

AN ANALYSIS OF THE RELATIONSHIP BETWEEN BIOLOGY  
TEACHERS' PUPIL CONTROL IDEOLOGY AND THEIR  
CLASSROOM PRACTICES

By

PAUL LINUS JONES

Bachelor of Science  
Northeastern State College  
Tahlequah, Oklahoma  
1961

Master of Science  
Oklahoma State University  
Stillwater, Oklahoma  
1964

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Thesis Approved:

*Kenneth E. Wiggins*  
\_\_\_\_\_  
Thesis Adviser

*L. Herbert Brunson*  
\_\_\_\_\_

*Roy W. Jones*  
\_\_\_\_\_

*Wm. D. Frazier*  
\_\_\_\_\_

*D. Durham*  
\_\_\_\_\_  
Dean of the Graduate College

762378

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## TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION . . . . .	1
The Problem . . . . .	6
Assumptions . . . . .	6
Hypotheses . . . . .	6
Definitions . . . . .	8
Limitations of the Study . . . . .	9
II. REVIEW OF SELECTED LITERATURE . . . . .	10
Pupil Control Ideology . . . . .	10
Biology Classroom Activity Checklist . . . . .	15
Classroom Practices and Behaviors . . . . .	17
Summary . . . . .	20
III. METHODOLOGY AND DESIGN . . . . .	21
Selection of the Sample . . . . .	21
Administration of the Instruments . . . . .	22
Instrumentation . . . . .	24
Statistical Application . . . . .	26
IV. RESULTS OF THE STATISTICAL ANALYSIS . . . . .	28
V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS . . . . .	38
Summary of the Study . . . . .	38
Conclusions of the Study . . . . .	41
Recommendations . . . . .	45
BIBLIOGRAPHY . . . . .	47
APPENDIX A . . . . .	51
APPENDIX B . . . . .	53
APPENDIX C . . . . .	55
APPENDIX D . . . . .	57
APPENDIX E . . . . .	59

Chapter	Page
APPENDIX F. . . . .	61
APPENDIX G. . . . .	65
APPENDIX H. . . . .	71

LIST OF TABLES

Table	Page
I. Analysis of Variance of Classroom Practices. . . . .	29
II. Analysis of Variance of Classroom Scores . . . . .	30
III. Analysis of Variance of Laboratory Scores. . . . .	31
IV. Analysis of Variance of Roles of the Teacher . . . . .	32
V. Analysis of Variance of Student Participation. . . . .	32
VI. Analysis of Variance of Textbook and Reference Materials .	33
VII. Analysis of Variance of Tests. . . . .	34
VIII. Analysis of Variance of Pre-Laboratory Activities. . . . .	35
IX. Analysis of Variance of Laboratory Activities. . . . .	36
X. Analysis of Variance of Post-Laboratory Activities . . . .	37

## CHAPTER I

### INTRODUCTION

Biologists and science educators, charged with the responsibility for developing an up-to-date biology program for the secondary schools, developed the Biological Sciences Curriculum Study, hereinafter referred to as BSCS, and its related materials. The content writing committee, when preparing the BSCS program and its related materials, took upon themselves a mandate to "give modern accounts of a carefully selected number of topics and ... agreed on the necessity of making biology a truly intellectual experience and not merely a catalogue of facts pertaining to plants and animals." (21) The result was an incorporation of scientific processes and knowledge which are considered to be basic to the activities of scientists into the BSCS program.

The authors of BSCS expected that these scientific processes and knowledge would be utilized in the classroom activities in the learning situation; they expected certain cognitive and affective behaviors on the part of the student to result from using these curricular materials. Schwab (26) in his statement of BSCS activities summarized the objectives of the program:

Most curricular objectives of the study are those which have traditionally guided the teaching of biology in the American school. The materials and organizations developed to serve these aims are also to serve an additional purpose. Through time, we hope to convey a conception of biological science by which the student may identify vocational and avocational interests and master a literate discipline which will render reports of future scientific progress

accessible to him. This means that the materials of the classroom and laboratory will present biology as a science which is an ongoing, self-correcting and revisionary process as well as a body of currently warranted fact and theory.

The teacher is charged with the responsibility of creating and maintaining an environmental situation in order that these cognitive-affective behaviors and objectives can result.

Schwab (28) indicated that the BSCS program and, indeed, the other "new" science and mathematics programs since developed have created a problem for the teachers. He wrote:

. . . redistribution of student time, the reordering of standard units and departments of instruction, and new techniques of teaching will be needed. A radical overhaul is in order, one which will involve the very content of many of our courses, their aims, their methods, and their essential structure.

This overhaul of the biology program is the prerogative of the classroom teacher. Even though the BSCS program provides new techniques, approaches and training, it is, in the final analysis, the prerogative of the classroom teacher to accept this new rationale, to create for himself a new course, and to deviate from the standards which have characterized his biology course for the years prior to this time.

The BSCS programs, in many ways, freed the biology teacher from the methods and techniques of the past. No longer is he able to "tell" the students; they must be active participants in the teaching-learning situation. Although these programs freed the teacher in some ways, many held to the methods of teaching which were familiar to them.

Kochendorfer (18) was concerned with

. . . the relationship between the actual classroom practice where these materials are used and the philosophy and rationale of the program and a comparison of this relationship with that found in classes not using the new materials.



Since the BSCS programs have been widely accepted by the secondary schools, it was a relatively easy task to identify situations where the teaching practices congruent with the BSCS rationale and philosophy should be occurring. Another task, not so easily accomplished, was to specifically identify these classroom practices as they relate to the rationale and the philosophy. Kochendorfer (18) stated:

An instrument and technique were developed to try to accomplish the task of identifying actual classroom practices as they relate to the philosophy and rationale of the BSCS program. It is the purpose of this paper to describe the development and evaluation of an instrument that we have called the Biology Classroom Activity Checklist (BCAC).

The Biology Classroom Activity Checklist, hereinafter referred to as BCAC, is designed to measure the classroom practices that are consistent with the BSCS rationale. These practices require an atmosphere of freedom; freedom in which the students are actively engaged in the learning situation.

A question which may be appropriately raised is, "How can these practices as measured by the BCAC be present, if teachers rigidly control the behavior of their students?" The literature indicates that some, perhaps many, teachers view their students in moralistic terms and feel the need to remain aloof and the center of thought and power in the classroom.

Carlson (5), for example, describes the school as a "Type IV, domesticated organization." He said that these institutions employ control to adjust to their lack of selectivity. The schools not only do not have a choice in the selection of their clients, but the clients do not have a choice in the selection of their institution.

Willower, Eidell and Hoy (35) were aware of the literature relating to pupil control. They noted that "pupil control problems were found

to play a major part in teacher-teacher and teacher-administrator relationships, and pupil control was important in both the structural and the normative aspects of the school culture." They developed the Pupil Control Ideology Form (PCI), hereinafter referred to as PCI, which employs the concepts of humanistic and custodial as the extremes of a continuum of control. The instrument serves as an operational measure of a teacher's pupil control ideology.

Based upon the rationale of the BCAC and the PCI, the following theoretical relationship appears plausible: teachers who have a more humanistic pupil control ideology will exhibit in their classroom practices the rationale of the BSCS programs as measured by the BCAC to a greater extent than teachers who have a more custodial pupil control ideology.

Willower, Eidell and Hoy (35) explained that custodial and humanistic were pure types. It would probably be impossible to find a teacher who was completely humanistic or who was completely custodial. There would be found, however, teachers who are more humanistic than custodial and vice versa.

Watson and Cooley (32) in writing of needed research in science education noted: "Specific areas which require more research are (a) the learning process, (b) the learner, and (c) the teacher." Later in this article, they stated:

. . . although we have yet to find anyone who would deny that the existence of a corps of competent science teachers is a necessary condition for an effective science program, there is little research on science teachers.

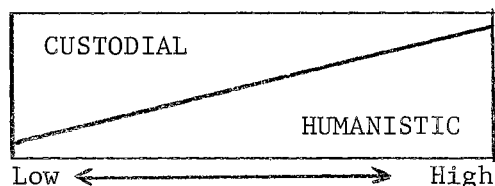
This is explained by the lack of a rationale based upon theory to guide empirical research.

Hoy and Blankenship (15) in their paper entitled, A Comparison of

the Ideological Orientations and Personality Characteristics of Innovative and Non-innovative High School Biology Teachers noted:

A review of Kochendorfer's statements reveals a compatibility with the behavior that one might expect from a teacher with a humanistic pupil control ideology who exhibits a capacity to think and act independently. For example, the statements, "We students are often allowed time in class to talk among ourselves about ideas in biology;" "Classroom demonstrations are usually done by students rather than the teacher;" "If I don't agree with what my teacher says, he wants me to say so;" and "Our teacher has tried to teach us how to ask questions of the text;" would seem to be consistent with the humanistic teacher who thinks and acts independently."

The following model represents the theoretical background which guided the empirical research of this study on teachers and teacher practices.



PERCENTAGE OF TEACHER CLASSROOM PRACTICES CONSISTENT WITH BSCS

The model indicates that teachers who exhibit a more humanistic pupil control ideology will be scored higher on teacher classroom practices consistent with BSCS than those teachers who are more custodial. This model was patterned from one developed by Getzels and Guba (9). The diagonal line since it does not intersect at the corners

indicates that it would be very difficult to find a teacher who was completely humanistic or completely custodial in his pupil control ideology.

### The Problem

Based on the concepts of pupil control ideology; teacher classroom practices; and needed research in science education, the following problem was identified: Do teachers who have a more humanistic pupil control ideology exhibit to a greater extent the classroom teacher practices recommended by the BSCS program as measured by the Biology Classroom Activity Checklist than do teachers who have a more custodial pupil control ideology?

