS Biology.
 yes no
3. I am planning to teach BSCS Biology during the next
 yes no school year.
4. If you are teaching BSCS Biology and you are using or will use a laboratory block, please specify the block involved.
-
5. If you are teaching BSCS Biology, please circle the version that you are using.
 Blue - Green - Yellow

PLEASE CONTINUE ON PAGE 3

-3-

8. Please list all extra-classroom activities for which you are responsible and that are considered part of your teaching responsibilities. (i.e., Math Club, Science Club, Pep Squad, etc.)

9. Please check only one of the following four statements. Check the one statement that most nearly describes your situation.

I am currently teaching BSCS Biology and I prefer to continue teaching it.

I am currently teaching BSCS Biology but I do not prefer it and would rather teach the conventional course.

I am not currently teaching BSCS Biology but I prefer the program and I would teach it if the situation permitted it.

I am not currently teaching BSCS Biology and I do not prefer to teach BSCS Biology.

10. Comments (if you are not teaching BSCS Biology, but you are using some of the BSCS ideas, e.g., lab blocks, please comment on this. Also feel free to explain any of the responses made above.)

PLEASE CHECK TO BE SURE THAT YOU HAVE ANSWERED ALL THE ITEMS.

Thank you again for your cooperation.

Sincerely,

J. W. Blankenship
Director

PUPIL SURVEY

Boy _____ Girl _____ Age _____ Grade _____ Code 73

A Message To You:

This is not a test. The purpose of this survey is to get some information about high school biology classes from you, the student. To do this, we need your help. Above all, we need honest, thoughtful answers.

No one in this school will ever know how you answer the questions on this survey. The completed surveys from your class will only be identified by the code number you see above so do not put your name on this booklet.

DIRECTIONS:

1. Read each statement carefully and place the number of the answer nearest your opinion in the space to the right of the statement.
2. Remember you will write the NUMBER of your answer in the space to the right.
3. THERE ARE NO RIGHT OR WRONG ANSWERS. An answer is right if it is true for you.
4. Be sure to answer every item; do not omit any.

SAMPLE:

0. Water is wet _____ 0. 5
 1-almost never, 2-few times, 3-sometimes, 4-often,
 5-almost always
1. This teacher puts aside her (his) own work to help us --- 1. _____
 1-almost never, 2-few times, 3-sometimes, 4-often,
 5-very often
2. In this class we do laboratory work _____ 2. _____
 1-almost never, 2-few times, 3-sometimes, 4-often,
 5-very often
3. This teacher finds out which pupils need help and gives
 them special attention _____ 3. _____
 1-almost never, 2-few times, 3-sometimes, 4-often,
 5-very often
4. This teacher lets us choose pupils to work with _____ 4. _____
 1-almost never, 2-few times, 3-sometimes, 4-often,
 5-very often

5. This teacher encourages us to do our own thinking ----- 5. _____
 1-almost never, 2-few times, 3-sometimes, 4-often,
 5-very often
6. This teacher has us help each other in class ----- 6. _____
 1-almost never, 2-few times, 3-sometimes, 4-often,
 5-very often
7. This teacher makes special efforts to get to know us ---- 7. _____
 1-almost never, 2-few times, 3-sometimes, 4-often,
 5-very often
8. For this class, I do experiments at home in my spare
 time that are not required by the teacher ----- 8. _____
 1-almost never, 2-few times, 3-sometimes, 4-often,
 5-very often

Please continue on page 2

9. This teacher talks to us kindly and nicely ----- 9. _____
 1-almost never, 2-few times, 3-sometimes, 4-often,
 5-very often
10. In this class I feel that I do things which are like the
 things that scientists do ----- 10. _____
 1-almost never, 2-few times, 3-sometimes, 4-often,
 5-very often
11. This teacher made friends with ----- 11. _____
 1-almost none of us, 2-few of us, 3-some of us, 4-many
 of us, or 5-almost all of us
12. When we have laboratory work in this class, I enjoy it - 12. _____
 1-almost never, 2-few times, 3-sometimes, 4-many times,
 5-almost always
13. This teacher gives me work that I think I need ----- 13. _____
 1-almost never, 2-few times, 3-sometimes, 4-many times,
 5-almost always
14. When we do something very well, this teacher tells us
 so ----- 14. _____
 1-almost never, 2-few times, 3-sometimes, 4-many times,
 5-almost always
15. This teacher likes ----- 15. _____
 1-almost none of the pupils, 2-a few of the pupils,
 3-some of the pupils, 4-many of the pupils, 5-almost
 all of the pupils
16. In this class we listen to the teacher talk about
 biology ----- 16. _____
 1-almost never, 2-few times, 3-sometimes, 4-many times,
 5-almost always

