ADMISSION FACTORS RELATED TO SUCCESS IN DOCTORAL
PROGRAMS IN VOCATIONAL-TECHNICAL EDUCATION
IN TEXAS AND OKLAHOMA

DISSERTATION

Presented to the Graduate Council of the
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For the Degree of

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By

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This study identified the admissions criteria for selected doctoral programs in vocational-technical education in Oklahoma and Texas and investigated the relationship of these criteria to success in the doctoral programs. Success in the doctoral programs was identified in terms of cumulative doctoral grade point average.

Data were obtained through a questionnaire designed to elicit both general information concerning admissions criteria for vocational-technical doctoral programs at the selected institutions and to collect specific information on a random sample of twenty doctoral candidates from each of the four selected institutions. Factors considered included birthdates, gender, scores on admissions tests, grade point average in the masters program, the year the latest masters was completed, number of colleges attended, and cumulative doctoral grade point average.

A statistical analysis using nine separate one-way analyses of variance determined that four of the nine factors considered proved to be statistically significant at the .05 level or better when correlated with the
criterion variable (cumulative doctoral grade point average). Those factors were gender, Graduate Record Examination verbal and composite scores, and masters grade point average.

The results of the study basically parallel findings of research concerning admissions criteria and success in graduate programs in other areas. Additional research efforts should address the issue of determining the most appropriate decision logic model for making admissions decisions in programs at the graduate levels.
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CHAPTER I

INTRODUCTION AND SIGNIFICANCE

One of the primary concerns of any institution of higher learning and of any department within any of those institutions of higher learning is developing a set of admissions criteria which can aid in the selection of candidates for admission who are most likely to fulfill the degree requirements of the program. A variety of approaches has been attempted, but none of them has been completely accurate in predicting success of students in academic programs.

Determining an appropriate set of admissions criteria becomes increasingly important as the academic programs become more stringent at the higher levels of the master's and doctoral degrees. The costs in terms of time, dollars (both personal and institutional), and personal commitment involved in pursuing a higher degree make it imperative that admissions criteria enable decision makers to select candidates who have the potential to succeed.

One of the primary admissions criteria used in graduate programs is a test score or a combination of test scores. For a large percentage of graduate programs, these scores may come from the Graduate Admissions Examination (GRE).
Other programs may use the Miller Analogies Test (MAT) or a subject-matter-oriented test. If survival time (1939 to the present) and high usage were the basic criteria for success in predicting likelihood of success in graduate programs, the GRE would indeed be a superb instrument. (10) In fact, the GRE-T score (a combination of the verbal and quantitative components of the GRE) is the single most frequently applied admissions requirement for graduate schools (1).

However, there is widespread concern over the inappropriate use of test scores in admissions. For example, when Marston (5) and Thacker and Williams (9) reviewed various predictive studies, they questioned the desirability of the widespread employment of the GRE for predicting performance in graduate school. (5, 9) Furst and Roelfs concluded in 1979 that evidence of the predictive validity of the various forms of the GRE had indeed been mixed (3).

In addition to questions raised concerning predictive validity of admissions tests, particularly the GRE, there are additional ethical issues which must be addressed. Individual accounts of denial of admissions based on erroneous reporting of test scores, for example, lend additional credence to the concern. Claims of ethnic, sexual, or socio-economic bias from individuals and groups bring ethical issues to the forefront during examinations
of admissions and/or graduation criteria for graduate programs.

In Texas, this concern is reflected in a series of proposed bills filed in the State Legislature of Texas. Many of these bills are designed to try to insure that institutions of higher education do not rely solely or unfairly on test scores in their admission policies. Examples include Senate Bill 29 authored by Senator Truan (6), House Bill 325 authored by Representative Luna (7), and Senate Bill 993 authored by Senator Parker (8). Copies of these bills are included in Appendix A.

Dr. Frederick H. Dietrich, Vice-President of the Program Division, College Entrance Examination Board, testified before the Select Committee on Higher Education of the State of Texas on March 13, 1986, where he stressed the importance of assuring access to higher education at the undergraduate level. He further emphasized that failure to recognize differences between common and compulsory education (which includes high school, and which, he says, undergraduate education is becoming) and higher education poses a very real threat to higher education. One particular danger he identifies is the common practice of using graduate level admissions tests as indicators of the quality of undergraduate programs or as assessments of individual achievement rather than as predictors of success in graduate programs. He further
cautions against overreliance on these test scores as either the sole or the primary criterion for determining appropriateness of admission to graduate programs. He concludes that other measures of academic success and promise are available, especially courses taken and the grades achieved (2). A copy of Dr. Dietrich's address is included in Appendix B.