### Assumptions

The investigator made the following assumptions: (a) the responses of teachers on the PCI Form accurately reflect their ideology concerning pupil control in the classroom, and (b) the student responses on the BCAC accurately reflect their perceptions of the teacher's classroom practices.

### Hypotheses

The hypotheses developed for investigation in this study are:

Hypothesis 1: There is no significant difference in the classroom practices of biology teachers as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

Hypothesis 2: There is no significant difference in the classroom scores (sections A through D combined) as measured by the Biology Classroom Activity Checklist between those

teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

Hypothesis 3: There is no significant difference in the laboratory scores (sections E through G combined) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

Hypothesis 4: There is no significant difference in the roles of the teacher (section A) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

Hypothesis 5: There is no significant difference in the student participation (section B) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

Hypothesis 6: There is no significant difference in the use of textbook and reference materials (section C) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

Hypothesis 7: There is no significant difference in design and use of tests (section D) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

Hypothesis 8: There is no significant difference in pre-laboratory activities (section E) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

Hypothesis 9: There is no significant difference in the laboratory activities (section F) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

Hypothesis 10: There is no significant difference in the post-laboratory activities (section G) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

## Definitions

BSCS - an abbreviation for the Biological Sciences Curriculum Study, a curriculum project for secondary school biology instruction.

BCAC - an abbreviation for the Biology Classroom Activity Checklist, an instrument designed by Kochendorfer and Lee to measure classroom practices which are consistent with the rationale of the Biological Sciences Curriculum Study.

PCI - an abbreviation for the Pupil Control Ideology Form, an instrument designed by Willower, Eidell and Hoy to identify two forms of pupil control ideology of the teacher, namely, humanistic and custodial.

Humanistic - This term as used in this study was defined by Willower, Eidell and Hoy. They wrote:

Student's learning and behavior is viewed in psychological and sociological terms rather than in moralistic terms. A humanistic orientation leads teachers to desire a democratic classroom climate with its attendant flexibility in status and rules, open channels of two-way communication and increased student self-determination. The humanistic teacher is optimistic that students will be self-disciplining rather than disciplined. Learning is looked upon as an engagement in worthwhile activity rather than the passive absorption of facts. (35)

Custodial - This term as used in this study was defined by Willower, Eidell and Hoy. They wrote:

A highly controlled setting concerned with the maintenance of order. Students are stereotyped in terms of their appearance, behavior and parents' social status. Teachers do not attempt to understand student behavior, but, instead, view it in moralistic terms. Misbehavior is taken as a personal affront. Relationships with students are maintained on as impersonal a basis as possible. Pessimism and watchful mistrust imbue the custodial viewpoint. (35)

### Limitations of the Study

No attempt was made to control for the variable of sex. It was assumed that a teacher holds his or her belief system regardless of sex.

No attempt was made to control for student responses. It was assumed that students will maintain their belief regardless of sex, I.Q. or age.

No attempt was made to control for education of teachers since all teachers in Oklahoma are required to complete a Bachelor's degree before they are certified by the State Department of Education.

## CHAPTER II

### REVIEW OF SELECTED LITERATURE

The purposes of this chapter are to review the important literature associated with the concepts represented in the model which guided the research study. These concepts are pupil control ideology and teacher classroom practices. This review is presented under three sub-headings entitled: Pupil Control Ideology, Biology Classroom Activity Checklist, and Classroom Practices and Behaviors.

#### Pupil Control Ideology

Carlson (5) categorized the public school as a "Type IV, domesticated organization." This type of organization has no control over the selection of its clients and the clients have no control over the selection of their organization. Carlson wrote that each will adjust to this lack of selectivity. The organization may adjust by employing segregation or by providing preferential treatment for some students. The result is that the organization has alternatives available to it to adjust to this lack of selectivity.

Carlson (5) listed alternatives available to the clients of the domesticated organizations. He listed three types of adaptations that are in-between the extremes of receptive and dropout adaptations.

These in-between types are:

- A. situational retirement. With this adaptation, the student is physically present but not mentally present.



- B. side-payment adaptation. In this case the student sees the school as a place to get side-payments or fringe benefits which are not available elsewhere.
- C. rebellious adjustment. The rebellious adjustment involves some rejection of both the school and what the school has to offer. The student constantly tests the limits of the situation to see the extent to which he can depart from that which is expected of a student.

Willower, Eidell and Hoy (35) used the research of Carlson as part of the rationale when they developed the Pupil Control Ideology Form.

They wrote:

The proposition that pupil control plays a central part in the organizational life of public schools grew out of observational and interview data gathered during a study. ... it also fitted Carlson's analysis of the school as a special type of organization.

Utilizing the information which they had gathered, they developed the Pupil Control Ideology Form (PCI) which measures the extremes of a continuum concerning the control of students. These extremes were termed custodial and humanistic.

Willower, Eidell and Hoy (35) tested the hypothesis that teachers would have a more custodial pupil control ideology than counselors or principals. Analysis of the data revealed that "the teachers in our sample had a mean PCI score significantly higher than principals. The difference between teacher and counselor was even more pronounced. In their conclusion they stated:

Thus, changes in a humanistic direction in public schools may be slow, painful, and at times quite unsuccessful. If such changes are desired, school increasingly will have to become a place where students want to be rather than a place where they have to be. Humane attitudes toward pupils on the part of school personnel are important but hardly sufficient. Equally essential are open minded teachers who possess relevant knowledge, a scientific temper, and the ability and will to apply knowledge appropriately.

Hoy (13) noted that "Control of students - discipline - is a major concern of all teachers, but it is especially acute for beginning teachers." He found, after testing eighty-two elementary and ninety-three secondary teachers, that "the pupil control ideology of beginning teachers was significantly more custodial after their first year of teaching." The findings suggest that "the process of socialization within the school subculture seems important in reshaping the control ideology of organizational newcomers."

The results of Hoy's work would tend to be supported by Ausubel (2) because he wrote that:

Although discipline is one aspect of teaching that the beginning teacher is most worried about, he receives little or no practical instruction in handling this problem. Colleges of education rationalize their inadequacies in this regard by pretending that disciplinary problems are relatively rare occurrences involving the disturbed child, or more typically the disturbed teacher.

The importance of the teaching experience by student teachers "appears to be functional for prospective teachers in terms of mitigating the potential role strain with respect to control of students." (13)

Willower and Jones (34) studied one Pennsylvania junior high school utilizing observation and interview techniques. Their findings indicated that pupil control was an institutional theme. It was discussed in all informal groupings of teachers. They wrote:

New teachers and sometimes student teachers were frequently silent but interested listeners in faculty lounge discussions. They learned that they had to be "tough on discipline" to get along; and they knew that they were restricted in the kinds of innovations that they could employ in their classrooms, since the use of more permissive methods left them open to the charge of softness. This created a serious problem for the more idealistic new teachers.

Willower, Hoy and Eidell (36) studied the counselor and the school as a social organization. In their discussion they postulated:

The findings reported here lead one to expect considerable conflict over the matter of pupil control. Undoubtedly conflict does occur. However, we suspect that those holding a more humanistic pupil control ideology will behave in ways that suggest to their teacher colleagues that a more custodial control ideology is held than is actually the case.

Appleberry (1) studied forty-five schools and found that the more "open" the climate of the school, the more humanistic the pupil control ideology. He also reported that the teachers serving in the open schools held a significantly more humanistic pupil control ideology than teachers serving in relatively closed schools.

Gossen (12) studied the relationship of socioeconomic status of elementary schools and the pupil control ideology of the teachers. He found that teachers in low socioeconomic status schools were significantly more custodial than those in both middle and high socioeconomic status schools.

Willower (33) when he was writing of barriers to the school administrator as he attempted to implement innovative practices included the teacher as one possible barrier to change. Willower wrote:

Concern with pupil control then may be a focal point for resistance to liberalizing changes in schools. Teachers, the school personnel most directly concerned with pupil control, will resist changes of this type to a greater extent than specialized personnel, such as guidance counselors.

A brief report of some of the early literature which has been done seems necessary because the rationale for and the conceptualization of custodial ideology and humanistic ideology for use in the public school was developed from this early literature.

Goffman (11) described "total institutions." He defined these as:

. . . a place of residence and work where a large number of like-situated individuals, cut off from the wider society for an appreciable period of time, together lead an enclosed, formally administered round of life.

Examples of these total institutions would be prisons, mental hospitals and boarding schools.

Gilbert and Levinson (10) coined the terms humanism and custodialism and operationalized these terms for work in mental hospitals. The Custodial Mental Illness Ideology (CMI) Scale was developed to classify client control ideology of the staff.

Christie and Jahoda (6) provide a critique and re-examination of The Authoritarian Personality. This instrument was a measure of authoritarian ideology.

Although Carlson (5) included public schools in the same classification as prisons and mental hospitals, Etzioni (8) has pointed out that the public schools have no choice in the selection of their clients but that they cannot be placed in the same category as prisons and mental hospitals because they are not total institutions.

The fact that authoritarian ideology and control ideology imbue the climate of the school is not surprising. Waller (31) indicated this when he wrote:

The teacher represents the established social order in the school, and his interest is in maintaining that order, whereas pupils have only a negative interest in that feudal superstructure. ... Authority is on the side of the teacher. The teacher nearly always wins. In fact, he must win, or he cannot remain a teacher.

Willower, Eidell and Hoy (35) were aware of this early literature when they referred to the concepts of custodialism and humanism. They limited their conceptualization of these terms as follows:

The concepts of custodialism and humanism provide a way of thinking about educator orientations toward pupil control. These ideas can be employed in terms of ideology or in terms of behavior. ... we chose to examine educator ideology concerning pupil control rather than controlling behavior.