17. When we start new work in this class, the teacher asks us to help in planning it ----- 17. _____
1-almost never, 2-few times, 3-sometimes, 4-often, 5-very often
18. This teacher invites us to bring in extra things connected with the class work ----- 18. _____
1-almost never, 2-few times, 3-sometimes, 4-often, 5-very often
19. For this class, I do experiments at home that are required by the teacher ----- 19. _____
1-almost never, 2-few times, 3-sometimes, 4-often, 5-very often
20. This teacher makes the work interesting for me ----- 20. _____
1-almost never, 2-few times, 3-sometimes, 4-often, 5-very often
21. In this class we need to know definitions for biological words to get good grades on the test ----- 21. _____
1-almost never, 2-few times, 3-sometimes, 4-often, 5-very often
22. When we suggest an opinion, the teacher looks at both sides and talks it over ----- 22. _____
1-almost never, 2-few times, 3-sometimes, 4-often, 5-very often
23. This teacher is friendly ----- 23. _____
1-almost never, 2-few times, 3-sometimes, 4-often, 5-very often

Please continue on page 3

24. When we have laboratory work in this class we fill in the blanks in a laboratory manual ----- 24. _____
1-almost never, 2-few times, 3-sometimes, 4-often, 5-very often
25. This teacher is careful not to hurt our feelings ----- 25. _____
1-almost never, 2-few times, 3-sometimes, 4-many times, 5-almost always
26. For this class, I do experiments outside of class but during school hours that are required by the teacher --- 26. _____
1-almost never, 2-few times, 3-sometimes, 4-often, 5-very often
27. When we start new work, this teacher helps us to see why this work is important to all of us ----- 27. _____
1-almost never, 2-few times, 3-sometimes, 4-often, 5-very often

28. When we have laboratory work I know how the exercise will turn out before we start ----- 28. _____
1-almost never, 2-few times, 3-sometimes, 4-often,
5-very often
29. When we suggest some good new ways of doing things, this teacher lets us do them that way ----- 29. _____
1-almost never, 2-few times, 3-sometimes, 4-often,
5-very often
30. If something happens that is this teacher's own fault, she (he) will admit it ----- 30. _____
1-almost never, 2-few times, 3-sometimes, 4-often,
5-very often
31. For this class, I do experiments outside of class but during school hours that are not required by the teacher ----- 31. _____
1-almost never, 2-few times, 3-sometimes, 4-often,
5-very often
32. This teacher encourages us to use our own ideas ----- 32. _____
1-almost never, 2-few times, 3-sometimes, 4-often,
5-very often
33. If this teacher doesn't know how to answer a question, she (he) will admit it ----- 33. _____
1-almost never, 2-few times, 3-sometimes, 4-often,
5-very often
34. When we have laboratory work in this class, it goes along with what we read in the textbook ----- 34. _____
1-almost never, 2-few times, 3-sometimes, 4-often,
5-very often
35. When an important point comes up in the class work, this teacher has the whole class discuss it ----- 35. _____
1-almost never, 2-few times, 3-sometimes, 4-many times,
5-almost always

VITA

Robert Duane Earl

Candidate for the Degree of

Doctor of Education

Thesis: THE SCIENCE TEACHER'S INCLUSIVE BEHAVIOR AS RELATED TO CERTAIN
PERSONALITY CHARACTERISTICS

Major Field: Higher Education

Biographical:

Personal Data: Born in Logan County, Ohio, November 24, 1932, the son of Kermit C. and Hazel M. Earl; married to Imogene Searfoss June 9, 1963; have two children, Dorothy Marie and Curtis Eugene, by this marriage.

Education: Attended grade school in Uniopolis, Ohio; graduated from Wapakoneta High School, Wapakoneta, Ohio in 1950; received the Bachelor of Science degree from Bluffton College with a major in Chemistry in May, 1954; received the Master of Arts degree from Miami University with a major in Chemistry in August, 1958; completed the requirements for the Doctor of Education degree in July, 1967.

Professional experience: Served as a teacher of science and mathematics at Waynesfield-Goshen High School in Waynesfield, Ohio, from 1957 until 1963, during this time also served as a guidance counselor and a high school principal; upon resignation served as principal of South Central High School, Greenwich, Ohio, until 1965; from 1966 to this date serving as an instructor in science education at Wright State Campus of the Miami and The Ohio State Universities.