

LEARNER EVALUATION OF INSTRUCTION IN
POST-SECONDARY TECHNICAL-
OCCUPATIONAL EDUCATION

By

EARL DALIN MILLER

Bachelor of Arts in Education
East Central Oklahoma State University
Ada, Oklahoma
1959

Master of Business Administration
Oklahoma City University
Oklahoma City, Oklahoma
1969

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of the Oklahoma State University
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Thesis Approved:

R. W. J. J. J. J.

Thesis Adviser

Clyde B. Knight

Ernie W. Duggan

Kenneth H. Clair

Norman N. Burkham

Dean of the Graduate College



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CHAPTER I

INTRODUCTION

Learner evaluation of instructor performance is a growing practice at all levels of education.

The concept of student evaluation of teacher effectiveness had its beginning during the 12th Century when students at the medieval university of Bologna contracted with teachers to provide instruction for a specified period. Students then evaluated their professors and decided to retain or dismiss them at the end of the term according to the general estimate of their effectiveness (Cobban, 1975).

The practice of learner evaluation of instructors has grown until today it is used "in some form" in 96 percent of universities (Centra, 1980).

Despite some strong opposition to incorporating student ratings in faculty evaluation, they are widely endorsed by both students and faculty members. Seventy-two percent of responding college freshmen in the 1977 annual survey by the American Council on Education (ACE) felt that they should help to evaluate faculty performance (Astin, 1978). In 1972, nearly 70 percent of responding faculty members agreed that faculty promotions should be based in part on formal student evaluations of their teaching (Bayer, 1973).

While most instructors recognize the need for evaluation, they are concerned that they be evaluated on substantive criteria, not

administrative whim or the self-serving comments of students. The end result, they feel, should be a valid measure of teaching effectiveness, rather than a measure of central tendency.

Centra (1980) says that most instructors who resist evaluation base their resistance on two points: the classroom is their personal realm and any attempt to assess what happens behind classroom doors is an invasion of their privacy; still others argue that how they teach and what they teach is their responsibility alone.

A study by Collins (1979) indicates that technical-occupational faculty members feel that they should be evaluated on different criteria than their academic colleagues in liberal arts education, yet in most institutions where learner rating of instruction is practiced the instruments are identical for technical-occupational instructors as for other faculty in the same institution.

With the tremendous growth of technical-occupational education in recent years, systematic instructor evaluation, and particularly learner evaluation of instructors, has suffered. Many post-secondary institutions have been concerned largely with the recruitment and retention of competent instructors. Today, with enrollments leveling off or declining, these institutions are being forced to make critical distinctions between generally competent instructors.

Most writers stress that the primary goal of the learner appraisal of instruction should be the improvement of instructor performance. However, such evaluations are often used for decision-making regarding merit increases, promotion, tenure, and assignment.

If student ratings are indeed to play so vital a role in technical-occupational education, it is important that rating instrument content

be relevant to the teaching area and that it accurately reflect the teaching tasks performed in the technical-occupational laboratory setting.

Statement of the Problem

The problem with which this study was concerned was the lack of information relative to valid content of instruments to be used for learner evaluation of instructors in post-secondary technical-occupational education.

Need for the Study

Although general education and technical-occupational education are intimately interwoven, these two branches of education differ significantly in objectives and methods employed to attain these objectives (Evans, 1971). Therefore, the usual criteria for evaluating effective teaching in general education may be inappropriate in technical-occupational education. A study was needed to identify more appropriate criteria in order to aid administrators in designing instruments to be used for learner evaluation of instruction in technical-occupational education.

Purpose of the Study

The purpose of this study was to gather information from students, instructors, and administrators in order to identify appropriate content of instruments to be used for learner evaluation of instructors in post-secondary technical-occupational education.

Research Objectives

Specifically, this study was designed to achieve the following research objectives:

1. To identify specific instructor qualities which students believe are most important to effective teaching in post-secondary technical-occupational education.
2. To identify specific instructor qualities which instructors believe are most important to effective teaching in post-secondary technical-occupational education.
3. To identify specific instructor qualities which administrators believe are most important to effective teaching in post-secondary technical-occupational education.
4. To identify areas of agreement among students, instructors, and administrators regarding criteria deemed most important to effective teaching in post-secondary technical-occupational education.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The purpose of this study was to gather information from students, instructors, and administrators in order to identify appropriate content of instruments to be used for learner evaluation of instructors in post-secondary technical-occupational education.

This chapter presents a review of the literature which relates to learner evaluation of teacher effectiveness and involves key concepts used in this study. The review of literature on areas pertinent to this study concerned: (1) research on effective teaching in general, (2) research on the use and validity of learner evaluations, and (3) research concerning evaluation of effective teaching in the field of technical-occupational education. A brief background of the statistical technique of paired comparisons is also included.

Effective Teaching

In an often-cited study, Clinton (1930) obtained a rough ranking of desired teacher characteristics by asking a relatively small sample of 177 college juniors to list traits in a free-response questionnaire. He compiled a total of 35 traits which were ordered according to the number of students that listed each one, ranging from 2 to 96. According

to this study, the five most prized characteristics were: (1) interest in students, (2) fairness, (3) pleasing personality, (4) sense of humor, and (5) mastery of subject matter.

In a more extensive study, Bousfield (1940) first obtained a list of desired qualities from 61 college students and then included the 16 most frequently mentioned traits and three unmentioned traits in a rating list. Five hundred and seven students from Tufts University and the University of Connecticut rated each of the 19 on an evaluative scale from 0 to 10 and the traits were ranked according to their ratings. Although Bousfield's research was designed along the same lines as that of Clinton (1930), he found that Clinton's personality factors were not as important as were other traits. His study found these five characteristics to be effective teaching criteria: (1) superior intellectual abilities, (2) above average school achievement, (3) good emotional adjustment, (4) favorable attitudes toward students, (5) enjoyment of student relationships, (6) generosity in the appraisal of the behaviors and motives of others, and (7) strong interest in reading and literary matters.

Characteristics of best-liked and least-liked teachers were researched by Drayer (1961) in a study of 148 liberal arts students over a five-year period. This study confirmed much of Clinton's and Bousfield's findings and seemed to indicate that the preferences held up over a long period of time. The qualities of the best-liked teachers were: (1) effective presentation of material, (2) sense of humor, (3) pleasant personality, (4) friendliness, and (5) creation of a relaxed atmosphere. Characteristics of least-liked teachers were: (1) ineffective presentation, (2) lack of objectivity in evaluating

work, and (3) attitudes of superiority and sarcasm.

In a study cited on page 11 of the present study, Elbe (1971) suggests a strong link between best-liked and most-effective teachers.

A 1962 study by Katz tended to show that student perception and evaluation of teachers were a function of students' internal frames of references rather than a result of concrete characteristics possessed by teachers. Knapp (1962) also holds this view, pointing out that students tend to have sharply defined, consistent images of professors. He concluded that students tend to prefer a personal-social quality in teachers rather than an intellectual quality.

Morton (1965) linked age, sex, and expected grade to student preferences. His results show that male students preferred a teacher who moves surely and vigorously; and they reacted more negatively than did female students to prejudice, unfairness, weakness, and error. Of more concern to females was the total personality of the instructor rather than individual characteristics.

Gage (1965) reviewed the literature on the subject and came up with five universal characteristics which seemed to be factors in effective teaching. They were: (1) warmth, (2) cognitive organization, (3) orderliness, (4) indirectness, and (5) problem solving ability.

Hildebrand, Wilson, and Dienst (1971) asked students at the University of California, Davis, to identify the best and worst teachers they had had in the previous year and to describe their teaching. From a correlation of means, the researchers concluded that the distinguishing features of good teaching were: (1) explains clearly, (2) seems to enjoy teaching, (3) makes difficult topics easy to understand, (4) knows if class is understanding the teacher or not, (5) keeps well

informed about class progress, and (6) is sensitive to student's desire to ask a question. Faculty members, when asked to comment on good teaching by their colleagues, listed (1) seems to have a congenial relationship with students, (2) uses well-chosen examples to clarify points, (3) emphasizes ways of solving problems rather than solutions, and (4) is an excellent public speaker.

Brewer and Brewer (1970), in a paired comparisons study, surveyed 627 students and 54 faculty and administrators in order to rank 10 teacher traits for their importance to good college teaching in the liberal arts and found substantial agreement among the rankings by student groups and between students and faculty--intellectual factors dominated, followed by learning facilitation traits. Personality characteristics ranked lowest of all.

Alciatore (1973) requested 1595 seniors in the Oklahoma State University College of Arts and Sciences to rate the teachers who had taught them while at Oklahoma State. Students were given a choice of five numbers to check in their ratings of these teachers with "five" an excellent rating and "one" a very poor rating. The analysis of variance technique, Duncan's Multiple-Range Test, and the chi-square statistic were used to determine significant student preferences. This study cited (1) interest in student, (2) good personality, (3) interest in subject matter, (4) ability to make subject interesting, and (5) objectivity in presenting subject matter as being characteristic of "best" teachers. The "worst" teachers as viewed by the students had (1) poor communications skills, (2) poor personalities (with lack of enthusiasm cited most often as the reason), (3) lack of organization, (4) lack of objectivity, and (5) little interest in students.

Alciatoire concluded that unique learning styles of students are prime determinants of teacher ratings, since the best teacher for one student may actually be a poor teacher for another.

While the study was somewhat limited because students were asked to recall experiences over a four-year period of time, its examination of more than 1,000 students representing a 70 percent response rate encourages its acceptance as a valid study of instruction preferences of liberal arts students.

Students, faculty, and alumni were queried in a University of Toledo study, conducted by Perry and Baumann (1973), who identified some 60 behaviors associated with effective teaching. Such behaviors as being well prepared for class and exhibiting interest in the subject were ranked high in teaching value by all three groups while items with low teaching value included being neatly dressed or having irritating personal mannerisms.

The Use and Validity of Learner Evaluations

The use of learner evaluations began concurrently with the rise of the modern university. Cobban (1975) says that students in the medieval university of Bologna contracted with teachers to provide instruction during the academic year. These teachers were paid by the students and served at the pleasure of the student body. In this instance student evaluation was the only evaluation which counted for retention and/or reward.

Today, a variety of evaluation methods are utilized according to the level and the goals of the institution (Centra, 1980). Such evaluation methods currently in use include student evaluations,

colleague evaluations, self-assessment, publications, personal qualifications (academic degrees, professional experience, etc.), research, supervision of student research, campus committee work, activity in professional societies, personality factors, public or community service, consultation (government, business, etc.), and competing job offers.

Of all the methods of evaluation, perhaps the most controversial is the learner rating of instructors. But despite strong opposition to their use in overall faculty evaluation, they are widely used and accepted by both students and faculty members. A study by Stecklein (1960), for example, reported that of 800 colleges surveyed, learner ratings were regularly used in nearly 40 percent and an additional 32 percent were considering their use at the time the survey was conducted.

Seventy-two percent of responding college freshmen in the 1977 annual survey by the American Council on Education (ACE) felt that they should help to evaluate faculty performance (Astin, 1978). In 1972, nearly 70 percent of a national sample of faculty members agreed that faculty promotions should be based, in part, on formal student evaluation of their teaching.