Their work indicates that the terms of humanistic and custodial should be viewed as ideas concerning pupil control and not as controlling behaviors actually employed in the classroom situation.

Examples of controlling behaviors which have been employed in the classroom are abundant in the literature. Gossen (12) wrote:

Many terms are used to describe the pupil-teacher relationship, which ultimately results in a measure of control of behavior of the student by the teacher. Words most commonly used to describe this relationship are discipline and order. The literature abounds in normative writing in the form of manuals, guides, and tips about how to maintain "good" classroom control.

#### Biology Classroom Activity Checklist

Schwab (27) listed the themes and objectives of the BSCS programs and pointed out that teaching authoritative facts and dogma have had a bad effect on students. He notes that the student is not merely told an event but is engaged and participates in the attempt to understand whenever the BSCS programs are used. This research and others identified specific classroom practices which should be occurring in the classroom when the BSCS materials are utilized.

Kochendorfer (16) reviewed the literature concerning the BSCS programs and developed a checklist to "examine the extent to which classroom practices recommended by the BSCS were being employed by high school biology teachers using various curriculum materials." He compared the mean scores for three groups of teachers. The first group were experienced teachers having considerable training with the BSCS program. The second group had no previous experience with the BSCS program but used BSCS materials. The third group were teachers utilizing curricular materials other than BSCS materials. The result was that a significant difference did exist among the groups, but one

teacher in the group utilizing curriculum materials other than BSCS "had a higher score on the BCAC than the majority of the experienced BSCS teachers."

Kochendorfer (16) found that "there was a significant relationship between the mean scores assigned to each teacher on the classroom portion and the laboratory portion of the BCAC." The classroom portion is represented by sections A through D, while the laboratory portion is represented by sections E through G. This work indicates that a teacher may score high on the classroom portion and score low on the laboratory portion and vice versa.

The work of Kochendorfer indicates that the BCAC has been validated with curricular materials other than BSCS. He believes that teachers of biology could utilize "this technique in self-evaluation and planning by teachers in developing in-service or workshop training programs for groups of teachers." The use of the BCAC does not imply that the practices recommended by BSCS are either good or bad. "Each teacher must decide for himself what practices can best produce the desired results in his own classroom." (16)

Kochendorfer (17) showed that:

A significant relationship between the nature of the classroom practices and gains on the Processes of Science Test was found. A significant correlation was also found between the teacher's attitude concerning the BSCS philosophy and rationale and the degree to which his classroom practices agreed with those advocated by BSCS.

The literature concerning the development, use, and heuristic value of the BCAC is limited primarily to the work of Kochendorfer. The reliability and validity scores of the instrument, and the results obtained with it when it has been used as an operational measure tend to support its appropriateness for this study.

## Classroom Practices and Behaviors

Kochendorfer (16) wrote of several trends in education which can be seen when reviewing the literature concerning secondary school biological science education. Among these trends were:

- a. the period of rapid growth of the secondary school
- b. an increase in the number of textbooks available for use
- c. a period when scientists and teachers realized that the role of the scientist needed to be included in the course of study
- d. the period of a great influx of federal funds
- e. and the "question that still remains is whether or not agreement among theorist and practitioner upon curricular materials is going to affect the classroom teacher's conception of course goals and whether or not his practices are consistent with the practices recommended in the rationale of the "new programs."

Several studies have been done regarding the practices which take place in the classroom. The following represent a sample of the kinds of research that has been done in the area of biological science education since the beginnings of the "new" curricular materials. Each one deals with some aspect of teacher behaviors or practices.

La Shier (20) found that verbal influence of student teachers on freedom of participation of pupils had a significant effect upon achievement and constructive attitudes of students. He wrote:

. . . the verbal behavior patterns of the indirect group of student teachers differed substantially from those of the direct group. The indirect group was more receptive to student-initiated ideas, tended to encourage these ideas more, and also made more of an effort to build upon these ideas than did the direct group.

Hoy and Blankenship (14) reported that attitudes of teachers are related to their "capacity for independent thought and action." The assumption is that, in order to successfully stress the two-way

communication which is necessary with the new curricular materials, teachers need to exhibit a capacity for independent thought and action.

The result was:

. . . biology teachers who have reacted favorably toward new science curricular materials ranked higher on measures of "capacity for independent thought and action" than those who reacted less favorably.

Sadler (25) identified "intellectual efficiency" as having an effect on the teacher and his classroom practices. Sadler wrote:

. . . the design was similar to a doctoral dissertation concerning the BSCS curriculum by Blankenship. The teachers with favorable attitudes concerning the new science curricula in both studies were found to have the characteristic of intellectual efficiency.

Blankenship (4) studied teachers with favorable and unfavorable attitudes toward BSCS. Using various demographic data as dependent variables and attitude as the independent variable, he reported "that there was no significant difference on semester hours in biology, grade point average, or age." He showed that "years of experience" was significant at the .02 level of confidence. This work indicated that:

Teachers who demonstrated a favorable attitude toward BSCS biology also may be described as having taught high school biology fewer years, on the average, than those demonstrating unfavorable attitudes.

Perkes (22) reported specific classroom behaviors of teachers. He reported:

Teaching behaviors become meaningful if they can be shown to have an effect on student learning. An examination shows that teaching behaviors including student involvement in laboratory activities and discussions, frequent use of equipment, lessons which stress principles of science, and questions which require students to speculate appear to be highly related to student achievement.

This work is supported by Yager and Wick (30) who wrote that "using a multireference approach in the biology classroom causes students to



develop more skill in critical thinking than when a single textbook is used with the same laboratory investigations."

Cogan (7) identified an independent variable which he termed "conjunctive." This variable includes four specific behaviors of teachers. These specific behaviors are:

. . . (1) skill in classroom management, (2) level of demands upon his pupils, (3) ability to develop interest in the classroom experiences, and (4) ability to communicate with his pupils.

These four specific behaviors were operationalized under the single conjunctive variable and were utilized in research. The result was that these behaviors are considered to be important behaviors of the classroom teacher.

Reed (24) identified three more characteristics of teachers which are exhibited in the classroom. These characteristics are "teacher warmth, teacher demand, and teacher utilization of intrinsic motivation." These characteristics have an effect on other teacher characteristics and practices as well as student achievement.

Yager (29) reported that:

. . . a given teacher may prove most effective in stimulating his students to learn information about science while he is quite ineffective in causing his students to learn to think more critically.

Belanger (3) summarized the literature concerning the new science curricula and the teacher behaviors and practices. He wrote:

The introduction of new science curricula appears to be a dramatic change factor in the teacher's experience. Presumably it necessitates an alteration in the classroom performance of many teachers. . . . the study of teaching is not aimed directly at administrative evaluation, but is aimed at increasing our knowledge about teaching.

## Summary

The pupil control ideology of teachers can be put into operational terms. Research with the PCI Form, the operational measure, indicates that all members of the school organization are concerned with control to a greater or lesser degree. Those who hold the more custodial pupil control ideology are the teachers.

An operational measure of classroom practices consistent with the rationale and philosophy of BSCS has been developed. Research has been completed utilizing the BCAC, the operational measure of classroom practices, in classroom situations where curriculum materials other than those recommended by BSCS have been and are being utilized.

The literature is abundant in which specific teacher characteristics have been related to achievement, critical thinking and practices such as use of reference materials, laboratory activities, and tests. Little or no research has been reported relating pupil control ideology to teacher classroom practices even though this relationship has been suggested in the literature.

## CHAPTER III

### METHODOLOGY AND DESIGN

In order to test the hypotheses, two groups of biological science teachers were compared with regard to the seven variables on the BCAC. The information for the comparison was supplied by student responses for each teacher in the group. Using student responses to provide information concerning the teacher practices as measured by the BCAC is consistent with the technique used by the authors when they developed the instrument. Kochendorfer (16) wrote:

After a critical review of the methods used in previous studies, the technique selected was that of having students report on the practices that took place in their classroom.

This is also consistent with the information provided by Reed (24).

He wrote:

The stability of pupils' responses concerning these teacher characteristics clearly indicates that pupils do perceive the teacher in a fairly uniform fashion, and can report their perceptions if given an opportunity to respond to specific behavior items.

The group of biological science teachers were identified by their response to the PCI Form. One group was designated as having a more humanistic pupil control ideology; one group was designated as having a more custodial pupil control ideology.

#### Selection of the Sample

The sample of biological science teachers was obtained by a

stratified randomized process. Since a listing of the individual biological science teachers was not available, it was necessary to devise a technique to identify the sample. This was accomplished by stratifying the listing of high schools in the State of Oklahoma into three stratifications. The stratifications were based upon the number of secondary school teachers in the high school. The stratifications chosen were: fifty secondary teachers and above, forty-nine to twenty-five secondary teachers, and twenty-four secondary teachers and below.

The randomization was accomplished by the use of a table of random numbers. The sample that was selected to participate in the study was one teacher from each of the one hundred and five selected high schools. The teacher who participated from the selected high school was a teacher of biological science.

Since the names of the biological science teachers were not available, the investigator mailed the materials to be completed for the study to the high school principals. This seemed to represent, from the viewpoint of the investigator, an entry point into the high school which would be least objectionable.

#### Administration of the Instruments

Since the administration of the instruments could not be personally directed by the investigator, a packet of materials was prepared and mailed to the principals of the selected high schools. These materials included: three letters, two sets of instruments, two self-addressed postage paid return envelopes, and one directions sheet.