Concern over identifying admissions criteria that are predictive rather than reflective is certainly not the only consideration for those involved in the issue of admissions to graduate programs. Inherent in the philosophy of those institutions which rely solely or heavily on admissions test scores, academic achievement, and/or assessment of ability is the assumption that such factors measure what is essential for success in an academic environment, excluding such factors as motivation, creativity, personal honesty, intuition, and characteristics of social responsibility and sensitivity. Each of these factors has been determined to play a key role in life success, yet each is often excluded from consideration when determining whether or not a given individual will be able to obtain an education commensurate with his or her life goals.

While test scores have often been shown to be closely correlated with ultimate success in graduate programs (i.e., graduation), there is no concomitant body of research to determine how well those excluded from programs
based on test scores might have done. Norman Gronlund points out in *Measurement and Evaluation in Teaching* that test scores provide only one type of information and should always be supplemented by past records of achievement and other types of assessment data. No major educational decision, he concludes, should ever be based on test scores alone (4).

After reviewing a broad spectrum of literature on the subject of admissions criteria for graduate programs, with particular emphasis on doctoral programs in vocational education, it became apparent that admissions tests, standardized or otherwise, should not be the sole criteria for admission to graduate-level programs. Consequently, it also became evident that it is incumbent upon those actively involved in enhancing higher education to determine what is, in fact, a more appropriate method for determining who is more likely to succeed in graduate programs of education, with particular emphasis on graduate programs in the field of vocational education. This study was designed with such a goal in mind.

To define the focus of the study and to provide preliminary background information, a pilot survey was conducted to determine exactly what admissions criteria are currently being employed in making determinations for admission to doctoral programs in the field of vocational education. For this survey, all thirty-four institutions
of higher education identified as offering doctoral programs in the field of vocational education were sent questionnaires requesting information concerning degree offerings in vocational education and selection and admission criteria for the period 1980-1985. A copy of the survey used is included in Appendix C. A list of surveyed institutions is included in Appendix D. Of the thirty-four institutions surveyed, nineteen responses were received. Thirteen of those responses contained usable data on degree offerings and selection or admissions criteria. Admissions factors identified by the survey included admissions tests, grade point average (GPA), personal interview, recommendations, teaching experience, work experience, and writing samples. Institutions were also asked if they ever waived scores on admissions tests if the scores fell below a cut-off score that had been established.

Of the thirteen institutions responding, twelve used admissions tests as one of the admissions criteria. Nine universities (69%) accept scores from either the GRE or Miller Analogies Test (MAT). Three (23%) required the GRE, and one (8%) did not require an admissions test. Cut-off scores ranged from 950 to 1000 composite score on the GRE (verbal and quantitative scores). One university required a composite of 1500 on the verbal, quantitative, and analytical components of the GRE. Cut-off scores on the MAT ranged from 40 to 55.
Of the institutions using admissions tests as one of the primary admissions criteria, ten (77%) had no waiver provision for test scores. Two institutions (15%) allowed waivers based on high GPAs and recommendations. The remaining institution had no requirement for admissions tests.

Ten of the institutions used minimum grade point averages as an admissions criterion. The remaining three required no specific GPA. Four institutions (31%) required a GPA of 2.5 or above; four other institutions (31%) required a GPA of 3.0 or above. The remaining two institutions (15%) required minimum GPAs of 3.5 or above.

Personal interviews with potential doctoral students were also popular admissions criteria. Eight of the institutions (62%) required personal interviews of candidates prior to admission to the graduate program. The remaining seven institutions had no requirement for interviews. Requirements for interviews were coupled with requirements for personal recommendations in all cases. However, three institutions (23%) which did not require interviews required recommendations.

A surprising number of institutions (six, or 46%) required teaching experience. The remaining seven institutions listed teaching experience as desirable. Only one institution (8%) required work experience. Interestingly, that institution was the same institution
which listed no other admissions criteria. However, eleven institutions (85%) said that work experience was desirable.

The final criterion examined was a writing sample. The writing sample was required by only one institution (8%), a rather surprising finding when one considers that writing is identified in much of the literature as the single skill most essential to success in graduate programs.

Based on information obtained from the pilot survey, it seemed apparent that there were several options to using a single admissions criterion. Preliminary review of the findings did not reveal the basis on which admissions criteria were established, and none of the literature reviewed addressed why specific admissions criteria were selected by given institutions. To try to determine what factors might be the best predictors of success in a graduate program, the scope of this study was limited to a regional survey so that correlations between admissions criteria for doctoral programs in vocational education and success in the programs could be studied in depth.