In comparison to surveys of evaluation practices in the 1960's colleges and universities are currently relying more on systematic student ratings. Seldin (1978) surveyed academic deans at more than 400 colleges in 1973 and again in 1978. He found that 53 percent "always used" systematic student ratings to evaluate teaching in 1978, compared to 29 percent in 1973.

While evidence is lacking, two-year colleges and technical institutes seem to employ student ratings of instruction on a systematic basis almost as much as at other types of institutions. In the mid-1960's an estimated 16 percent of the two-year colleges reported using systematic student ratings (Astin and Lee, 1967); and Centra (1980), as previously noted, found that 96 percent of all two-year colleges used learner evaluation of instruction "in some form."

The learner evaluation process is at issue in almost every institution where it is practiced. Many faculty members and others charge that these evaluations are merely a popularity contest and that such ratings tend to reward entertaining teachers and penalize serious scholars (Wentling and Lawson, 1975).

While most studies do not address the question of validity, Elbe (1971) goes to great lengths to support his contention that student ratings suggest that the vulgarly popular teacher is not what students want and reward with favorable evaluations. He says that students tend to reward specific traits that traditionally have been used to define effective teaching.

However, opposite findings were recorded by Naftulin, Ware, and Donnelly (1973) when they tested the entertainment question by obtaining the services of a professional actor to deliver a graduate-level lecture with content that was nonsubstantive and contradictory in nature. The high ratings he received, the researchers found, supported their contention that

. . . given a sufficiently impressive lecture paradigm, an experienced group participating in a new learning situation can feel satisfied that they have learned despite irrelevant and meaningless content conveyed by the lecturer (p. 634).

Centra (1980) argues that learner ratings are both reliable and valid and quotes several studies to support his contention, providing that enough students in a class have made ratings. For personnel decisions, he says that judgements should be based on several courses taught by a specific instructor.

A variety of procedures have been used by researchers to determine the reliability of students ratings. Each procedure seeks to estimate the extent of student agreement on ratings within a class. One method draws pairs of students at random from a course and correlates their ratings. The higher the correlations, the greater consistency among student respondents. Another method computes the mean scores for random halves of a class and then correlates these means across classes. A third method and the one most frequently used by researchers computes the intraclass correlation coefficient (Winer, 1962). This index compares the variation across classes to provide an estimate of the relative homogeneity of ratings. The wider the variation in rating among students in a typical class, the lower the reliability estimate that is produced.

Evaluation of Technical-Occupational Education

While the research on evaluation in higher education has been voluminous, studies of evaluation in two-year colleges and particularly of evaluation in technical-occupational education have been few.

There is, however, sufficient research to indicate that there is a difference in the way learners perceive effective teaching in a technical-occupational setting than in a liberal arts setting.

Trudell (1972) conducted a study of community colleges in California as a follow-up procedure to determine the effectiveness of a 1971 law which required all permanent teachers in the public schools and community colleges of California to be evaluated at least once every two years. A questionnaire was sent to instructors and administrators at each of the state's community colleges to determine attitudes regarding compulsory teacher evaluation under the California law.

While the thrust of Trudell's research is not important to this study, one of his findings is useful in pointing up the problem with which this study is concerned. The majority of his respondents agreed that different procedures and criteria should be used for evaluating technical-occupational faculty than those used for evaluating other faculty.

Roberts and Becker (1976) found that the importance of communication skills in the technical-occupational teaching/learning process seemed to be greater than some of the characteristics generally associated with effective teaching in other areas, particularly in view of the fact that the one-to-one approach is central to much of technical-occupational education. The most important measures which differentiated good from poor teaching in technical-occupational education were: (1) teacher dynamism, (2) teacher delivery, (3) time spent with students, (4) positive reinforcement of students, and (5) positive attitude toward students.

Cline (1974) found that technical-occupational teachers need to possess verbal abilities in greater measure than some other teachers and he projected verbal abilities along with knowledge of the trade as a predictor of technical-occupational teacher effectiveness. The

key seems to be the relative strength of a teacher's verbal ability in presenting subject matter so that the learner comprehends it.

In a study of methods used to evaluate technical-occupational faculty members in Illinois Community Colleges, Collins (1978) found that technical-occupational faculty and administrators tended to agree on evaluation criteria more often than did academic faculty and administrators. Collins conducted a Delphi study using a jury to validate the list of criteria. The Delphi panel was asked to rate the importance of each of the validated criteria on a five-point scale. A mean was computed on each item in each of three categories. The means were used to rank order each item in each category according to the responses received. A t-test to compare the means of the two groups was computed from data collected.

Collins' study revealed substantial agreement on the following criteria for instructor evaluation: (1) classroom teaching ability, (2) command of the subject, (3) student-oriented attitude, (4) enthusiastic attitude toward the subject, and (5) continued professional growth.

The Method of Paired Comparisons

The statistical method of paired comparisons, used in the instrument employed in this study, has long been associated with attitude assessment, personality testing and psychological scaling (Guilford, 1954).

While its chief use has been in the determination of affective and aesthetic values, this method can be applied whenever stimuli can be presented in pairs. Opinion polling can be treated and evaluated by this method and it is frequently used to validate ratings obtained by other methods. A common application has been the evaluation of

individuals on traits of personality or character of value to an employer.

In the method of paired comparisons, all stimuli to be evaluated on a psychological scale are typically presented to the observer in all possible pairs. The observer judges whether one of the pair is of greater quality than the other in some defined respect. The response of the observer is essentially a comparative judgement. The same observer may judge all pairs a large number of times on different occasions, giving an occasion matrix, or many observers may judge all pairs only once giving an individual matrix. In either case, the number and proportion of the times each stimulus is judged higher on the scale than every other stimulus gives a proportion matrix.

The key to the scaling operations that start with comparative judgements is to be found in Thurstone's law of comparative judgement.

In a landmark paper published in Psychology Review, Thurston (1927) developed an important psychological law--the law of comparative judgement. According to Thurston's law, the same stimulus will not always elicit from the same organism the same response on different occasions. Therefore, the quantity of response is a variable phenomenon, although the variability is restricted to a relatively narrow range.

Thurstone refers to each response occurring at any moment as a "discriminal process." He refers to the response most often elicited by the stimulus as the "modal discriminial process."

Each distribution of the discriminial processes for a given stimulus is called a "discriminal dispersion," measurable by the standard deviation or by any other common measure of variability. Both normality and equality are assumed for these dispersions when stimuli are equally easy to place on a scale.

Ross (1934) has prepared a general scheme for the planning of stimulus presentations in paired comparisons which includes the careful wording of instructions and a completely counter-balanced method of presentation of pair sequences to control the space error, thereby helping to insure internal consistency of individual responses.

Summary

A great amount of research has been conducted to establish criteria for effective teaching. However, despite the large number of studies, very little agreement is evident in the literature of higher education as to what constitutes effective teaching.

Learner ratings of instructor performance have been used since the dawn of the medieval university to determine how students perceive their instructors and the instruction they receive. It was reported in 1979 that the practice of learner evaluation of instructors has grown to such an extent that it is now employed in some form in 96 percent of all two-year colleges, 97 percent of four-year colleges and 99 percent of comprehensive universities.

While research into evaluation and effective teaching has served to create a pool of rating criteria that can be used in designing learner rating instruments for the liberal arts, this has not been true in the case of post-secondary technical-occupational education.

Research evidence indicates that there is a difference in the way technical-occupational students perceive effective teaching, but insufficient research is available to provide the kind of aid that administrators need in order to design individualized learner rating instruments for evaluation of post-secondary technical-occupational

education instructors.

The chapter concludes with a discussion from the literature of the method of paired comparisons which is used in the design of the instrument employed in this study.

CHAPTER III

METHODOLOGY

The purpose of this study was to gather information from students, instructors, and administrators in order to identify appropriate content of instruments to be used for learner evaluation of instructors in post-secondary technical-occupational education.

Specifically, this study was designed to achieve the following research objectives:

1. To identify specific instructor qualities which students believe are most important to effective teaching in post-secondary technical-occupational education.
2. To identify specific instructor qualities which instructors believe are most important to effective teaching in post-secondary technical-occupational education.
3. To identify specific instructor qualities which administrators believe are most important to effective teaching in post-secondary technical-occupational education.
4. To identify areas of agreement among students, instructors, and administrators regarding criteria deemed most important to effective teaching in post-secondary technical-occupational education.

Definitions

The following terms that appear in this thesis are defined to clarify meanings. Other terms used are considered to be self-explanatory.

Instructor Evaluation is a practice followed by all colleges and universities which involves assessing the total performance of instructors on the basis of selected criteria including, but not limited to, classroom teaching ability.

Learner Rating Instrument is a survey form employing a rating scale designed to be answered by students. Its purpose is to provide diagnostic information in a number of areas about the course and the way it is taught.

Post-Secondary Technical-Occupational Student is anyone who is enrolled in a course in a skilled or technical occupation area in a post-secondary technical-occupational education institution or in a technical-occupational division of a post-secondary educational institution.

Post-Secondary Technical-Occupational Instructor is anyone who is a member of the faculty of a post-secondary educational institution whose major assignment is teaching in one or more skilled or technical occupation areas.

Post-Secondary Technical-Occupational Administrator is anyone who serves in a supervisory capacity and who is responsible for overseeing the resources of a post-secondary technical-occupational education institution or of a technical-occupational division of a post-secondary educational institution.

Assumptions

It was assumed that the data collected were unbiased and that the consensus regarding evaluation criteria were similiar to those that would have been made by any comprehensive group of post-secondary technical-occupational instructors, and administrators.

It was further assumed that the instrument used for collecting evaluation criteria elicited responses which accurately reflected the beliefs of post-secondary technical-occupational students, instructors, and administrators.

It was also assumed that each respondent was capable of making an honest and unbiased response and did so voluntarily.

Selection of the Subjects

In order to achieve the objectives of the study, it was necessary to survey subjects in the following categories: post-secondary technical-occupational students, post-secondary technical-occupational instructors, and post-secondary technical-occupational administrators.

In obtaining student opinion for use in this study, it was decided to survey selected students enrolled in technical-occupational courses at Oklahoma State University School of Technical Training at Okmulgee, Oklahoma; Spartan School of Aeronautics, located in Tulsa, Oklahoma; and Tulsa Junior College, located in Tulsa, Oklahoma.

It was decided to survey instructors belonging to the Oklahoma Technical Society as listed in the Society's 1980-81 membership directory. This decision was based on the assumption that faculty

members of the various colleges and technical institutes in Oklahoma who belong to the state technical society were practicing professionals who had the experience to recognize the criteria of teacher effectiveness in the post-secondary technical-occupational setting.

For the category of administrator, it was decided to distribute questionnaires to persons listed in the membership directory of the Oklahoma Technical Society (1980-81) and the Industrial Teacher Education Directory (Oklahoma Edition) (1980) as having administrative duties in post-secondary technical-occupational educational programs. Administrators also were included whose titles indicated that they worked with faculty, students or other administrators in post-secondary technical-occupational education.