Enclosed in the packet of materials sent to the principal was a letter addressed to him (Appendix A). This letter informed him of the

selection of his high school to participate in the research study and he was asked to make two responses. The first response was to select one biological science teacher and to select the first biology class of the day for that teacher to respond to the instruments. The teacher would complete the PCI Form; the students would complete the BCAC. The second response was to send the letter marked SUPERINTENDENT through the school mail to his superintendent.

The letter to the superintendent (Appendix B) informed the superintendent that his school district had been selected to participate in the research study and informed him that the materials to be completed were sent to his high school principal. The letter also solicited the support and encouragement of the superintendent for the research study.

The final selection of the biological science teachers who participated in the research study and the students who participated was made by the principal of the respective high school.

In an effort to further guide the study, an instructional sheet (Appendix C) was enclosed in the packet of materials, as well as a letter to the selected teacher. The instructional sheet consisted of three parts: (a) a section informing the principal of the contents of the materials which he had before him, (b) a section requesting that an appropriate member of the staff administer the instruments, not the selected teacher, and (c) a section containing directions for administering the instruments.

The section informing the principal of the contents of the materials which he had received identified the letter to the superintendent, identified the instrument which was to be completed by the teacher, and identified the instruments which were to be completed by the students.

The letter to the teacher (Appendix D) was addressed "Dear Colleague" and had the PCI Form attached to it. This information-type letter reminded the teacher of current research in the area of science education and it informed the teacher that the instrument which he was completing was different from the one which his students were completing. It also pointed out the code number on his instrument and revealed that this same code number appeared on the instruments of his students.

The directions for administering the instruments was included on the instructional sheet (Appendix C). Anonymity and secrecy of response were stressed with the directions: Please emphasize that the students should not write their name on the questionnaire, and please SEAL the student responses in the brown envelope in the presence of the students and ask one student to return it to the school office for mailing.

A follow-up letter (Appendix E) was mailed to the one hundred and five selected high schools three weeks after the initial mailing of the packet of materials. This letter encouraged participation from those who had not yet responded and thanked those who had responded. Telephone calls were made six weeks after the initial mailing to the high schools which had not responded.

One hundred and five packets of materials were mailed; seventy-five packets were returned. This represented a 71.4% return with seven sets not useable. The sample available for analysis was 68 which represented 64.7% of the original sample drawn.

### Instrumentation

Two instruments were used in this study. The instruments were the

Pupil Control Ideology Form (PCI) and the Biology Classroom Activity Checklist (BCAC).

The Pupil Control Ideology Form was developed by Willower, Eidell and Hoy. The form has twenty items (Appendix F). The reliability was determined at .91 using the Pearson product-moment correlation and .95 using the Spearman-Brown formula (35). The validity was determined by judgments of principal's concerning the pupil control ideology of their teachers. The principals judgments were significant at the .01 level of confidence. The PCI Form is scored on a likert-type scale: Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree. The responses are valued at 5, 4, 3, 2 and 1 respectively except for items 5 and 13 which are reversed scored. The range of scores on the PCI Form are, theoretically, 20 to 100. (35)

Permission to use the PCI Form was obtained by a telephone call to Dr. Wayne K. Hoy. Written permission to use the instrument was later obtained from Dr. Hoy.

The Biology Classroom Activity Checklist was developed by Dr. Leonard Kochendorfer and Dr. Addison Lee. The form has fifty-three items (Appendix G). Reliability and validity coefficients of .96 and .84, respectively, were obtained for the instrument. (17)

The BCAC is organized into seven sections. "The nature of each section is as follows:

- A - Role of the Teacher
- B - Student Participation
- C - Use of Curriculum Materials
- D - Tests
- E - Pre-Laboratory

F - Laboratory

G - Post-Laboratory." (16)

Each of the items on the BCAC is written from the viewpoint of the student. The BCAC has 26 items which are considered True and 27 items which are considered False. The student responds True or False depending upon the situation in his classroom. The instrument is scored as "a positive item which was marked TRUE or a negative item marked FALSE was classified as as a correct response." (16) A score for each test was computed using the following formula:

$$\text{SCORE} = \frac{\text{NUMBER OF CORRECT RESPONSES}}{\text{TOTAL NUMBER OF RESPONSES}} \times 100$$

The test scores have a potential range of 0 to 100 with the highest scores indicating a greater degree of agreement with practices recommended by BSCS. (16)

Written permission to use the BCAC was obtained from both Dr. Leonard Kochendorfer and Dr. Addison Lee.

### Statistical Application

From the 75 packets or 71.4% of the sample which were returned, only 68 packets or 64.7% of the sample were useable for statistical analysis. Five packets were eliminated because the student responses to the BCAC were incomplete; two packets were eliminated because the teacher responses to the PCI Form were incomplete.

Upon receipt of the 68 useable PCI Forms, they were scored. The range of the PCI scores for the biological science teachers was 74 to 40 with the higher scores representing a more custodial pupil control ideology and the lower scores representing a more humanistic pupil



control ideology. In order to obtain the two groups needed for analysis, the range of PCI scores was divided on the median. The top thirty-four scores were chosen to represent the group of teachers with a more custodial PCI; the lower thirty-four scores were chosen to represent the group of teachers with a more humanistic PCI.

Upon receipt of the BCAC instruments, they were scored for each class. The following mean scores were calculated for each class: one for total BCAC score, one for sections A through D combined, one for sections E through G combined, and one for each section A through G. A total of ten mean scores were calculated for each class.

The code number on the student responses was matched with the code number on the appropriate PCI Form. The class mean scores represented the scores for their respective teacher on the variables to be tested. The mean scores for the group of teachers with a more humanistic PCI were recorded on IBM data cards; the mean scores for the group of teachers with a more custodial PCI were recorded on IBM data cards. Appendix H shows the raw data recorded on the IBM data cards.

Once the information was recorded on the IBM data cards, it was taken to the computer center where a single classification analysis of variance was computed to test the hypotheses. This technique was chosen because the assumptions necessary for its application had been met. Popham (23) wrote that the AOV can be utilized in place of the more commonly used t-test when only two groups are employed. This supplied additional evidence for choosing the single analysis of variance.

## CHAPTER IV

### RESULTS OF THE STATISTICAL ANALYSIS

Two groups of biological science teachers were determined by their responses to the PCI Form. The range of responses to the PCI Form was 74 to 40. The scores above the median represented the thirty-four teachers who exhibited a more custodial pupil control ideology. The scores below the median represented the thirty-four teachers who exhibited a more humanistic pupil control ideology.

Students responded to the BCAC. A mean score for each class on ten variables was determined. This mean score on each variable represented the score for their respective teacher. The teacher scores were compared using a single classification analysis of variance.

The results of the statistical analysis is presented in this chapter. Each hypothesis is repeated and the results of the statistical analysis follows it.

Hypothesis 1: There is no significant difference in the classroom practices of biology teachers as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

The raw data yielded a mean score of 52.0358 for the teachers who exhibited a more custodial pupil control ideology and a mean score of 55.3502 for the teachers who exhibited a more humanistic pupil control ideology. These mean scores were compared using the analysis of variance.

The computed analysis of variance yielded an F ratio of 4.3374 (TABLE I). Rejection of the null hypothesis at the .05 level of confidence with 1 and 66 degrees of freedom called for an F ratio of 3.99. The result was a rejection of the null hypothesis.

TABLE I  
ANALYSIS OF VARIANCE OF CLASSROOM PRACTICES

Source	SS	DF	MS	F Ratio
Between Groups	186.7483	1	186.7483	4.3374
Within Groups	2841.6536	66	43.0553	
Total	3028.4019	67		

Hypothesis 2: There is no significant difference in the classroom scores (sections A through D combined) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

The raw data yielded a mean score of 48.8702 for the teachers who have a more custodial pupil control ideology and a mean score of 53.5396 for the teachers who have a more humanistic pupil control ideology. These mean scores were compared using the analysis of variance.

The computed analysis of variance yielded an F ratio of 5.3665 (TABLE II). Rejection of the null hypothesis at the .05 level of confidence with 1 and 66 degrees of freedom called for an F ratio of 3.99. The result was a rejection of the null hypothesis.

TABLE II  
ANALYSIS OF VARIANCE OF CLASSROOM SCORES

Source	SS	DF	MS	F Ratio
Between Groups	370.6567	1	370.6567	5.3665
Within Groups	4558.5273	66	69.0686	
Total	4929.1836	67		

Hypothesis 3: There is no significant difference in the laboratory scores (sections E through G combined) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

The raw data yielded a mean score of 55.8608 for the teachers who have a more custodial pupil control ideology and a mean score of 57.5587 for the teachers who have a more humanistic pupil control ideology. These mean scores were compared using the analysis of variance.

The computed analysis of variance yielded an F ratio of 1.6623 (TABLE III). Rejection of the null hypothesis at the .05 level of confidence with 1 and 66 degrees of freedom called for an F ratio of 3.99. The result was a failure to reject the null hypothesis.

TABLE III  
ANALYSIS OF VARIANCE OF LABORATORY SCORES

Source	SS	DF	MS	F Ratio
Between Groups	49.0108	1	49.0108	1.6623
Within Groups	1945.8950	66	29.4832	
Total	1994.9058	67		

Hypothesis 4: There is no significant difference in the roles of the teacher (section A) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

The raw data yielded a mean score of 54.6581 for the teachers who have a more custodial pupil control ideology and a mean score of 60.1958 for the teachers who have a more humanistic pupil control ideology. These mean scores were compared using the analysis of variance.

The computed analysis of variance yielded an F ratio of 8.8635 (TABLE IV). Rejection of the null hypothesis at the .01 level of confidence with 1 and 66 degrees of freedom called for an F ratio of 7.04. The result was a rejection of the null hypothesis.