Statement of the Problem

The problem investigated in this study was twofold. The first aspect of the problem addressed the identification of admissions criteria for selected doctoral programs in vocational-technical education. After these factors were identified, the second aspect of the problem
addressed correlation of the admissions factors with success in the doctoral programs as evidenced by grade point average in the programs.

Purposes of the Study

The purposes of this study are described below:

1. To identify the admissions criteria which are currently used by selected institutions offering doctoral programs in the area of vocational-technical training.

2. To determine the extent to which these criteria correlate with success in the doctoral program entered when success in the program is defined as the grade point average achieved in the program.

3. To determine the relative predictive value of these admissions criteria.

Hypothesis

For purposes of this study, the following hypothesis was tested:

Null Form: There will be no significant difference in rankings of grade point averages of students who are admitted to vocational-technical doctoral programs and their respective rankings on a variety of admissions factors.

Alternate (Working) Hypothesis: Rankings of grade point averages of students in vocational-technical doctoral
programs will be significantly related to their rankings on a variety of admissions factors.

Background and Significance of the Study

While identifying appropriate screening mechanisms for determining admissions criteria for entry into education programs at all levels has been a matter of discussion, debate, and almost outright warfare in the educational community basically since the inception of an "educational system," it has become a critical issue in the field of vocational education in the 1980s and 1990s. Increasing fiscal constraints plague vocational-technical training programs in the private, public, and government sectors. Consequently, increasing emphasis is being placed on insuring maximum benefit for training dollars, including increased emphasis on accountability associated with the expenditure of those funds.

In light of this current climate, insuring that the "right" students (i.e., those who have the highest probability of succeeding when compared to the total population of applicants for the program) are accepted into educational programs, especially doctoral programs in vocational-technical training, becomes an essential factor in fiscal responsibility and accountability. If it is possible to more accurately predict which admissions factors correlate most closely with success in a doctoral
vocational-technical training program (grade point average), it may be possible to insure better use of training dollars available. An additional, and perhaps equally important, benefit would be the possibility of more appropriately using human resources in the form of both instructors and students.

Because this is one of the initial studies specifically targeting doctoral programs in vocational-technical education and training, it is hoped that the results of this study can form the foundation for further research which may enhance the effectiveness of the screening process for admissions to doctoral programs in vocational-technical education and training. While the results cannot be expected to be conclusive, they can certainly provide additional direction in the search for the best admissions policies and procedures.

Limitations of the Study

A limitation of this study was the inability to survey persons who failed to meet the admissions standards and were never admitted to graduate school.

Delimitations of the Study

A delimitation was that the detailed sample of student data was limited to doctoral programs in vocational-technical education in Texas and Oklahoma. In addition, the study was limited to doctoral students who were
admitted to graduate study during the 1980-1988 time period. The questionnaire further delimits the sample to twenty cases per institution. The sample from each institution was selected at random to be representative of the population at that institution.

Definition of Terms

Terms used in the context of this study are common terms in the field of education and training. For that reason, no special or specific definitions are required.

2. Dietrich, Frederick H. 1986, March. Report from the College Entrance Examination Board. Address presented to the Select Committee on Higher Education of the State of Texas, Tyler, TX.


Literature reviewed for this study was heavily oriented toward admissions testing as a primary criterion for admissions to graduate programs. Because the GRE is one of the most widely recognized and utilized admissions tests, innumerable articles, studies, and discourses addressed virtually every combination of correlations between the GRE and "success" imaginable. For no other single admissions criterion was such an array of information available.

However, a number of studies examined correlations between GRE scores and several other commonly applied admissions criteria, such as grade point average, age, and quality of undergraduate programs or other graduate programs attended.

Because the GRE has been in use in various forms since about 1946, much of the data is relatively old, with many of the studies being conducted in the 1960s and 1970s. When the GRE is taken in isolation as a predictive criterion for success in graduate programs, the evidence of predictive validity of the various forms of the GRE has certainly been mixed. Evidence of the widespread confidence in the predictive validity of the GRE manifests itself in the nearly universal application of the GRE as at
At least a major admissions criterion, if not a sole admissions criterion. Based on a common-sense approach to the application of test scores and cautions against their misuse, it is understandable that studies would routinely and consistently be conducted to determine whether or not GRE scores are, indeed, valid predictors of success in graduate programs.