Development of the Instrument

The questionnaire used in this study consisted of two sheets of Coronado Velum #60, printed on both sides and folded to a finished booklet of eight pages. When collated, the instrument booklet measured 5 1/2 by 8 1/2 inches. Printed instructions requested that it be filled out, folded, stapled, and returned without an envelope. The return address and a first class postage permit were printed on the outside of the folded form.

The questionnaire consisted of two sections. Section one presented the rating task as a standard paired comparison procedure in which subjects were instructed to consider each pair of qualities and to place a check mark "next to the trait in each pair that you think is more important of the two for effective technical-occupational teaching."

The technique of paired comparison forces the observer to a conclusion between two qualities (or stimuli). This method was selected because it allows the subject to compare two qualities or traits at one time rather than having to rank a large number of traits from a single listing.

Nine qualities were selected for comparison. The nine were chosen to represent a wide range of qualities appearing in previous research studies. Three traits were selected as being more characteristic of technical and occupational instructors. Three were chosen as more characteristic of instructors in other types of education. Three were included for their applicability to both environments. The 36 possible pairings of these nine traits were printed with nine pairs to the page in counter-balanced order. Every trait was alternated, appearing equally often on the right and on the left of the pairs to help control "first-listed" bias, according to the general scheme suggested by Ross (1934).

Section two requested personal data about the subjects. Students were requested to indicate their program of study and level of enrollment according to term or classification. Instructors were requested to indicate their specialty field, number of years of industry experience and of teaching experience. Administrators were asked to indicate number of years experience as instructor and as administrator. Blanks were labeled Name and Institution, but it was indicated that this information was optional.

The Personal Data section was printed on the inside back page of the instrument and the pages were arranged into booklets in counter-balanced order.

Collection of the Data

Questionnaires were distributed to a total of 100 students at Oklahoma State University School of Technical Training, Okmulgee, Oklahoma; Tulsa Junior College, Tulsa, Oklahoma; and Spartan School of Aeronautics, Tulsa, Oklahoma. A total of 210 questionnaires were mailed to technical-occupational education instructors in 21 Oklahoma colleges and technical institutes as listed in the membership directory of the Oklahoma Technical Society. A total of 65 questionnaires were mailed to directors of technical-occupational programs in colleges and technical institutes in the State of Oklahoma listed in a 1979 publication by the Oklahoma State Regents for Higher Education as offering one or more technical-occupational education courses.

A total of 375 questionnaires were distributed to the population of these three groups. The survey was administered to those subjects in the student category by the author of this study and the questionnaires to instructors and administrators were mailed with a covering transmittal letter on March 16, 1981.

A code letter was used on the survey form to identify student responses, instructor responses, and administrator responses for those respondents choosing to remain anonymous.

Analysis of the Data

Respondents were first grouped according to class of subjects, i.e., student, instructor or administrator. For these groups, equal-interval scale values were determined for the nine teacher traits, following the procedures specified by Guilford (1954) for paired

comparison data. A 9x9 matrix was constructed for each group, indicating the proportion of respondents who had selected each quality as "more important" than each of the other traits. This procedure yielded complementary matrices in which the proportional values in the cells above the principal diagonal plus the values in corresponding cells below the diagonal sum to 1.00.

The matrices of proportions were converted to z-score matrices by consulting the table of deviates and ordinates for areas under the normal curve. The z-scores were summed in each column and the column mean provided the scale value for each trait. Linear transformations were made of the obtained scale values in order to set the value of the lowest-ranked trait equal to zero.

Kendall's (1962) Coefficient of Concordance was used to measure the relationships between and among these sets of rankings. The Kendall statistic is a linear function of the mean of the coefficient of rank correlations for all sets of rankings.

Limitations of the Study

This study involved separate studies of technical-occupational students, instructors, and administrators and a correlation study of the responses of the separate groups.

The instrument of paired comparisons relied upon forced choices which imposes limits upon the respondent and hinders the freedom of choice. If the respondent had suggestions for other desirable traits in a technical-occupational education instructor, no space was provided for their listing.

In addition, there is always a possibility of bias in findings because of the absence of information from nonrespondents.

The subjects selected for this study were students, instructors, and administrators in the State of Oklahoma. It is possible that such a limited group would not be representative of the nation as a whole.

Summary

This chapter has described the methodology of the study. Also, described were the study instrument, the subjects, and the procedures used to collect the data. The chapter concludes with an explanation of the statistical procedures used to analyze the data and the basic limitations of the study.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

The purpose of this study was to gather information from students, instructors, and administrators in order to identify appropriate content of instruments to be used for learner evaluation of instructors in post-secondary technical-occupational education.

The objective of this chapter is to present and analyze the data gathered in the study. The chapter is divided into six sections as follows: (1) questionnaire response rate, (2) analysis of respondents, and (3-6) analysis of the data gathered to answer the four research objectives.

Questionnaire Response Rate

In conducting the study, 375 questionnaires were distributed to subjects in three categories: students in post-secondary technical-occupational programs, instructors in post-secondary technical-occupational programs, and administrators of post-secondary technical-occupational programs in the State of Oklahoma.

One hundred questionnaires were distributed to students in post-secondary technical-occupational programs. By April 1, the cut-off date, 84 questionnaires had been returned for a response rate of 84 percent.

Two hundred ten questionnaires were mailed to instructors listed in the membership directory of the Oklahoma Technical Society (1980-81) as having teaching responsibilities in post-secondary technical-occupational education. By the cut-off date of April 1, 142 questionnaires had been returned for a response rate of 67.6 percent.

Sixty-five questionnaires were mailed to persons listed in the membership directory of the Oklahoma Technical Society and the Industrial Teacher Education Directory (Oklahoma Section) (1980) as having administrative duties in post-secondary technical-occupational education programs. By April 1, 43 responses had been received for a response rate of 66 percent.

On those instruments returned, three were completed incorrectly, one was mutilated and could not be read, and one arrived too late to be included in the study.

A grand total of 375 questionnaires were distributed and 265 were returned in usable form for an effective response rate of 70.7 percent.

Analysis of Respondents

This section of the study has been included to demonstrate the diversity of the study respondents as to the program options of the students, the area of occupational specialty, years of teaching and industry experience of instructors and years of teaching and administrative experience of the administrators.

Although a number of respondents did not include full information as requested in the instrument, sufficient numbers of respondents did include personal data to effectively demonstrate diversity.

Program Options of Students

More students listed "electronics" as their program of study than any other single option. Sixteen listed "electronics", three indicated "aviation electronics"; and eight listed "electro-mechanical". Eleven respondents wrote "aviation maintenance tech"; nine, "diesel"; five, "air conditioning"; four, "automotive"; four, "business education"; three, "drafting"; two each, "shoe, boot, and saddle"; and "plumbing and pipefitting"; and one each, "commercial art," "printing," "data processing," and "machinist."

Experience of Instructors

One hundred thirty-four instructor respondents indicated their teaching and industrial experience on the survey forms. The mean teaching experience was 10.5 years. The mean industrial experience was 7.3 years. Ten respondents indicated that they had no industrial experience.

Twenty-five specialty areas were given by the respondents. "electronics" was indicated by 18 respondents. "Aviation mechanics" was next with 17. "Drafting" produced 12; "business education," 10; "automotive trades," nine, "air conditioning," nine; "diesel mechanics," eight; "nursing," seven; "electrical," "commercial art," and "plumbing," four each; "building construction," and "data processing," three each; "printing," and "sheet metal," two each. Each of the following were listed as specialty area by one respondent: "engineering tech," "surveying," "mechanical power technology," "petroleum," "machinist," "programs for the deaf," "child care," "welding," "veterinary technology," and "applied sciences."

Experience of Administrators

All administrator respondents completed the section requesting the number of years experience in administration and the number of years teaching experience. Administrator experience ranged from 3 months to 30 years with a mean of 8.9 years. Teaching experience ranged from 2 to 31 years with a mean of 12.7 years. One respondent indicated that he had no previous teaching experience.

Students Rate Effective Teaching --

An Analysis of the Data

The first research objective with which this study was concerned was as follows:

1. To identify specific criteria which students feel are most important to effective teaching in post-secondary technical-occupational education.

The instructions in the study instrument requested subjects to place a check mark next to the trait in each of 36 pairs of traits that "you think is the more important of the two for effective teaching in technical-occupational education."

In order to convert these choices to an individual ranking, a 9x9 matrix was constructed and each selection from the respondents' questionnaires recorded. The individual rankings were then determined by counting the check marks within the matrix. Individual rankings are included in Appendix B.

Kendall's (1962) Coefficient of Concordance was used to measure the relationship among these sets of rankings. The Kendall statistic

is a linear function of the mean of the coefficients of rank correlation for all sets of rankings. The data is presented in the form of a two-way matrix of dimension $k \times n$ with row and column labels designating observers and stimuli. The ranks in each column are then indicative of the agreement between observers. The value of the coefficient ranges between zero and one with the maximum value being attained when there is perfect agreement and the minimum value attained when each observer's rankings are assigned completely at random so that there is no agreement between observers.

Kendall's Coefficient of Concordance formula is as follows:

$$W = \frac{12 \sum_{i=1}^n \left(\sum_{j=1}^k R_{ij} \right)^2}{k^2 n(n^2 - 1)} - \frac{3(n+1)}{n-1}$$

W yields the coefficient of concordance when n stimuli are ranked from 1 to n by k observers and R_{ij} is the rank assigned to the i th stimulus by the j th observer.

The null hypothesis states:

Student respondents have no community of preference when ranking traits considered important to effective teaching in post-secondary technical-occupational education.

When the individual student rankings were iterated, the coefficient of concordance was found to be 0.23, representing a mild positive agreement among rankings of student respondents.

The chi-square was equal to 155.00 with 8 degrees of freedom. Since the calculated chi-square was greater than the table value at the 0.001 level of significance (26.125), it was concluded that there was

some agreement among student respondents and that some unique ordering of these traits existed in their estimation. Therefore, the null hypothesis was rejected, and the rankings were accepted as the true preferential ordering of the student respondents.

To determine this true preferential ordering by students as a distinct category of respondents, another 9x9 matrix was constructed in which the number of times each stimulus was judged higher on the scale than every other stimulus was entered in the appropriate cell. This matrix was then converted to a complementary matrix in which the proportional values in the cells above the principal diagonal plus the values in corresponding cells below the diagonal sum to 1.00.

By summing the columns, the proportional matrix was rearranged and renumbered in order of increasing sums across the columns to yield a matrix of proportional preferences. Table I has been rearranged and renumbered to show the proportional preferences of the student respondents.

From the proportional matrix in Table I, the normal-curve tables were then used to derive the corresponding matrix of z-values as presented in Table II. By this procedure, each stimulus was given a single value on a linear scale which has the properties of an interval scale.

In the z-matrix, the columns were summed in row $\sum z_{jk}$ and their means derived (row Mz_{jk}). In order to remove the negative signs from the means of the columns, the value zero was given to the lowest stimulus in the list, which required the addition to each mean of 0.933, a number equal to the absolute value of the mean of the lowest stimulus.