Hypothesis 5: There is no significant difference in the student participation (section B) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

The raw data yielded a mean score of 51.4717 for the teachers who have a more custodial pupil control ideology and a mean score of 54.9864

for the teachers who have a more humanistic pupil control ideology. These mean scores were compared using the analysis of variance.

The computed analysis of variance yielded an F ratio of 2.6412 (TABLE V). Rejection of the null hypothesis at the .05 level of confidence with 1 and 66 degrees of freedom called for an F ratio of 3.99. The result was a failure to reject the null hypothesis.

TABLE IV  
ANALYSIS OF VARIANCE OF THE ROLES OF THE TEACHER

Source	SS	DF	MS	F Ratio
Between Groups	521.3159	1	521.3159	8.8635
Within Groups	3881.8538	66	58.8160	
Total	4403.1680	67		

TABLE V  
ANALYSIS OF VARIANCE OF STUDENT PARTICIPATION

Source	SS	DF	MS	F Ratio
Between Groups	210.0040	1	210.0040	2.6412
Within Groups	5247.7070	66	79.5107	
Total	5457.7109	67		

Hypothesis 6: There is no significant difference in the use of textbook and reference materials (section C) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

The raw data yielded a mean score of 47.0858 for the teachers who have a more custodial pupil control ideology and a mean score of 52.4537 for the teachers who have a more humanistic pupil control ideology. These mean scores were compared using the analysis of variance.

The computed analysis of variance yielded an F ratio of 4.7399 (TABLE VI). Rejection of the null hypothesis at the .05 level of confidence with 1 and 66 degrees of freedom called for an F ratio of 3.99. The result was a rejection of the null hypothesis.

TABLE VI

## ANALYSIS OF VARIANCE OF TEXTBOOK AND REFERENCE MATERIALS

Source	SS	DF	MS	F Ratio
Between Groups	489.8528	1	489.8528	4.7399
Within Groups	6820.9336	66	103.3475	
Total	7310.7852	67		

Hypothesis 7: There is no significant difference in design and use of tests (section D) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

The raw data yielded a mean score of 39.6540 for the teachers who have a more custodial pupil control ideology and a mean score of 44.1531 for the teachers who have a more humanistic pupil control ideology. These mean scores were compared using the analysis of variance.

The computed analysis of variance yielded an F ratio of 1.4913 (TABLE VII). Rejection of the null hypothesis at the .05 level of confidence with 1 and 66 degrees of freedom called for an F ratio of 3.99. The result was a failure to reject the null hypothesis.

TABLE VII  
ANALYSIS OF VARIANCE OF TESTS

Source	SS	DF	MS	F Ratio
Between Groups	344.1145	1	344.1145	1.4913
Within Groups	15229.0781	66	230.7436	
Total	15573.1914	67		

Hypothesis 8: There is no significant difference in pre-laboratory activities (section E) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

The raw data yielded a mean score of 54.5222 for the teachers who have a more custodial pupil control ideology and a mean score of 55.6587 for the teachers who have a more humanistic pupil control ideology.



These mean scores were compared using the analysis of variance.

The computed analysis of variance yielded an F ratio of 0.6711 (TABLE VIII). Rejection of the null hypothesis at the .05 level of confidence with 1 and 66 degrees of freedom called for an F ratio of 3.99. The result was a failure to reject the null hypothesis.

TABLE VIII  
ANALYSIS OF VARIANCE OF PRE-LABORATORY ACTIVITIES

Source	SS	DF	MS	F Ratio
Between Groups	21.9579	1	21.9579	0.6711
Within Groups	2159.4468	66	32.7189	
Total	2181.4045	67		

Hypothesis 9: There is no significant difference in the laboratory activities (section F) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

The raw data yielded a mean score of 55.6337 for the teachers who have a more custodial pupil control ideology and a mean score of 55.4929 for the teachers who have a more humanistic pupil control ideology. These mean scores were compared using the analysis of variance.

The computed analysis of variance yielded an F ratio of 0.0053 (TABLE IX). Rejection of the null hypothesis at the .05 level of

confidence with 1 and 66 degrees of freedom called for an F ratio of 3.99. The result was a failure to reject the null hypothesis.

TABLE IX  
ANALYSIS OF VARIANCE OF LABORATORY ACTIVITIES

Source	SS	DF	MS	F Ratio
Between Groups	0.3372	1	0.3372	0.0053
Within Groups	4209.9570	66	63.7872	
Total	4210.2390			

Hypothesis 10: There is no significant difference in the post-laboratory activities (section G) as measured by the Biology Classroom Activity Checklist between those teachers who have a more humanistic pupil control ideology and those teachers who have a more custodial pupil control ideology.

The raw data yielded a mean score of 57.6840 for the teachers who have a more custodial pupil control ideology and a mean score of 62.5352 for the teachers who have a more humanistic pupil control ideology. These mean scores were compared using the analysis of variance.

The computed analysis of variance yielded an F ratio of 4.9032 (TABLE X). Rejection of the null hypothesis at the .05 level of confidence with 1 and 66 degrees of freedom called for an F ratio of 3.99. The result was a rejection of the null hypothesis.

TABLE X  
ANALYSIS OF VARIANCE OF POST-LABORATORY ACTIVITIES

Source	SS	DF	MS	F Ratio
Between Groups	400.0745	1	400.0745	4.9032
Within Groups	5385.1914	66	81.5938	
Total	5785.2656	67		

The high schools in Oklahoma were stratified into three categories, based upon the number of secondary teachers in the high school. The stratifications chosen were: (1) fifty secondary teachers and above, (2) forty-nine to twenty-five secondary teachers, and (3) twenty-four secondary teachers and below. Thirty-five schools in each stratification were chosen at random. The results of the return were: twenty-six returned from the first stratification, nineteen from the second stratification, and twenty-three from the third stratification. This represented the sixty-eight packets which were usable for the analysis.

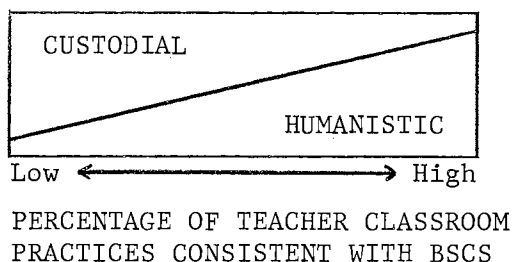
## CHAPTER V

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purposes of this chapter are to provide a summary of the study, to review the conclusions which resulted from the study, and to make recommendations concerning questions which may suggest areas of future research.

#### Summary of the Study

The central objective of this study was to determine the extent to which pupil control ideology is related to teacher classroom practices recommended by the BSCS programs as measured by the Biology Classroom Activity Checklist. An initial review of the literature enabled the investigator to adapt a theoretical model developed by Getzels and Guba (9) to the concepts of pupil control ideology and teacher classroom practices. The model which resulted from this adaptation is shown below.



Based upon the concepts of pupil control ideology; teacher classroom practices; and needed research in education, the following problem, which represented the central objective of the study, was investigated: Do teachers who have a more humanistic pupil control ideology exhibit to a greater extent the teacher classroom practices recommended by the BSCS program as measured by the Biology Classroom Activity Checklist than do teachers who have a more custodial pupil control ideology?

Ten hypotheses were tested in this study. These hypotheses were necessary in order that all dependent variables, which are possible when the BCAC is utilized, could be tested.

A further review of the literature indicated that the Pupil Control Ideology Form (PCI) and the Biology Classroom Activity Checklist were both valid and reliable instruments for testing the hypotheses. The literature also indicated that many independent variables have been related to teacher classroom practices, but that pupil control ideology, even though an important variable, had not been reported to any great extent as being related to teacher classroom practices.

The methodology and design utilized a stratified randomized technique to select the sample. A packet of materials was mailed to the principals of the one hundred and five high schools which were selected to participate in the study. The principal asked one biological science teacher and the first biological science class of the day for that selected teacher to respond to the instruments.

One hundred and five packets of material were mailed; seventy-five or 71.4% of the packets were returned. Seven of the returned packets were not useable. This left 64.7% of the original sample drawn or 68 useable packets available for statistical analysis. The two groups

needed in the analysis was obtained by dividing the PCI range at the median. These groups consisted of thirty-four of the more humanistic group and thirty-four for the more custodial group.

The student responses to the BCAC were matched with their respective teacher. Class mean scores on the ten variables, called for by the hypotheses, were calculated for each of the more humanistic and the more custodial teachers. These mean scores were compared using a single classification analysis of variance.

The results of testing the hypotheses yielded the following:

1. The mean difference of the total BCAC scores (sections A through G combined) was significant beyond the .05 level of confidence.
2. The mean difference of the classroom scores (sections A through D combined) was significant beyond the .05 level of confidence.
3. The mean difference of the laboratory scores (sections E through G combined) was not significant at the .05 level of confidence.
4. The mean difference of the roles of the teacher was significant beyond the .01 level of confidence.
5. The mean difference of student participation was not significant at the .05 level of confidence.
6. The mean difference of textbook and reference materials was significant at the .05 level of confidence.
7. The mean difference of design and use of tests was not significant at the .05 level of confidence.
8. The mean difference of pre-laboratory activities was not significant at the .05 level of confidence.
9. The mean difference of laboratory activities was not significant at the .05 level of confidence.

10. The mean difference of post-laboratory activities was significant beyond the .05 level of confidence.

### Conclusions of the Study

The conclusions which can be drawn from this study should be considered in light of several factors. Included among these factors to be considered are: (a) the method by which the sample was selected, (b) the limitations reported in the study, and (c) the failure of 28.6% of the original sample to respond.

It should be noted that the selection of the sample was an attempt to draw a sample which was representative of the population of biological science teachers in the State of Oklahoma. Since the sample was drawn from a list of high schools, not from a list of biological science teachers, the sample may not be representative of the population from which it was intended to be drawn.

This study was limited to pupil control ideology of biological science teachers and teacher classroom practices. No attempt was made to report various demographic data such as sex, age, or grade level of students. No attempt was made to report various demographic data of teachers such as age, sex, experience in teaching, or education. These limitations must, therefore, be considered when drawing conclusions about the results obtained.

Why did 28.6% of the selected sample fail to respond? This question cannot be answered by the investigator; therefore, any conclusions drawn from the study must be considered in light of this limitation.

The model which guided this research stressed the fact that as

teachers become more humanistic in pupil control ideology they will exhibit a higher percentage of classroom practices consistent with those recommended by BSCS. Using the mean difference on total BCAC scores for comparison, this idea was supported by this research.

Reporting a significant difference of mean scores on the variable of classroom activities (sections A through D combined) fails to provide a complete picture of the results obtained. Four hypotheses concerning role of the teacher (section A), student participation (section B), use of textbook and reference materials (section C), and design and use of tests (section D) were predicted in order to provide a more complete picture of the results obtained. Even though a conclusion can be drawn that those teachers who have a more humanistic pupil control ideology exhibit a higher percentage of classroom activities as measured by sections A through D combined of the BCAC than do the teachers who have a more custodial pupil control ideology, this conclusion is of limited value when considered alone.

The mean difference of the role of the teacher was found to be significant. A conclusion can be drawn that the teacher with the more humanistic pupil control ideology asks his students to explain the meaning of certain things in the text, asks questions that cause his students to think about things that have been learned in previous chapters, and asks questions which cause his students to think about the evidence that is behind statements made in the textbook, to a greater extent than does the teacher who has a more custodial pupil control ideology.

The mean difference on student participation was not significant. Observation and analysis of the raw data reveal that those teachers



with a more humanistic pupil control ideology exhibited a higher mean score on the variable of student participation. The higher mean score does, however, permit limited speculation. One might speculate that students working with the teacher who has a more humanistic pupil control ideology is permitted to share his ideas with both the teacher and the class to a greater extent than those students working with the teacher who has a more custodial pupil control ideology.

The mean difference on textbook and reference materials (section C) was significant. The conclusion can be drawn that the teacher with the more humanistic pupil control ideology tries to teach his students to question the textbook and reference materials, and tries to teach his students to substantiate these questions by reading the original writings of scientists.

The mean difference on design and use of tests (section D) was not significant. A consideration of the mean scores enabled the investigator to conclude that both the more humanistic and the more custodial group of teachers scored low on this section. A speculative reason for both groups scoring low is that the time required for developing open-ended test items which are recommended by BSCS is not available to these teachers. This lack of time available can be explained by high teacher-pupil class ratios.

After having reported the results of the classroom activities, both collectively and individually, through a series of hypotheses, the investigator concludes that the teacher who has a more humanistic pupil control ideology will exhibit a higher percentage of classroom activities consistent with those recommended by BSCS than will the teacher

who has a more custodial pupil control ideology. These exhibited practices will be observed and can be reported by their students.

The mean difference on laboratory activities (sections E through G combined) was not significant. There was also no significant difference on pre-laboratory (section E) and laboratory (section F) activities. A conclusion that can be drawn is that teachers simply prepare the material for the laboratory activities and send the students to the laboratory to work. The student must "discover" the purposes of the laboratory exercise, formulate the needed hypotheses, and collect the data without much help or guidance from the teacher.

The significance of post-laboratory activities (section G) indicates that those teachers who have a more humanistic pupil control ideology do bring the students back from the laboratory and discuss the results obtained and analyze these results in terms of further hypotheses which could be tested to a greater extent than those teachers who have a more custodial pupil control ideology.

An analysis of the laboratory activities, both collectively and individually, leads to the conclusion that these activities cannot be predicted from the model developed to guide this research. Perhaps, these activities could be predicted from the model if a more representative sample were to be employed.

Hoy and Blankenship (15) wrote:

A review of Kochendorfer's statement reveals a compatibility with the behavior that one might expect from a teacher with a humanistic pupil control ideology . . .

One may conclude from the results obtained on total BCAC scores that the expectation expressed by Hoy and Blankenship has been borne out.

## Recommendations

There are several questions which need to be investigated in order that the relationship of pupil control ideology and teacher classroom practices can be made more meaningful.

Does the age of the student affect his perception of teacher classroom practices? Does the sex of the student affect his perception of teacher classroom practices?

How do various demographic variables such as sex of teacher, age of teacher, education of teacher, and number of years experience relate to the teacher classroom practices and pupil control ideology?

Do the students' perceptions of teacher classroom practices remain fairly constant or do they vary from day to day, week to week, or month to month?

Would a teacher's knowledge of his pupil control ideology have an effect on his classroom practices?

Would a replication of this study and the elimination of its weakness reveal new knowledge about the relationship between pupil control ideology and teacher classroom practices?

If teachers do become more custodial with time as has been reported and since this tendency toward custodialism affects the classroom practices, it seems salient to recommend a series of inservice programs to help combat this tendency toward custodialism.

If the more humanistic teachers do exhibit the practices recommended by BSCS to a greater extent than the more custodial teachers as this study indicates, it is recommended that teacher training programs be structured so that the prospective teacher can be made aware of his pupil control ideology and the extent to which he exhibited the

practices recommended by BSCS during his student teaching experience. It is a simple thing to measure pupil control ideology and to measure exhibited classroom practices, therefore, a knowledge of these may have an important beneficial effect upon prospective teachers and their relationships with students.

The area of science education is fruitful for empirical research. It is hoped that this study will make a contribution and will stimulate additional research in the area.

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APPENDIX A

## SCIENCE TEACHER CHARACTERISTICS STUDY

Director: Dr. J. W. Blankenship

Gundersen Hall

Project Associate: Paul L. Jones

Oklahoma State University

Stillwater, Oklahoma 74074

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Dear Sir:

One hundred school districts from the State of Oklahoma have been selected to participate in a basic research project being conducted at Oklahoma State University.

This project involves biology teachers and one of their biology classes to respond to the questionnaire-type instruments which are enclosed. The forms do not take long to complete; the time required by most classes varies from ten to fifteen minutes. The teacher form requires approximately five minutes to complete. The only requirement for teachers or for students is that they give frank answers. The names of respondents are not required and all responses will be kept strictly confidential.

A detailed instruction sheet is attached to this letter and a letter for your superintendent is enclosed. Your prompt attention and cooperation will be greatly appreciated because it is a prerequisite to the success of this research. Thank you.

Sincerely yours,

Paul L. Jones  
Project Associate

PLJ/km

Enclosures

APPENDIX B

## SCIENCE TEACHER CHARACTERISTICS STUDY

Director: Dr. J. W. Blankenship  
Project Associate: Paul L. Jones

Gundersen Hall  
Oklahoma State University  
Stillwater, Oklahoma 74074

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Dear Sir:

One hundred school districts from the State of Oklahoma have been selected to participate in a basic research project being conducted at Oklahoma State University.

A packet of materials has been sent to your high school principal. These materials do not take long to complete; the time required varies from ten to fifteen minutes. The principal has been asked to select one biology teacher and one of his/her classes of biology to respond to the materials.

This letter is to inform you that materials are with the principal and to solicit your encouragement of this research.

Your prompt attention and cooperation will be greatly appreciated as it is a prerequisite to the success of this research. Thank you.

Sincerely yours,

Paul L. Jones  
Project Associate

PLJ/km

APPENDIX C

Instructional Sheet

Enclosed you will find:

1. An envelope marked "SUPERINTENDENT" containing a letter to your chief administrator explaining the research and soliciting his encouragement. PLEASE FORWARD this letter through your school distribution channels.
2. A "GREEN" questionnaire and a return postage-paid envelope. Please select one of your biology teachers to complete this questionnaire and return it directly to us in the envelope provided.
3. A packet marked "TO BE COMPLETED BY STUDENTS" and a brown return postage-paid envelope. There are thirty questionnaires in the packet. Please ask the first biology class of the day that is taught by the selected teacher to respond to these questionnaires.

Please ask an appropriate member of your staff, not the selected biology teacher, to administer these questionnaires. The success of this project depends upon your participation and your cooperation. The results of this study will enable science educators to more adequately describe science teacher characteristics.

Directions for administering questionnaires marked "TO BE COMPLETED BY STUDENTS."

1. Please emphasize to the students that the purpose of the checklist is to determine how well they know what is going on in the classroom.
2. Please emphasize that all statements should be answered in the margins of the booklet.
3. Please emphasize that the students should blacken in the space under the appropriate response in pencil or ink.
4. Please emphasize that the students should not write their names on the questionnaire.
5. Please SEAL the student responses in the brown envelope in the presence of the students and ask one student to return it to the school office for mailing.

THANK YOU FOR YOUR COOPERATION.

APPENDIX D

## SCIENCE TEACHER CHARACTERISTICS STUDY

Director: Dr. J. W. Blankenship  
Project Associate: Paul L. Jones

Gundersen Hall  
Oklahoma State University  
Stillwater, Oklahoma 74074

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Dear Colleague:

Science educators are currently conducting research into two key factors related to science instruction: (1) the teacher; and (2) the learning situation. We have requested that you and one class of your students respond to questionnaires that will enable us to learn more about the relationship between teachers and activities in the biology classroom.

IBM Data Card Processing of the information supplied by one hundred Oklahoma biology teachers will allow us to extend our knowledge concerning the biology teacher and biology teaching. Since the information furnished by you and your students will be processed using the university computer, all information supplied will be confidential in that we are not asking for you nor your students to sign the questionnaire.