The rank order thus derived is as follows: Neat Appearance, 0.000; Sense of Humor, 0.604; Intellectual Abilities, 0.636; Verbal Skills,

TABLE I

PROPORTION MATRIX FOR NINE CRITERIA JUDGED BY STUDENTS IN TERMS OF PREFERENCES
FOR EFFECTIVE TEACHING IN POST-SECONDARY TECHNICAL-OCCUPATIONAL EDUCATION*

Instructor Trait	1	2	3	4	5	6	7	8	9
1. Neat Appearance	0.500	0.774	0.750	0.786	0.893	0.893	0.857	0.905	0.905
2. Sense of Humor	0.226	0.500	0.452	0.536	0.702	0.821	0.690	0.798	0.833
3. Intellectual Abilities	0.250	0.548	0.500	0.464	0.643	0.643	0.726	0.833	0.845
4. Verbal Skills	0.214	0.464	0.536	0.500	0.607	0.726	0.750	0.786	0.833
5. Time Spent with Students	0.107	0.298	0.357	0.393	0.500	0.452	0.690	0.798	0.833
6. Knowledge of Trade	0.107	0.179	0.357	0.274	0.548	0.500	0.417	0.619	0.702
7. Positive Reinforcement	0.143	0.310	0.274	0.250	0.310	0.583	0.500	0.548	0.690
8. Knowledge of Subject Matter	0.095	0.205	0.167	0.214	0.202	0.381	0.452	0.500	0.667
9. Presentation of Subject Matter	0.095	0.167	0.155	0.167	0.167	0.298	0.310	0.333	0.500
$\sum p_j > k$	1.737	3.442	3.548	3.584	4.622	5.297	5.392	6.120	6.808

*Stimuli have been arranged in order of increasing $\sum p_j > k$ across the columns.

TABLE II

SCALE SEPARATIONS MATRIX Z FOR NINE CRITERIA JUDGED BY STUDENTS IN TERMS OF PREFERENCES
FOR EFFECTIVE TEACHING IN POST-SECONDARY TECHNICAL-OCCUPATIONAL EDUCATION

Instructor Trait	1	2	3	4	5	6	7	8	9	
1. Neat Appearance	0.000	0.752	0.674	0.793	1.243	1.243	1.067	1.311	1.311	8.394
2. Sense of Humor	-0.752	.000	-0.121	0.090	0.530	0.919	0.496	0.835	0.966	2.963
3. Intellectual Abilities	-0.674	0.121	0.000	-0.090	0.367	0.367	0.601	0.966	1.015	2.673
4. Verbal Skills	-0.793	-0.090	0.090	0.000	0.272	0.601	0.675	0.793	0.966	2.514
5. Time Spent with Students	-1.243	-0.530	-0.367	-0.272	0.000	-0.121	0.496	0.835	0.966	-0.236
6. Knowledge of Trade	-1.243	-0.919	-0.367	-0.601	0.121	0.000	-0.210	0.303	0.530	-2.386
7. Positive Reinforcement	-1.067	-0.496	-0.601	-0.675	0.496	0.210	0.000	0.121	0.496	-2.508
8. Knowledge of Subject Matter	-1.311	-0.835	-0.966	-0.793	-0.835	-0.303	-0.121	0.000	0.432	-4.732
9. Presentation of Subject Matter	-1.311	-0.966	-1.015	-0.966	-0.966	-0.530	-0.496	-0.432	0.000	-6.682
$\sum z_{jk}$	-8.394	-2.963	-2.673	-2.514	+0.236	+2.386	+2.508	+4.732	+6.682	0.000
Mz_{jk}	-0.933	-0.329	-0.297	-0.279	+0.026	+0.265	+0.279	+0.526	+0.742	.000
R_j	.000	0.604	0.636	0.654	0.959	1.198	1.212	1.459	1.675	8.397

0.654; Time Spent with Students, 0.959; Knowledge of Trade, 1.198; Positive Reinforcement, 1.212; Knowledge of Subject Matter, 1.459; and Presentation of Subject Matter, 1.675 (see Table VIII).

Instructors Rate Effective Teaching --

An Analysis of the Data

The second research objective with which this study was concerned was as follows:

2. To identify specific criteria which instructors feel are most important to effective teaching in post-secondary technical-occupational education.

By following the procedures outlined in the previous section of this chapter, the individual trait selections of instructor respondents were entered on matrices and individual rankings were determined. To test for independence, Kendall's Coefficient of Concordance was used to measure agreement among observers.

The null hypothesis states:

Instructor respondents have no community of preference when ranking traits considered important to effective teaching in post-secondary technical-occupational education.

When the individual instructor rankings were iterated, the coefficient of concordance was found to be 0.61, representing a strong positive agreement among rankings of instructor respondents.

The chi-square was equal to 670.00 with 8 degrees of freedom. Since the calculated chi-square was greater than the table value at the 0.001 level of significance (26.125), it was concluded that there was some agreement among instructor respondents and that some unique ordering of these traits existed in their estimation. Therefore, the null

hypothesis was rejected and the rankings accepted as the true preferential ordering of the instructor respondents.

To determine the true preferential ordering of the instructors as a distinct category of respondents, a matrix of proportional values was constructed, the columns summed, and the proportional matrix rearranged and renumbered to show the proportional preferences of the instructor respondents.

From the proportional matrix in Table III, the normal-curve tables were used to derive the corresponding matrix of z-values as presented in Table IV. The columns were summed and their means derived. The negative signs were removed from the means by giving the value zero to the lowest stimulus in the list, which required the addition to each of 1.061, a number equal to the absolute value of the mean of the lowest stimulus.

The rank order thus derived is as follows: Neat Appearance, 0.000; Sense of Humor, 0.274; Intellectual Abilities, 0.427; Verbal Skills, 9.749; Time Spent with Students, 1.050; Positive Reinforcement, 1.592; Knowledge of Trade, 1.609; Knowledge of Subject Matter, 1.824; and Presentation of Subject Matter, 2.125 (see Table VIII).

Administrators Rate Effective Teaching --

An Analysis of the Data

The third research objective with which this study was concerned is as follows:

3. To identify specific criteria which administrators feel are most important to effective teaching in post-secondary technical-occupational education.

TABLE III

PROPORTION MATRIX FOR NINE CRITERIA JUDGED BY INSTRUCTORS IN TERMS OF PREFERENCES
FOR EFFECTIVE TEACHING IN POST-SECONDARY TECHNICAL-OCCUPATIONAL EDUCATION*

Instructor Traits	1	2	3	4	5	6	7	8	9
1. Neat Appearance	0.500	0.710	0.703	0.710	0.862	0.957	0.942	0.964	0.957
2. Sense of Humor	0.290	0.500	0.514	0.638	0.818	0.957	0.913	0.928	0.964
3. Intellectual Abilities	0.297	0.486	0.500	0.674	0.826	0.870	0.906	0.906	0.870
4. Verbal Skills	0.200	0.362	0.326	0.500	0.681	0.783	0.833	0.877	0.957
5. Time Spent with Students	0.138	0.182	0.174	0.319	0.500	0.703	0.645	0.862	0.935
6. Knowledge of Trade	0.043	0.043	0.130	0.217	0.297	0.500	0.558	0.587	0.717
7. Positive Reinforcement	0.058	0.087	0.094	0.167	0.355	0.442	0.500	0.638	0.725
8. Knowledge of Subject Matter	0.036	0.072	0.094	0.123	0.138	0.413	0.362	0.500	0.703
9. Presentation of Subject Matter	0.043	0.036	0.130	0.043	0.065	0.283	0.275	0.297	0.500
$\sum p_j > k$	1.605	2.478	2.665	3.391	4.542	5.908	5.934	6.559	7.328

*Stimuli have been arranged in order of increasing $\sum p_j > k$ across the columns.

TABLE IV

SCALE-SEPARATIONS MATRIX Z FOR NINE CRITERIA JUDGED BY INSTRUCTORS IN TERMS OF PREFERENCES
FOR EFFECTIVE TEACHING IN POST-SECONDARY TECHNICAL-OCCUPATIONAL EDUCATION

Instructor Traits	1	2	3	4	5	6	7	8	9	
1. Neat Appearance	0.000	0.553	0.533	0.553	1.089	1.717	1.572	1.799	1.717	+9.553
2. Sense of Humor	-0.553	0.000	0.035	0.353	0.908	1.717	1.360	1.461	1.799	+7.080
3. Intellectual Abilities	-0.533	-0.035	0.000	0.451	0.939	1.126	1.317	1.317	1.126	+5.708
4. Verbal Skills	-0.553	-0.353	-0.451	.000	0.471	0.782	0.966	1.160	1.717	+3.712
5. Time Spent with Students	-1.089	-0.908	-0.939	-0.471	0.000	0.533	0.372	1.089	1.514	+0.101
6. Knowledge of Trade	-1.717	-1.717	-1.126	-0.782	-0.533	0.000	0.146	0.220	0.574	-4.935
7. Positive Reinforcement	-1.572	-1.360	-1.317	-0.966	-0.372	-0.146	0.000	0.353	0.598	-4.782
8. Knowledge of Subject Matter	-1.799	-1.461	-1.317	-1.160	-1.089	-0.220	-0.353	0.000	0.533	-6.866
9. Presentation of Subject Matter	-1.717	-1.799	-1.126	-1.717	-1.514	-0.574	-0.598	-0.533	0.000	-9.578
$\sum z_{jk}$	-9.553	-7.080	-5.708	-3.712	-0.101	+4.935	+4.782	+6.866	+9.578	0.000
M_{zjk}	-1.061	-0.787	-0.634	-0.412	-0.011	+0.548	+0.531	+0.763	+1.064	0.000
R_j	0.000	0.274	0.427	0.749	1.050	1.609	1.592	1.824	2.125	8.705

By following the procedures outlined in a previous section of this chapter, the trait selections of administrator respondents were tabulated and individual rankings were determined. To test for independence, Kendall's Coefficient of Concordance was used to measure the agreement among observers.

The null hypothesis states:

Administrator respondents have no community of preference when ranking traits considered important to effective teaching in post-secondary technical-occupational education.

When individual administrator rankings were iterated, the coefficient of concordance was found to be 0.66, representing a strong positive agreement among rankings.

The chi-square was equal to 227.00 with 8 degrees of freedom. Since the calculated chi-square was greater than the table value at the 0.001 level of significance (26.125), it was concluded that there was some agreement among administrator respondents and that some unique ordering of these traits existed in their estimation. Therefore, the null hypothesis was rejected and the rankings accepted as the true preferential ordering of the administrator respondents.

To determine the true preferential ordering of the administrators as a distinct category of respondents, a matrix of proportional values was constructed, the columns were summed, and the proportional matrix rearranged and renumbered in order of increasing sums across the columns to yield a matrix of proportional preferences. Table V has been rearranged and renumbered to show the proportional preferences of the instructor respondents.