You will note that there is a code number on your questionnaire. This same number appears on the questionnaires of your students. This is to insure that the student and the teacher responses can be correlated.

The questionnaire that your students are responding to is different from the questionnaire that you complete. The student questionnaire deals with the activities that take place in the classroom.

We appreciate your cooperation and the contribution that your participation makes to science education.

Sincerely yours,

Paul L. Jones  
Project Associate



APPENDIX E

## SCIENCE TEACHER CHARACTERISTICS STUDY

Project Director: Dr. J. W. Blankenship      301 Gundersen Hall  
Oklahoma State University  
Project Associate: Paul L. Jones              Stillwater, Oklahoma 74074

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Dear Sir:

Recently you received a packet of material from the Science Teacher Characteristics Study in which you were asked to select one biology teacher and one of his/her classes to respond to the enclosed materials. Your school was one of one hundred schools selected from Oklahoma to participate in this phase of a larger National Study.

The response has been rewarding, but several of the school districts have not, as yet, responded to our initial inquiry. If your school has not responded, this letter is being written to solicit and encourage your participation in the Science Teacher Characteristics Study.

If you did not receive the materials, or if the materials have been accidentally lost or destroyed, please call FR 2-6211, Ext. 6245 and I will rush a duplicate set of materials to you.

If you have responded, I would like to take this opportunity to thank you, your faculty and students for the time taken to complete the materials.

Sincerely,

Paul L. Jones  
Project Associate

APPENDIX F

## FORM PCI\*

## INFORMATION

On the following pages a number of statements about teaching are presented. Our purpose is to gather information regarding the actual attitudes of educators concerning these statements.

You will recognize that the statements are of such a nature that there are no correct or incorrect answers. We are interested only in your frank opinion of them.

Your responses will remain confidential, and no individual or school will be named in the report of this study. Your cooperation is greatly appreciated.

INSTRUCTIONS: Following are twenty statements about schools, teachers, and pupils. Please indicate your personal opinion about each statement by circling the appropriate response at the right of the statement.

KEY: SA - Strongly Agree  
 A - Agree  
 U - Undecided  
 D - Disagree  
 SD - Strongly Disagree

- |   |    |   |   |   |    |
|---|----|---|---|---|----|
| 1. It is desirable to require pupils to sit in assigned seats during assemblies.                        | SA | A | U | D | SD |
| 2. Pupils are usually not capable of solving their problems through logical reasoning.                  | SA | A | U | D | SD |
| 3. Directing sarcastic remarks toward a defiant pupil is a good disciplinary technique.                 | SA | A | U | D | SD |
| 4. Beginning teachers are not likely to maintain strict enough control over their pupils.               | SA | A | U | D | SD |
| 5. Teachers should consider revision of their teaching methods if these are criticized by their pupils. | SA | A | U | D | SD |
| 6. The best principals give unquestioning support to teachers in disciplining pupils.                   | SA | A | U | D | SD |

- |  |    |   |   |   |    |
|--|----|---|---|---|----|
| 7. Pupils should not be permitted to contradict the statements of a teacher in class.                            | SA | A | U | D | SD |
| 8. It is justifiable to have pupils learn many facts about a subject even if they have no immediate application. | SA | A | U | D | SD |
| 9. Too much pupil time is spent on guidance and activities and too little on academic preparation.               | SA | A | U | D | SD |
| 10. Being friendly with pupils often leads them to become too familiar.  | SA | A | U | D | SD |
| 11. It is more important for pupils to learn to obey rules than that they make their own decisions.              | SA | A | U | D | SD |
| 12. Student governments are a good "safety valve" but should not have much influence on school policy.           | SA | A | U | D | SD |
| 13. Pupils can be trusted to work together without supervision.  | SA | A | U | D | SD |
| 14. If a pupil uses obscene or profane language in school, it must be considered a moral offense.                | SA | A | U | D | SD |
| 15. If pupils are allowed to use the lavatory without getting permission, this privilege will be abused.         | SA | A | U | D | SD |
| 16. A few pupils are just young hoodlums and should be treated accordingly.                                      | SA | A | U | D | SD |
| 17. It is often necessary to remind pupils that their status in school differs from that of teachers.            | SA | A | U | D | SD |
| 18. A pupil who destroys school material or property should be severely punished.                                | SA | A | U | D | SD |
| 19. Pupils cannot perceive the difference between democracy and anarchy in the classroom.                        | SA | A | U | D | SD |
| 20. Pupils often misbehave in order to make the teacher look bad.  | SA | A | U | D | SD |



APPENDIX G

## BIOLOGY CLASSROOM ACTIVITY CHECKLIST\*

The purpose of this checklist is to determine how well you know what is going on in your biology class. Each statement describes some classroom activity. The activities are not judged as either good or bad. Therefore, this checklist is not a test and is not designed to grade either you or your teacher. You are to read each statement and decide if it describes the activities in your class. All answers should be recorded on the answer sheet. NO MARKS should be made in this booklet.

## SAMPLE QUESTION

	Checklist		Answer Sheet	
	T	F	T	F
1. My teacher often takes class attendance.			1. ( )	( )

If the statement describes what occurs in your classroom, blacken the space under the letter T (TRUE) on the answer sheet; if it does not, blacken in the space under the letter F (FALSE).

## REMEMBER:

1. The purpose of the checklist is to determine how well you know what is going on in your classroom.
2. Make no marks in this booklet.
3. All statements should be answered on the answer sheet by blackening in the space under the chosen response in pencil or ink.
4. Please do not write your name on this booklet or answer sheet.

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\*Written permission to use the instrument was granted by Dr. Leonard H. Kochendorfer and Dr. Addison E. Lee.



## BIOLOGY CLASSROOM ACTIVITY CHECKLIST

SECTION A

1. Much of our class time is spent listening to our teacher tell us about biology.
2. My teacher doesn't like to admit his mistakes.
3. If there is a discussion among students, the teacher usually tells us who is right.
4. My teacher often repeats almost exactly what the textbook says.
- \*5. My teacher often asks us to explain the meaning of certain things in the text.
6. My teacher shows us that biology has almost all of the answers to questions about living things.
- \*7. My teacher asks questions that cause us to think about things that we have learned in other chapters.
- \*8. My teacher often asks questions that cause us to think about the evidence that is behind statements that are made in the textbook.

SECTION B

1. My job is to copy down and memorize what the teacher tells us.
- \*2. We students are often allowed time in class to talk among ourselves about ideas in biology.
3. Much of our class time is spent in answering orally or in writing questions that are written in the textbook or on study guides.
- \*4. Classroom demonstrations are usually done by students rather than by the teacher.
5. We seldom or never discuss the problems faced by scientists in the discovery of a scientific principle.
- \*6. If I don't agree with what my teacher says, he wants me to say so.
7. Most of the questions that we ask in class are to clear up what the teacher or text has told us.

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\*Items considered as those which contribute positively toward the attainment of BSCS objectives.

- \*8. We often talk about the kind of evidence that is behind a scientist's conclusion.

### SECTION C

1. When reading the text, we are expected to learn most of the details that are stated there.
2. We frequently are required to write out definitions to word lists.
- \*3. When reading the textbook, we are always expected to look for the main problems and for the evidence that supports them.
- \*4. Our teacher has tried to teach us how to ask questions of the text.
5. The textbook and the teacher's notes are about the only sources of biological knowledge that are discussed in class.
- \*6. We sometimes read the original writings of scientists.
- \*7. We are seldom or never required to outline sections of the textbook.

### SECTION D

- \*1. Our tests include many questions based on things that we have learned in the laboratory.
2. Our tests often ask us to write out definitions of terms.
- \*3. Our tests often ask us to relate things that we have learned at different times.
- \*4. Our tests often ask us to figure out answers to new problems.
- \*5. Our tests often give us new data and ask us to draw conclusions from these data.
6. Our tests often ask us to put labels on drawings.

### SECTION E

1. My teacher usually tells us step-by-step what we are to do in the laboratory.
- \*2. We spend some time before every laboratory in determining the purpose of the experiment.
3. We often cannot finish our experiments because it takes so long to gather equipment and prepare solutions.

4. The laboratory meets on a regularly scheduled basis (such as every Friday).
- \*5. We often use the laboratory to investigate a problem that comes up in class.
- \*6. The laboratory usually comes before we talk about the specific topic in class.
7. Often our laboratory work is not related to the topic that we are studying in class.
8. We usually know the answer to a laboratory problem that we are investigating before we begin the experiment.

#### SECTION F

1. Many of the experiments that are in the laboratory manual are done by the teacher or students while the class watches.
- \*2. The data that I collect are often different from data that are collected by the other students.
3. Our teacher is often busy grading papers or doing some other personal work while we are working in the laboratory.
- \*4. During an experiment we record our data at the time we make our observations.
- \*5. We are sometimes asked to design our own experiment to answer a question that puzzles us.
6. We often ask the teacher if we are doing the right thing in our experiments.
- \*7. The teacher answers most of our questions about the laboratory work by asking us questions.
8. We spend less than one-fourth of our time in biology doing laboratory work.
9. We never have the chance to try our own ways of doing the laboratory work.

#### SECTION G

- \*1. We talk about what we have observed in the laboratory within a day or two after each session.
- \*2. After every laboratory session, we compare the data that we have collected with the data of other individuals or groups.

3. Our teacher often grades our data books for neatness.
4. We are required to copy the purpose, materials, and procedure used in our experiments from the laboratory manual.
- \*5. We are allowed to go beyond the regular laboratory exercise and do some experimenting on our own.
- \*6. We have a chance to analyze the conclusions that we have drawn in the laboratory.
7. The class is able to explain all unusual data that are collected in the laboratory.