From the proportional matrix in Table V, the normal-curve tables were used to derive the corresponding matrix of z-values as presented

TABLE V

PROPORTION MATRIX FOR NINE CRITERIA JUDGED BY ADMINISTRATORS IN TERMS OF PREFERENCES
FOR EFFECTIVE TEACHING IN POST-SECONDARY TECHNICAL-OCCUPATIONAL EDUCATION*

Instructor Traits	1	2	3	4	5	6	7	8	9
1. Neat Appearance	0.500	0.721	0.791	0.884	0.953	0.977	0.953	0.977	0.977
2. Sense of Humor	0.289	0.500	0.605	0.744	0.837	0.930	0.977	0.977	0.930
3. Intellectual Abilities	0.209	0.395	0.500	0.674	0.837	0.860	0.977	0.977	0.953
4. Verbal Skills	0.116	0.256	0.326	0.500	0.698	0.628	0.837	0.744	0.907
5. Time Spent with Students	0.047	0.163	0.163	0.302	0.500	0.605	0.698	0.860	0.907
6. Knowledge of Trade	0.023	0.070	0.140	0.372	0.395	0.500	0.581	0.651	0.860
7. Positive Reinforcement	0.047	0.023	0.023	0.163	0.302	0.419	0.500	0.581	0.605
8. Knowledge of Subject Matter	0.023	0.023	0.023	0.256	0.140	0.344	0.419	0.500	0.814
9. Presentation of Subject Matter	0.023	0.070	0.047	0.093	0.093	0.140	0.395	0.186	0.500
$\sum p_j > k$	1.277	2.221	2.618	3.988	4.755	5.408	6.337	6.453	7.453

*Stimuli have been arranged in order of increasing $\sum p_j > k$ across the columns.

in Table VI. The columns were summed and their means derived. The negative signs were removed from the means by giving the value zero to the lowest stimulus in the list which required the addition to each mean of 1.255, a number equal to the absolute value of the mean of the lowest stimulus.

The rank order thus derived is as follows: Neat Appearance, 0.000; Sense of Humor, 0.338; Intellectual Abilities, 0.446; Verbal Skills, 1.088; Time Spent with Students, 1.293; Knowledge of Trade, 1.532; Positive Reinforcement, 2.022; Knowledge of Subject Matter, 2.188; and Presentation of Subject Matter, 2.370 (see Table VIII).

Agreement Among Categories of Respondents

The fourth research objective with which this study was concerned is as follows:

4. To identify areas of agreement among students, instructors, and administrators regarding criteria deemed most important to effective teaching in post-secondary technical-occupational education.

Figure 1 depicts in chart form by category of respondent, the z-value rankings of the nine traits considered important to effective teaching in post-secondary technical-occupational education.

Table VII presents these rankings in table form with negative signs removed and the lowest ranked traits equal to zero.

From this series of z-values, one-through nine rankings were determined for each category of respondent and the Kendall Coefficient of Concordance was computed.

TABLE VI

SCALE-SEPARATIONS MATRIX Z FOR NINE CRITERIA JUDGED BY ADMINISTRATORS IN TERMS OF PREFERENCES
FOR EFFECTIVE TEACHING IN POST-SECONDARY TECHNICAL-OCCUPATIONAL EDUCATION

Instructor Traits	1	2	3	4	5	6	7	8	9	
1. Neat Appearance	0.000	0.586	0.810	1.195	1.049	1.995	1.675	1.995	1.995	+11.300
2. Sense of Humor	-0.586	0.000	0.266	0.656	0.982	1.476	1.995	1.995	1.476	+ 8.260
3. Intellectual Abilities	-0.810	-0.266	0.000	0.451	0.982	1.080	1.995	1.995	1.675	+ 7.102
4. Verbal Skills	-1.195	-0.656	-0.451	0.000	0.519	0.327	0.982	0.656	1.323	+ 1.505
5. Time Spent with Students	-1.049	-0.982	-0.982	-0.519	0.000	0.266	0.519	1.080	1.323	- 0.344
6. Knowledge of Trade	-1.995	-1.476	-1.080	-0.327	-0.266	0.000	1.180	0.388	1.080	- 2.496
7. Positive Reinforcement	-1.675	-1.995	-1.995	-0.982	-0.519	-1.180	0.000	1.180	0.266	- 6.900
8. Knowledge of Subject Matter	-1.995	-1.995	-1.955	-0.656	-1.080	-0.388	-1.180	0.000	0.893	- 8.396
9. Presentation of Subject Matter	-1.995	-1.476	-1.675	-1.323	-1.323	-1.080	-0.266	-0.893	0.000	-10.031
$\sum zjk$	-11.300	-8.260	-7.102	-1.505	+0.344	+2.496	+6.900	+8.396	+10.031	0.000
$Mzjk$	- 1.255	-0.917	-0.789	-0.167	+0.038	+0.277	+0.767	+0.933	+1.115	0.000
Rj	0.000	0.338	0.466	1.088	1.293	1.532	2.022	2.188	2.370	11.277

- A. Presentation of Subject Matter
- B. Knowledge of Subject Matter
- C. Positive Reinforcement
- D. Knowledge of Trade
- E. Time Spent with Students
- F. Verbal Skills
- G. Intellectual Abilities
- H. Sense of Humor
- I. Neat Appearance

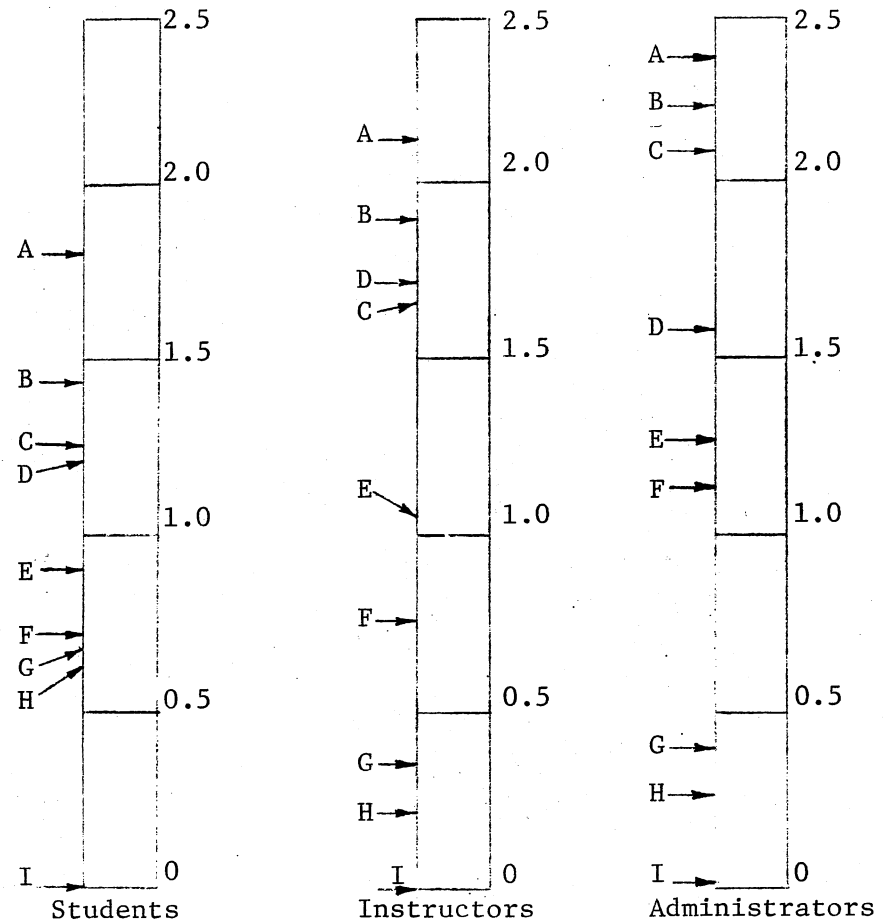


Figure 1. Scale values by preferences by students, instructors, and administrators of nine criteria for effective teaching in post-secondary technical-occupational education

TABLE VII
TRAIT SCALE VALUES BY CATEGORY OF RESPONDENT

Traits	Students	Instructors	Administrators
A. Presentation of Subject Matter	1.675	2.125	2.370
B. Knowledge of Subject Matter	1.459	1.824	2.188
C. Positive Reinforcement	1.212	1.592	2.022
D. Knowledge of Trade	1.198	1.609	1.532
E. Time Spent with Students	0.959	1.050	1.293
F. Verbal Skills	0.654	0.749	1.088
G. Intellectual Abilities	0.636	0.427	0.466
H. Sense of Humor	0.604	0.274	0.338
I. Neat Appearance	0.000	0.000	0.000

TABLE VIII

TRAIT RANKINGS OF SCALE VALUES BY CATEGORY OF RESPONDENT
FOR KENDALL COEFFICIENT OF CONCORDANCE

Traits	Students	Instructors	Administrators
A. Presentation of Subject Matter	1.7 (1)	2.1 (1)	2.4 (1)
B. Knowledge of Subject Matter	1.5 (2)	1.8 (2)	2.2 (2)
C. Positive Reinforcement	1.2 (3.5)	1.6 (3.5)	2.0 (3)
D. Knowledge of Trade	1.2 (3.5)	1.6 (3.5)	1.5 (4)
E. Time Spent with Students	1.0 (5)	1.1 (5)	1.3 (5)
F. Verbal Skills	0.7 (6)	0.7 (6)	1.1 (6)
G. Intellectual Abilities	0.6 (7.5)	0.4 (7)	0.5 (7)
H. Sense of Humor	0.6 (7.5)	0.3 (8)	0.3 (8)
I. Neat Appearance	0.0 (9)	0.0 (9)	0.0 (9)

The null hypothesis states:

There is no community of preference among student, instructor, and administrator respondents when ranking traits considered important to effective teaching in post-secondary technical-occupational education.

The Kendall Coefficient was determined to be 0.91, which represented a very strong positive agreement among rankings. The chi-square was equal to 819.00 with 1 degree of freedom. Since the calculated chi-square was greater than the table value at the 0.001 level of significance (10.827), it was concluded that there was some agreement among student, instructor, and administrator respondents and that some unique ordering of these traits existed in their estimation. Therefore, the null hypothesis was rejected and the rankings accepted as the true preferential ordering of the three groups of respondents.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The problem with which this study was concerned was the lack of sufficient information relative to valid content of instruments to be used for learner evaluation of instructors in post-secondary technical-occupational education. Specifically, this study was designed to achieve the following research objectives;

1. To identify specific instructor qualities which students feel are most important to effective teaching in post-secondary technical-occupational education.
2. To identify specific instructor qualities which instructors feel are most important to effective teaching in post-secondary technical-occupational education.
3. To identify specific instructor qualities which administrators feel are most important to effective teaching in post-secondary technical-occupational education.
4. To identify areas of agreement among students, instructors, and administrators regarding instructor qualities deemed most important to effective teaching in post-secondary technical-occupational education.

A questionnaire was developed and distributed to students, instructors, and administrators in post-secondary technical-occupational

education programs in the State of Oklahoma. Nine instructor qualities were selected which appeared in the literature on evaluation of instruction in both general education and technical-occupational education. The ratings task was presented as a standard pair comparisons procedure. The method of pair comparisons was used in order to permit subjects to evaluate qualities two at a time rather than all at once.

A total of 375 questionnaires were distributed to subjects in three categories, and 265 were returned in usable form for an effective response rate of 70.7 percent without follow-up. The majority of instructor and administrator respondents had extensive experience in their fields, averaging 10.5 years and 8.9 years respectively.