APPENDIX H

## RAW DATA FOR CUSTODIAL GROUP

Teacher	PCI	Total BAC	Combined A-D	Combined E-G	Section A
01	74	53.30	46.98	60.94	53.13
02	73	47.98	44.70	51.93	58.48
03	70	46.78	40.78	54.02	52.13
04	68	53.05	48.01	59.13	52.88
05	68	48.11	42.64	54.72	53.75
06	66	52.16	45.19	60.57	53.57
07	66	54.11	50.25	58.78	53.02
08	66	49.74	47.02	53.03	54.55
09	64	49.83	44.22	56.62	52.94
10	64	47.55	46.90	48.33	47.50
11	63	47.17	40.91	54.73	43.18
12	63	64.87	63.02	67.10	63.36
13	63	51.00	43.91	58.58	39.17
14	62	46.44	42.84	50.80	40.87
15	61	54.32	52.30	56.77	58.33
16	60	44.73	43.68	46.01	45.83
17	60	55.12	56.03	54.02	63.39
18	60	46.86	42.41	52.22	55.00
19	59	48.16	46.63	50.00	54.17
20	59	47.59	43.68	52.31	46.53
21	59	63.29	62.93	63.71	71.88
22	59	49.71	46.49	53.59	54.31
23	59	47.48	43.30	52.55	54.17
24	59	46.88	41.25	53.69	53.37
25	58	44.86	39.09	51.85	51.39
26	58	57.98	53.05	63.94	60.58
27	58	50.88	48.62	53.61	53.75
28	58	64.67	70.15	58.05	64.66
29	58	48.24	46.03	50.91	54.35
30	57	50.62	47.83	53.99	53.80
31	57	55.69	54.22	57.47	50.43
32	57	47.44	44.09	51.49	51.79
33	56	61.74	55.94	68.75	63.19
34	56	70.87	76.51	64.06	78.90

## RAW DATA FOR CUSTODIAL GROUP

Teacher	Sections					
	B	C	D	E	F	G
01	51.56	48.21	31.25	53.13	62.50	67.86
02	50.45	36.73	27.98	50.45	50.79	55.10
03	37.50	40.39	30.46	57.76	50.19	54.68
04	45.67	54.40	37.18	72.12	54.70	50.00
05	40.83	39.52	33.89	58.33	50.00	56.67
06	48.21	44.39	30.95	50.00	58.33	75.51
07	46.43	53.06	45.83	52.68	60.32	63.78
08	44.32	51.95	34.85	55.11	54.55	48.70
09	49.26	35.29	36.27	59.56	58.17	51.26
10	55.00	40.00	43.33	45.00	44.44	57.14
11	52.27	37.01	27.27	57.95	52.52	53.90
12	65.52	54.68	66.67	69.40	70.50	60.10
13	50.83	42.38	42.78	53.33	55.56	71.90
14	51.44	44.51	32.05	49.52	55.56	46.15
15	59.89	45.24	42.36	64.06	58.80	45.83
16	42.19	48.81	36.81	46.88	45.83	45.24
17	66.52	49.49	39.88	54.46	49.60	59.18
18	38.75	42.38	30.56	55.42	53.70	46.67
19	54.76	44.18	28.57	53.57	44.44	53.06
20	52.08	42.06	30.56	53.47	43.83	61.90
21	60.42	60.12	57.64	61.98	65.74	63.10
22	54.74	36.95	37.21	53.02	51.34	57.14
23	49.31	42.06	22.22	52.78	53.09	51.59
24	37.98	36.26	36.26	50.96	57.26	52.20
25	42.06	31.75	25.93	40.28	58.02	57.14
26	56.25	43.96	49.36	61.06	67.95	62.09
27	43.75	54.76	41.11	54.17	51.11	56.19
28	68.96	70.44	78.74	58.62	49.81	67.98
29	46.19	50.93	28.99	40.76	48.31	65.84
30	50.54	47.20	36.96	46.74	60.87	53.42
31	61.21	58.13	45.40	55.60	57.85	59.11
32	41.07	41.84	40.48	51.79	56.35	44.90
33	60.42	59.52	36.11	52.08	72.84	82.54
34	72.66	72.32	83.33	61.72	66.67	63.39

## RAW DATA FOR HUMANISTIC GROUP

Teacher	PCI	Total BCAC	Combined A-D	Combined E-G	Section A
01	55	53.56	50.38	57.41	59.03
02	55	55.00	56.10	53.69	54.33
03	54	56.23	55.40	57.22	65.83
04	54	51.42	48.99	54.34	57.29
05	54	53.69	51.87	55.90	75.52
06	54	50.66	46.99	55.09	67.13
07	54	71.28	73.95	68.06	79.17
08	53	45.91	44.25	47.92	50.42
09	53	48.28	47.46	49.26	54.41
10	53	50.94	47.68	54.89	54.89
11	53	53.08	53.56	52.50	56.67
12	53	59.99	58.86	61.35	62.06
13	53	56.25	53.77	59.26	56.02
14	52	63.24	61.36	65.52	71.12
15	51	50.52	48.66	52.78	55.56
16	51	55.37	57.90	53.27	65.09
17	51	49.78	48.77	50.99	53.57
18	50	54.18	52.96	55.65	62.05
19	49	57.12	56.16	58.93	60.27
20	49	50.38	46.44	55.14	59.17
21	49	53.49	51.21	56.25	68.13
22	48	52.73	49.73	56.36	61.84
23	48	44.56	40.19	49.84	46.15
24	48	52.58	51.27	54.17	56.52
25	46	43.90	36.78	52.50	48.33
26	46	72.33	73.79	70.56	68.75
27	46	59.01	55.89	62.79	51.29
28	45	60.47	55.67	66.27	64.29
29	44	53.96	50.48	58.17	53.50
30	43	63.29	62.64	64.06	60.42
31	43	58.24	53.97	63.41	61.41
32	43	52.03	50.12	54.32	58.93
33	41	65.28	66.21	64.17	66.00
34	40	63.17	65.52	60.33	61.50



## RAW DATA FOR HUMANISTIC GROUP

Teacher	Sections					
	B	C	D	E	F	G
01	65.28	37.30	34.26	53.47	53.70	66.67
02	61.06	68.13	37.82	51.44	46.15	65.93
03	56.67	53.34	42.22	56.67	57.04	58.09
04	52.08	40.48	19.44	48.44	52.31	63.69
05	61.98	42.26	42.36	47.40	59.26	61.31
06	44.91	48.15	21.60	54.17	52.67	59.26
07	77.08	73.02	63.89	63.19	64.20	78.57
08	43.33	41.43	40.56	52.92	38.52	54.29
09	53.68	42.02	36.27	49.26	47.71	51.26
10	47.83	51.55	33.33	60.33	54.59	49.07
11	54.58	59.05	41.67	52.08	45.56	61.90
12	55.60	54.68	63.79	56.90	61.30	66.50
13	54.63	50.79	53.09	53.70	58.85	66.14
14	67.24	73.54	32.18	57.76	63.22	83.07
15	55.56	53.97	24.07	52.78	51.85	53.97
16	50.43	52.71	41.95	59.91	53.26	61.58
17	48.21	50.34	40.48	57.74	45.50	50.34
18	55.36	47.96	43.45	57.14	53.17	57.14
19	50.45	50.00	65.48	53.57	50.79	75.51
20	44.17	40.48	39.44	51.67	52.96	61.90
21	45.00	42.14	47.50	54.38	58.33	55.71
22	44.08	40.60	51.75	57.24	49.12	64.66
23	48.08	40.66	21.15	55.29	41.88	53.85
24	53.26	57.14	34.78	50.00	60.87	50.31
25	42.50	38.10	12.22	57.50	44.44	57.14
26	74.17	70.95	83.33	61.67	70.74	80.48
27	68.53	63.55	36.21	56.90	58.24	75.37
28	52.98	57.82	45.24	55.36	67.20	77.55
29	52.50	51.43	42.57	55.50	58.22	61.14
30	59.38	63.10	69.44	64.06	75.46	49.40
31	57.61	45.96	48.55	62.50	65.22	62.11
32	57.50	66.86	77.33	63.00	68.00	60.57
33	47.32	45.92	47.02	54.46	46.43	64.29
34	66.50	68.00	66.67	54.00	60.00	67.43

VITA

Paul Linus Jones

Candidate for the Degree of

Doctor of Education

**Thesis:** AN ANALYSIS OF THE RELATIONSHIP BETWEEN BIOLOGY TEACHERS'  
PUPIL CONTROL IDEOLOGY AND THEIR CLASSROOM PRACTICES

**Major Field:** Higher Education

**Biographical:**

**Personal Data:** Born in Tulsa, Oklahoma, January 9, 1937, the son of Charles Paul and Velma Jones.

**Education:** Attended public school in Sand Springs, Oklahoma; graduated from Sand Springs High School, Sand Springs, Oklahoma, in 1954; attended Northeastern A and M, Miami, Oklahoma; attended Kansas State College, Pittsburg, Kansas; received the Bachelor of Science degree from Northeastern State College, Tahlequah, Oklahoma, in 1961, with a major in biology; received the Master of Science degree from Oklahoma State University, Stillwater, Oklahoma, in 1964, with a major in Natural Science; completed the requirements for the Doctor of Education degree at Oklahoma State University, Stillwater, Oklahoma, in May, 1970.

**Professional Experience:** Secondary teacher at Central High School, Tulsa, Oklahoma, 1961-1963; secondary teacher with the Oklahoma State University project in Jimma, Ethiopia, Africa, 1964-1966; secondary teacher at C. E. Donart High School, Stillwater, Oklahoma, 1966-1968; graduate teaching assistant, College of Education, Oklahoma State University, Stillwater, Oklahoma, 1968-1970.