The responses were tabulated and statistical analyses were performed on the data from the paired comparisons. Matrices were constructed and individual rankings determined for all respondents in the three categories. Kendall's Coefficient of Concordance was used to measure the relationship among these sets of rankings. It was shown that there was, in fact, some degree of agreement among respondents in their respective categories and that some unique ordering of these qualities existed in their estimation. Therefore, the rankings were all accepted as the true preferential ordering of the respondents.

Matrices were also constructed to determine collective rankings of the nine traits by each category of respondents. This procedure yielded proportion matrices, indicating the proportion of respondents who had selected each quality as "more important" than each of the other qualities. This yielded complementary matrices in which the proportional values in the cells above the principal diagonal plus the values in corresponding cells below the diagonal sum to 1.00. The matrices of

proportions were converted to z-score matrices, z-scores were summed in each column, and the column means provided the scale value for each trait. Linear transformations were made of the obtained scale values in order to set the value of the lowest-ranked trait equal to zero. All matrices and the resulting scale values for each category of respondents were reported in Tables I through IX.

Kendall's Coefficient of Concordance was also used to measure agreement between groups. It was shown that a strong positive agreement existed between the rankings.

Findings and Conclusions

Research Objective One

Research objective one was as follows: "to identify specific instructor qualities which students feel are most important to effective teaching in post-secondary technical-occupational education."

Findings. The interval rankings by students for the nine instructor qualities were as follows: Presentation of Subject Matter, 1.675; Knowledge of Subject Matter, 1.459; Positive Reinforcement, 1.212; Knowledge of Trade, 1.198; Time Spent with Students, 0.959; Verbal Skills, 0.654; Intellectual Abilities, 0.636; Sense of Humor, 0.604; Neat Appearance, 0.000.

Conclusions. Students in the this study generally showed a preference for direct, nuts-and-bolts approach to instruction, selecting the learning facilitation factors over personality traits and intellectual qualities favored by students in other landmark evaluation studies.

Student respondents in Clinton's (1930) study showed a definite preference for personality traits, and students in Brousfield's (1940) study, selected intellectual qualities as most important to effective teaching in liberal arts education.

Findings by Roberts and Becker (1976) that communication skills in the technical-occupational teacher/learning process are more important than some of the characteristics generally associated with effective teaching in other areas, seem to be borne out in this study.

While there was a low degree of internal consistency among student respondents, indicating that they often did not agree with each other, the rankings of the nine instructor qualities by the group as a whole were close enough to the rankings by instructors and administrators to refute the contention noted in Wentling and Lawson (1975) that learner rankings are simply a popularity contest and that such evaluations tend to reward entertaining teachers and penalize serious scholars.

Research Objective Two

Research objective two was as follows: "to identify specific instructor qualities which instructors feel are most important to effective teaching in post-secondary technical-occupational education."

Findings. The interval ranking by instructors for the nine instructor qualities were as follows: Presentation of Subject Matter, 2.125; Knowledge of Subject Matter, 1.824; Knowledge of Trade, 1.609; Positive Reinforcement, 1.592; Time Spent with Students, 1.050; Verbal Skills, 0.749; Intellectual Abilities, 0.427; Sense of Humor, 0.274; Neat Appearance, 0.000.

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Conclusions. Except for the categories, "Knowledge of Trade" and "Positive Reinforcement," which were reversed, the z-value rankings by the instructors were identical to those of the student and administrator respondents. Although the z-values are extremely close, it is obvious that instructors feel that weight should be given to their occupational expertise in the evaluative process.

In some respects, this study agrees with the Delphi study by Collins (1978) which revealed substantial agreement by instructors on the top three criteria for instructor evaluation in post-secondary technical-occupational education: (1) classroom teaching ability, (2) command of the subject, and (3) student-oriented attitude.

Research Objective Three

Research objective three was as follows: "to identify specific instructor qualities which administrators feel are most important to effective teaching in post-secondary technical-occupational education".

Findings. Administrators, more than either of the other groups, demonstrated a very high degree of internal consistency in their ordering of traits deemed to be important in post-secondary technical-occupational education. In other words, as a group, administrators seemed to have a more precise ordering of these traits in mind.

The three lowest ranked traits are closely grouped at the bottom of the ranking scale. (See Table VII.) The middle three traits are closely grouped at the center of the scale and the three highest traits are bunched near the top of the scale.

Conclusions. Interestingly enough, the results of Brewer and Brewer's (1970) study show an inversion of the two highest ranked traits. "Interesting Presentation of Subject Matter" is ranked second and "Thorough Knowledge of Subject Matter" is ranked first by administrators in liberal arts programs. While the evidence is inconclusive, this finding could be indicative of a fundamental difference in trait preferences between administrators in technical-occupational education and those administrators in liberal arts programs.

Research Objective Four

Research objective four was as follows: "to identify areas of agreement among students, instructors, and administrators regarding criteria deemed most important to effective teaching in post-secondary technical-occupational education."

Findings. The z-value trait rankings were very similar for all three categories of respondents. The Kendall Coefficient of Concordance, used to measure extent of agreement among these three sets of rankings, was determined to be 0.91, which represented a very strong positive agreement among rankings.

Conclusions. The similarity of trait rankings among groups of subjects in the study is striking. The single exception to uniformity of rank ordering was the ranking of the trait "Knowledge of Trade" higher than "Positive Reinforcement" by faculty respondents. This, however, involved two traits which had very close scale values in each category.

The results of the study confirm, to some degree, the agreement noted in a study of student, faculty, and administrator rankings of traits desired for effective teaching in general education, made by Brewer and Brewer (1970). They found a correlation of 0.94 between the rankings, reflecting general agreement between the groups in their ordering of instructor traits.

The closeness of the rankings of instructor traits important for effective teaching in post-secondary technical-occupational education in the present study would seem to refute the contentions of those who claim that students are not qualified to judge effective teaching or that administrators are at variance with faculty about what constitutes effective teaching (Centra, 1980).

This study would seem to confirm Collins' (1978) findings that technical-occupational faculty members at the junior college level feel that they should be evaluated on different criteria than their general education colleagues in the same institution. All three categories of respondents in the present study placed greatest emphasis on learning management factors and correspondingly less emphasis on intellectual qualities and personality traits--characteristics highly prized by students in the liberal arts (Bousfield, 1940). ✓

Recommendations

1. It is recommended that in institutions where learner rating of instruction is practiced, different instruments be used to rate technical-occupational faculty and for general education faculty in the same institution.

2. It is recommended that factors peculiar to the technical-occupational field of teaching, such as "knowledge of trade" and "time spent with students" be included in learner evaluation instruments when students in post-secondary technical-occupational education rate their instructors.

3. It is recommended that technical-occupational faculty have input into the construction of learner evaluation instruments when instructors are evaluated by students in post-secondary technical-occupational education.

4. It is recommended that the findings of this study be made available to those administrators in post-secondary technical-occupational education planning the construction of learner rating instruments.

5. Suggested follow-up studies might include: (a) A comparison of student, instructors, and administrators in similar programs of study, i.e., electronics, auto mechanics, to determine if greater or lesser agreement exists among them relative to rankings of instructor qualities important to effective teaching; (b) additional research needs to be done in technical-occupational education to determine real or perceived differences among students, faculty, and administrators as compared to those in general education as to the importance of instructor traits to effective teaching.

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APPENDIX A

COVER LETTER AND
QUESTIONNAIRE

**LEARNER EVALUATION
OF
INSTRUCTOR PERFORMANCE
IN
TECHNICAL-OCCUPATIONAL
EDUCATION**

-A Growing Concern

-----fold and crease here-----
FIRST CLASS MAIL

**THE SCHOOL OF OCCUPATIONAL AND ADULT EDUCATION
Oklahoma State University
Stillwater, OK 74078**

staple here

DIRECTIONS: On the following pages are listed 36 pairs of qualities which have been suggested as criteria for effective teaching at the post-secondary level. Please consider each pair of qualities and place a check mark next to the trait in each pair that you think is the more important of the two for effective teaching in technical-occupational education.

Please complete the survey form, fold it along the dotted line indicated on the back of the booklet so that the address and stamp are showing, staple it where indicated and drop it in a mailbox.

- | | |
|--|---|
| 1. <input type="checkbox"/> Time spent with students | <input type="checkbox"/> Positive reinforcement of students |
| 2. <input type="checkbox"/> Sense of humor | <input type="checkbox"/> Neat appearance |
| 3. <input type="checkbox"/> Intellectual abilities | <input type="checkbox"/> Presentation of subject matter ✓ |
| 4. <input type="checkbox"/> Verbal skills | <input type="checkbox"/> Knowledge of trade |
| 5. <input type="checkbox"/> Knowledge of subject matter | <input type="checkbox"/> Time spent with students |
| 6. <input type="checkbox"/> Positive reinforcement of students | <input type="checkbox"/> Sense of humor |
| 7. <input type="checkbox"/> Neat appearance | <input type="checkbox"/> Intellectual abilities |
| 8. <input type="checkbox"/> Presentation of subject matter | <input type="checkbox"/> Verbal Skills ✓ |
| 9. <input type="checkbox"/> Knowledge of trade | <input type="checkbox"/> Knowledge of subject matter ✓ |

- | | |
|---|---------------------------------------|
| 10. ___Sense of humor | ___Presentation of subject matter |
| 11. ___Intellectual abilities | ___Knowledge of trade |
| 12. ___Verbal Skills | ___Knowledge of subject matter |
| 13. ___Time spent with students | ___Neat appearance |
| 14. ___Positive reinforcement of students | ___Intellectual abilities |
| 15. ___Knowledge of trade | ___Sense of humor |
| 16. ___Neat appearance | ___Verbal Skills |
| 17. ___Presentation of subject matter | ___Time spent with students |
| 18. ___Knowledge of subject matter | ___Positive reinforcement of students |

- | | |
|---|-----------------------------------|
| 19. ___Knowledge of trade | ___Neat appearance |
| 20. ___Verbal Skills | ___Sense of humor |
| 21. ___Time spent with students | ___Knowledge of trade |
| 22. ___Presentation of subject matter | ___Knowledge of subject matter |
| 23. ___Intellectual abilities | ___Verbal Skills |
| 24. ___Neat appearance | ___Presentation of subject matter |
| 25. ___Sense of humor | ___Intellectual abilities |
| 26. ___Verbal Skills | ___Time spent with students |
| 27. ___Positive reinforcement of students | ___Knowledge of trade |

- | | |
|--|--|
| 28. ___ Knowledge of subject matter | ___ Neat appearance |
| 29. ___ Sense of humor | ___ Time spent with students |
| 30. ___ Intellectual abilities | ___ Knowledge of subject matter |
| 31. ___ Neat appearance | ___ Positive reinforcement of students |
| 32. ___ Knowledge of trade | ___ Presentation of subject matter |
| 33. ___ Positive reinforcement of students | ___ Verbal Skills |
| 34. ___ Knowledge of subject matter | ___ Sense of humor |
| 35. ___ Presentation of subject matter | ___ Positive reinforcement of students |
| 36. ___ Time spent with students | ___ Intellectual abilities |

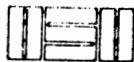
PERSONAL DATA

Present status: (check one)

- ___ Student (indicate classification or term of study _____)
 (indicate program of study _____)
- ___ Instructor (indicate no. of years teaching experience _____)
 (indicate no. of years industrial experience _____)
 (indicate specialty area _____)
- ___ Administrator (indicate no. years in administration _____)
 (indicate no. of years teaching experience _____)

(optional) Name _____

Institution _____



Oklahoma State University

SCHOOL OF OCCUPATIONAL AND ADULT EDUCATION

STILLWATER, OKLAHOMA 74078
CLASSROOM BUILDING 406
(405) 624-6275

Dear Colleague:

May I ask a favor of you.

In order to complete a research project, I need your help in identifying criteria which may be used to construct valid learner rating instruments for evaluation of technical-occupational instruction.

Faculty evaluation is one of the most critical tasks facing administrators today. Colleges are currently relying more on systematic student ratings than ever before.

Research studies reveal that technical-occupational faculty members feel that they should be evaluated on different criteria than their academic colleagues. Yet, in most institutions where learner rating of instructors is practiced, the survey instruments are identical for technical-occupational instructors and for the academic faculty in the same institution.

To obtain data for this study, I would like for you to participate in a paired-comparison study. In the booklet enclosed, there are listed 36 pairs of qualities which researchers have found to be important criteria for effective teaching at the post-secondary level. Please consider each pair of qualities and place a check mark next to the trait in each pair that you think is the more important of the two for effective technical-occupational teaching.

When you have completed the survey form, fold it along the dotted line on the back of the booklet, staple it where indicated and drop it into any mailbox. The proper amount of postage has already been affixed.

The information obtained will be used to determine if a consensus exists among faculty, administrators and students with regard to the appropriate content of learner rating instruments to be used for evaluation of instructors in technical-occupational education.

The information from your correspondence will be kept strictly confidential. Neither you nor your school will be identified. Please return the survey form as soon as possible. I plan to complete the project no later than April 1, 1981.

Thank you for your assistance.

Sincerely,

Earl D. Miller

APPENDIX B

TRAIT RANKINGS BY INDIVIDUAL RESPONDENTS

TABLE IX
 TRAIT RANKINGS BY INDIVIDUAL RESPONDENTS

i \ j	Time	Sense	Intellec. Ability	Verbal Skills	Knowledge of Subject	Positive	Neat	Presenta- tion	Knowledge of Trade
STUDENTS									
1	5	3.5	6	7	1	3.5	9	2	8
2	5.5	7	5.5	8	2	3.5	9	3.5	1
3	2	8.5	7	8.5	4.5	1	4.5	6	3
4	8	5.5	2	5.5	5.5	2	9	5.5	2
5	6	8	4.5	7	2.5	2.5	9	1	4.5
6	3.5	6	9	6	3.5	2	8	1	6
7	5.5	3	5.5	3	3	8	9	1	7
8	9	3	7	7	2	5	7	4	1
9	5.5	7.5	4	5.5	2	1	9	3	7.5
10	8	8	2.5	2.5	4.5	4.5	6	1	8
11	4	6	7	8.5	3	1.5	8.5	1.5	5
12	2	5.5	4	2.5	5.5	1	8	2.5	8
13	5.5	1	7	8	4	2.5	9	2.5	5.5
14	3	2	7	4	5	1	9	7	7
15	3	8.5	6.5	6.5	3	3	8.5	1	5
16	6	5	7	8	3	3	9	1	3
17	4.5	6	8.5	7	2	4.5	8.5	1	3
18	2	6	8	6	3.5	1	9	6	3.5
19	4	6	8	7	3	1	9	2	5
20	6	5	7	8	3	2	9	1	4

Table IX (Continued)

i \ j	Time	Sense	Intellec. Ability	Verbal Skills	Knowledge of Subject	Positive	Neat	Presenta- tion	Knowledge of Subject
21	5	7	8	6	1	4	9	2	3
22	6.5	8	4.5	6.5	1	3	9	2	4.5
23	2	7.5	3.5	9	5	1	7.5	6	3.5
24	4	7.5	2.5	5	2.5	7.5	9	1	6
25	7	7	4	7	2	4	9	1	4
26	7	9	6	3.5	3.5	5	8	1.5	1.5
27	8	6	9	3.5	3.5	7	3.5	1	3.5
28	6	6	3.5	8.5	3.5	6	8.5	1.5	1.5
29	5.5	4	9	5.5	2	1	7.5	3	7.5
30	7	8	5	1	2.5	5	9	2.5	5
31	9	2	5	7	8	3	1	5	5
32	6.5	8	5	2	4	6.5	9	2	2
33	3	5	6.5	6.5	3	8.5	8.5	1	3
34	3.5	7	8	6	5	3.5	9	1.5	1.5
35	5.5	5.5	7	9	2.5	4	8	1	2.5
36	6.5	2.5	6.5	8	5	2.5	9	2.5	2.5
37	9	3	5	7.5	1	7.5	5	2	5
38	2.5	8	6.5	4	6.5	5	9	1	2.5
39	1	2	6.5	8	6.5	5	9	3.5	3.5
40	3.5	7	6	5	3.5	2	9	1	8
41	1	8	7	6	4	2	9	4	4
42	1.5	6.5	8.5	6.5	3.5	1.5	8.5	3.5	5

Table IX (Continued)

i \ j	Time	Sense	Intellec. Ability	Verbal Skills	Knowledge of Subject	Positive	Neat	Presenta- tion	Knowledge of Trade
43	8	2	8	5	8	5	2	5	2
44	3.5	6	8.5	6	2	3.5	8.5	1	6
45	6	8	3	3	3	9	6	1	6
46	6	4.5	8	9	2	4.5	7	2	2
47	4.5	6	8.5	7	3	2	8.5	1	4.5
48	6.5	9	6.5	8	5	2	4	2	2
49	4	4	7	7	4	7	9	1	2
50	4.5	8	4.5	6	2.5	8	8	1	2.5
51	4.5	4.5	8.5	8.5	1.5	3	6.5	1.5	6.5
52	6	6	8	2.5	1	2.5	9	4	6
53	5	8	5	5	1	3	8	2	8
54	4	8	5	7	2	3	9	1	6
55	3	6.5	6.5	6.5	2	4	9	1	6.5
56	7	3	5	4	6	2	9	1	8
57	1.5	7	4	8	4	1.5	9	4	6
58	4.5	6.5	3	8	1	4.5	9	2	6.5
59	7	7	9	3	4.5	2	7	1	4.5
60	1.5	8	6	7	3.5	3.5	9	1.5	5
61	6.5	9	5	6.5	2	3.5	8	1	3.5
62	6	8	9	2	4	1	7	3	5
63	1.5	9	8	1.5	5	3	7	5	5
64	6.5	4	4	9	1.5	6.5	8	2.5	4

Table IX (Continued)

i \ j	Time	Sense	Intellec. Ability	Verbal Skills	Knowledge of Subject	Positive	Neat	Presenta- tion	Knowledge of Subject
65	6	8	3	4	2	8	8	1	5
66	6	4	6	3	2	6	9	1	8
67	9	3	3	5	6.5	1	3	6.5	8
68	6	8	1.5	6	4	3	9	1.5	6
69	4	7	8	6	3	5	9	1	2
70	5	7	8	1.5	3.5	6	9	3.5	1.5
71	6.5	4.5	6.5	8	2	4.5	9	1	3
72	6	8	7	4.5	1	4.5	9	3.5	2.5
73	2	8	6	7	3	1	9	4	5
74	5.5	8	3.5	7	2	7.5	9	1	3.5
75	6	8	3	5	2	7	9	4	1
76	5	1.5	9	7	3	4	8	1.5	6
77	5	7	8	6	2	4	9	3	1
78	6	8	3	5	3	7	9	3	1
79	1.5	5	6	7	1.5	8	9	1	4
80	5	5	5	8.5	5	5	8.5	1.5	1.5
81	5	8	2	7	2	6	9	2	4
82	2.5	7	8.5	5.5	4	1	8.5	2.5	5.5
83	1.5	7	5	8	3.5	1.5	9	3.5	6
84	8	7	5.5	3.5	1	2	9	5.5	3.5

TABLE IX (Continued)

i \ j	Time	Sense	Intellec. Ability	Verbal	Knowledge of Subject	Positive	Neat.	Presenta- tion	Knowledge of Trade
INSTRUCTORS									
1	6	7	8	5	1	3	9	4	2
2	5	9	8	7	3	4	6	1	2
3	6	7	8	5	4	2	9	2	2
4	5	8	7	5	2	5	9	3	1
5	5	7	8	6	2	3	9	1	4
6	3	7	8	6	3	3	9	1	5
7	4	6	8	7	3	1	9	2	5
8	4	6	7	9	1	5	8	2	3
9	5	6	7	9	3	2	8	1	4
10	6.5	8	4	6.5	4	2	9	1	4
11	4	8	6	7	4	2	9	1	4
12	6	6	6	8.5	1	3	8.5	2	4
13	6	9	6	6	2	4	8	1	3
14	5	6	7	9	3	4	8	2	1
15	5	8	8	6	2	3	8	1	4
16	7	9	5	6	4	2	8	1	3
17	4	7	6	9	2	5	8	1	3
18	5	8	6	7	3	1	9	2	4
19	6	6	9	8	4	3	6	2	1
20	4	6	6	8	2	9	6	1	3
21	7	8	5	6	4	1	9	2	3

TABLE IX (Continued)

i \ j	Time	Sense	Intellec. Ability	Verbal	Knowledge of Subject	Positive	Neat	Presenta- tion	Knowledge of Trade
22	9	8	5	7	3	1	5	2	5
23	4	6	9	2	4	4	7.5	1	7.5
24	3	5	9	8	5	1	7	2	5
25	6	8	7	4	2	3	9	1	5
26	6	7	4	5	3	8	9	2	1
27	9	7	4	5	3	1	8	2	6
28	3	8	7	6	5	2	9	1	4
29	4	7	8	6	2	5	9	3	1
30	4	9	7	3	2	5	8	1	6
31	8	8	5	4	3	1	8	2	6
32	3	8	8	5.5	1.5	4	8	1.5	5.5
33	2	6	8	7	5	3	9	1	4
34	6	9	8	5	3	1	7	2	4
35	4	9	8	5	3	2	7	1	6
36	3	6	9	8	3	1	7	5	3
37	6.5	9	8	3.5	2	6.5	5	1	3.5
38	6	4.5	8.5	4.5	2	3	8.5	1	7
39	6	8	6	6	1	4	9	2	3
40	5	7	8	6	3	2	9	1	4
41	6.5	6.5	5	8.5	1	4	8.5	2	3
42	5.5	7	5.5	8.5	2	4	8.5	1	3
43	5	7	7	7	4	1	9	3	2

TABLE IX (Continued)

i \ j	Time	Sense	Intellec. Ability	Verbal	Knowledge of Subject	Positive	Neat	Presenta- tion	Knowledge of Trade
66	5	7	8	6	1	4	9	2	3
67	4	8.5	7	6	2.5	2.5	8.5	1	5
68	2.5	6.5	9	6.5	2.5	4.5	8	1	4.5
69	1.5	9	8	3.5	5.5	3.5	5.5	7	1.5
70	4	9	7	5	3	2	8	1	6
71	6	8	7	4	3	5	9	2	1
72	7	5.5	2.5	5.5	4	1	8	2.5	9
73	6	9	4	6	3	1.5	8	1.5	6
74	3	9	6	8	1	5	7	3	3
75	4	7	8	2.5	5.5	1	9	2.5	5.5
76	4	8	9	7	2	3	6	1	5
77	8.5	5.5	2	3.5	3.5	7	8.5	1	5.5
78	6	7	5	8	2	4	9	1	3
79	6	8	5	8	2	1	9	4	3
80	2.5	8.5	7	5.5	5.5	1	8.5	2.5	4
81	3	5.5	9	8	1.5	1.5	7	5.5	4
82	2.5	9	4.5	7	1	8	6	2.5	4.5
83	5	7	7	9	3	3	3	1	7
84	5	6	8	7	2	3	9	4	1
85	3	6	6	8	3	3	9	1	6
86	2	7.5	7.5	4.5	4.5	7.5	7.5	1	3
87	5	8	6.5	3.5	2	6.5	9	1	3.5

TABLE IX (Continued)

i \ j	Time	Sense	Intellec. Ability	Verbal	Knowledge of Subject	Positive	Neat	Presenta- tion	Knowledge of Trade
88	5	7	8	6	2	4	9	2	2
89	2.5	8	6	7	4.5	2.5	9	1	4.5
90	3.5	9	7.5	6	3.5	5	7.5	1	2
91	5	7	8	3	3	6	9	3	1
92	3	6	8	7	3	3	9	1	5
93	5.5	3.5	8	7	3.5	1	9	2	5.5
94	9	7	5	2.5	5	2.5	8	1	5
95	5	6	8	7	3	3	9	1	3
96	4	7	2	8	3	5	9	6	1
97	6	9	8	4	7	5	7	2	3
98	8.5	5.5	8.5	7	4	1	5.5	2	3
99	4	8	8	6	2	4	8	1	4
100	5.5	8	7	2.5	4	2.5	9	1	5.5
101	7	4	9	5	1.5	1.5	8	3	6
102	6	7	8	5	1	3	9	4	2
103	6	8	7	5	4	2	9	1	3
104	3	8	7	6	3	5	9	1	3
105	8.5	5	8.5	6.5	3	2	6.5	1	4
106	4.5	6	8.5	7	3	2	8.5	1	4.5
107	5	7	8	5	2	3	9	1	5
108	5	8	8	6	2	3	8	4	1
109	5	7	9	6	2	4	8	2	2

TABLE IX (Continued)

i \ j	Time	Sense	Intellec. Ability	Verbal	Knowledge of Subject	Positive	Neat	Presenta- tion	Knowledge of Trade
110	4.5	7	9	6	4.5	1	8	2.5	2.5
111	4	7	8	6	1	5	9	3	2
112	5	7	7	9	2	7	4	1	3
113	3	7	7	7	1	4	9	2	5
114	4	8	7	5	1	6	9	3	2
115	7.5	9	5.5	5.5	3	2	7.5	1	4
116	4	7	9	7	2.5	2.5	7	1	5
117	5	9	8	7	2	6	4	1	3
118	2	6	7.5	7.5	3.5	5	9	1	3.5
119	4.5	4.5	9	7.5	2.5	7.5	6	1	2.5
120	4	8	7	6	2	4	9	4	1
121	4.5	6	7	9	2.5	4.5	8	1	2.5
122	4	8.5	8.5	6.5	3	5	6.5	1	2
123	8	6	9	7	4	2	5	1	3
124	4	9	6	5	2	7	8	3	1
125	4.5	6.5	4.5	9	2	1	8	3	6.5
126	2.5	4	6.5	9	2.5	5	6.5	8	1
127	1.5	6	9	8	4.5	4.5	7	3	1.5
128	6.5	6.5	4.5	8	2	3	9	1	4.5
129	3	7	6	8	4	1	9	2	5

TABLE IX (Continued)

i \ j	Time	Sense	Intellec. Ability	Verbal	Knowledge of Subject	Positive	Neat	Presenta- tion	Knowledge of Trade
130	3.5	9	6.5	5	1	6.5	8	2	3.5
131	7	3.5	8	5.5	3.5	1	9	2	5.5
132	5	8	6	7	3	4	9	2	1
133	4	5	7	7	2	7	9	3	1
134	3.5	7.5	7.5	1.5	3.5	5.5	9	1.5	5.5
135	5	7	9	7	1.5	3.5	7	1.5	3.5
138	3	8	7	6	3	1	9	3	5
137	4	7	6	9	4	4	8	2	1
138	5	8	6	7	1.5	3.5	9	3.5	1.5

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1	3	8	6	6	4	1.5	9	1.5	6
2	6	8	5	7	2	4	9	1	3
3	5	6	8.5	7	1	3	8.5	3	3
4	3	9	5.5	7.5	3	1	5.5	3	7.5
5	5	6	9	7.5	3.5	3.5	7.5	1	2
6	2	8.5	7	4.5	4.5	2	8.5	2	6
7	6	5	8	7	2	4	9	1	3
8	2	3.5	7.5	5.5	3.5	1	7/5	5.5	9
9	5	8	8	6	3.5	1.5	8	3.5	1.5
10	3.5	7	8	5	3.5	6	9	2	1
11	6.5	8	6.5	5	1	2.5	9	4	2.5
12	3.5	8	6	7	1.5	3.5	9	1.5	5

TABLE IX (Continued)

i \ j	Time	Sense	Intellec. Ability	Verbal	Knowledge of Subject	Positive	Neat	Presenta- tion	Knowledge of Trade
44	4.5	7	8	6	1.5	4.5	9	3	1.5
45	6	8	4.5	7	2	3	9	1	4.5
46	6	7.5	9	7.5	2	3	4.5	1	4.5
47	4	7	9	6	3	2	8	1	5
48	4	6.5	8	3	2	5	9	1	6.5
49	8	2	7	5.5	3	9	4	1	5.5
50	5	3	9	8	3	6	7	3	1
51	5.5	7	1	2.5	2.5	9	8	3.5	4
52	9	5.25	2.5	5.25	5.25	2.5	8	1	5.25
53	6.5	8	6.5	4.5	2	4.5	9	2	2
54	6	8	7	4	2	5	9	2	2
55	8	7	5	6	2	3	9	1	4
56	6	3.5	9	7	3.5	5	8	1.5	1.5
57	7.5	7.5	5	5	3	2	9	1	5
58	5	7	9	3	5	1	8	2	5
59	5	5	9	5	3	1	8	2	7
60	4.5	7	6	8	3	1.5	9	1.5	4.5
61	5	7	9	7	3	7	4	2	1
62	7.5	7.5	4.5	6	1	4.5	9	2	3
63	3	6.5	9	6.5	4.5	1	8	2	4.5
64	4	8.5	6.5	6.5	2	5	8.5	2	2
65	7.5	5.5	4	7.5	2	2	9	2	5.5

TABLE IX (Continued)

i \ j	Time	Sense	Intellec. Ability	Verbal	Knowledge of Subject	Positive	Neat	Presenta- tion	Knowledge of Trade
13	6.5	6.5	5	3	4	1.5	9	1.5	8
14	5	7	9	5	3	2	8	5	1
15	7	8	6	4	3	5	9	1	2
16	4.5	7.5	7.5	2	3	4.5	9	1	6
17	3.5	7	8	3.5	3.5	1	9	3.5	6
18	5	8	6	4	4	2	9	1	3
19	5	6.5	8	6.5	4	1	9	2.5	2.5
20	4.5	9	6	7	1.5	4.5	8	3	1.5
21	6.5	9	4.5	2	2	6.5	8	4.5	2
22	6.5	9	6.5	4.5	4.5	1	8	3	2
23	5	9	6	7	2	4	8	1	3
24	6.5	5	8.5	6.5	1.5	1.5	8.5	3	4
25	5	9	7	6	4	3	8	1	2
26	3	8	6	7	1	5	9	3	3
27	6.5	4.5	9	6.5	4.5	1.5	8	1.5	3
28	5	7.5	7.5	5	5	1	9	2	3
29	4	8	6	7	3	1	9	2	5
30	4.5	6	8	7	1.5	4.5	9	3	1.5
31	6	7.5	9	3.5	1.5	3.5	7.5	1.5	5
32	5	9	7	6	2	3	8	1	4
33	8	8	5	4	3	1	8	2	6
34	3	8	6	4	6	2	9	1	6

TABLE IX (Continued)

i \ j	Time	Sense	Intellec. Ability	Verbal	Knowledge of Subject	Positive	Neat	Presenta- tion	Knowledge of Trade
35	6	7.5	7.5	4	4	4	9	1.5	1.5
36	4.5	7.5	7.5	4.5	3	2	9	1	6
37	4	7	9	8	2	1	6	3	5
38	5	8	7	1	3	6	9	2	4
39	5	8	6	7	3	4	9	2	1
40	4	8	6	7	2	3	9	1	5
41	4	9	7.5	1.5	3	7.5	5.5	1.5	5.5
42	6	7	9	2	3	5	8	1	4
43	4	7	6	8	3	1	9	2	5

VITA

Earl Dalin Miller

Candidate for the Degree of

Doctor of Education

Thesis: LEARNER EVALUATION OF INSTRUCTION IN POST-SECONDARY
TECHNICAL-OCCUPATIONAL EDUCATION

Major Field: Occupational and Adult Education

Biographical:

Personal Data: Born in Okmulgee, Oklahoma, November 20, 1934,
the son of Mr. and Mrs. C. J. Miller.

Education: Graduated from Okmulgee High School, Okmulgee,
Oklahoma, in May, 1951; attended Connors State College,
Warner, Oklahoma, Northeastern Missouri State College,
Kirksville, Missouri, and graduated with a Bachelor of
Arts in Education from East Central Oklahoma State Uni-
versity, Ada, Oklahoma, in 1959; graduated from Oklahoma
City University with a Master of Business Administration
degree in 1969; completed requirements for the Doctor of
Education degree at Oklahoma State University in Decem-
ber, 1981.

Professional Experience: U.S. Army, 1954-56; Program Director,
KTEN-TV, Ada, Oklahoma, 1958-59; Manager, Safety and Health
Department, U.S. Jaycees, Tulsa, Oklahoma, 1959-62; Director
of Public Relations, Phillips University, Enid, Oklahoma,
1962-65; Coordinator of Creative Services, Kerr-McGee Cor-
poration, Oklahoma City, Oklahoma, 1965-69; Advertising
Manager, Collins Radio Company, Dallas, Texas, 1969-73;
General Education Department Instructor, Oklahoma State Uni-
versity School of Technical Training, Okmulgee, Oklahoma,
1973 to present.

Professional Organizations: Higher Education Alumni Council of
Oklahoma; Oklahoma Technical Society.