Because this study focuses on graduate programs at the doctoral level, literature addressing GRE predictive validity at that level are included in this review. When other studies were found to be particularly relevant by other researchers, such studies may be included in which research was conducted using graduate programs at the master's level. The literature review included in this chapter is presented basically in chronological order, with minor deviations in sequence as required to preserve logical order.

Admissions Tests as Predictive Criteria for Success in Doctoral or Masters Programs

In 1975, John Nagi conducted a study of 63 graduate students in a doctoral program in Educational Administration at the State University of New York at Albany. Thirty-three of these students completed the program; thirty did not. In this study, Nagi addressed the predictive validity of both the Graduate Record Examination (GRE) and the Miller Analogies Test (MAT). The dependent
variable was completion/non-completion of the program. Using a point-biserial correlation, Nagi found no statistically significant correlation between the dependent variable and either the GRE or the MAT score. Nagi therefore concluded that neither the GRE nor the MAT were effective predictors of success in the doctoral program, and further concluded that his study bore out similar studies by W. R. Borg and other researchers (12).

In 1979, a study by Arthur A. Dole and Andrew R. Baggaley revealed similar results, but against a dependent variable of averaged rankings by faculty members on scholarship and professionalism of students enrolled in doctoral programs in a number of fields. Dole and Baggaley added different independent variables of undergraduate and graduate GPA, age at time of admission into the doctoral program, a selectivity index (indicating quality of institutions attended--Astin's index), gender, and honors (primarily awards and published work). Somewhat surprisingly, age had the highest correlation with both dependent variables. Grade point averages also correlated significantly with both criteria. The GRE-Verbal score and the selectivity index also correlated somewhat less strongly, but still significantly, with scholarship but not with professionalism. None of the other predictors, including the GRE-Quantitative score, showed significant correlations with either of the criterion variables. Dole
and Baggaley therefore concluded that the GRE can serve a "modest but useful function" in predicting success in programs at the doctoral level if it is used in concert with other predictive devices (6).

Another study published in 1979 by Edward J. Furst and Pamela J. Roelfs of the University of Arkansas examined the predictive validity of the GRE and the MAT in a doctoral program in Education over a nine-year period. Criterion variables were devised based on the requirement for disciplined thinking in an analytical exercise selected by the researchers in conjunction with grades in statistics and educational research and a sum of these grades. Over 300 subjects were included in the study. Correlations using a variety of combinations of predictors revealed that the GRE-Verbal and GRE-Total were valid indicators of potential success in graduate level work in education, but that the predictive validity was substantially enhanced when combinations of predictors were used (7).

David J. Hebert and Alan Holmes conducted a study in 1979 at the master's level, studying only the predictive validity of different components of the GRE. Using data from 67 students admitted to the University of New Hampshire Master of Education program, they correlated the GRE-Verbal, GRE-Quantitative, and GRE-Total scores with the graduate grade point averages. They found statistically significant relationships between the GRE-Verbal and the GRE-Total and the subjects' graduate grade point averages.
However, the GRE-Quantitative score did not correlate significantly with graduate grade point average. Additionally, the researchers pointed out that there was a negative correlation between GRE-Quantitative and graduate grade point average, with those scoring lower on the GRE-Quantitative receiving higher graduate grade point averages. Consequently, they questioned the use of GRE-Total scores, because the GRE-Quantitative score forms part of that composite. They also cautioned that generalizations concerning the validity of using the GRE across a variety of departments are suspect. They suggest that the most useful information concerning the predictive value of the GRE is local data relevant to a specific department and that each department should undertake its own study to determine specific local relevance of the GRE and its subscores (9).

Another study at the master's level (also 1979) was conducted by Joseph Camp and Thomas Clawson of the University of North Florida supported Holmes' findings. Camp and Clawson studied the predictive validity of the GRE and its subscores with graduate grade point average for 135 students in a Master of Arts program in counseling. Again, GRE-Verbal correlated significantly with graduate grade point average; GRE-Quantitative did not. While the GRE-Total score also correlated significantly with graduate GPA, Camp and Clawson suggest that the quantitative portion
of the total score could actually detract from the validity of the GRE-Total score (3).

A later study by Javaid Kaiser of the University of Kansas was presented as a paper at the annual meeting of the Rocky Mountain Educational Research Association in 1982. In this study, Kaiser studied the predictive validity of the GRE along with a number of other predictors. Using graduate grade point average as the criterion variable and GRE-Verbal, GRE-Quantitative, GRE-Total, undergraduate grade point average, graduate grade point average, major field of study, sex, and year of enrollment as predictors, Kaiser collected data for 356 students in education and 51 in computer science and used stepwise multiple regression to analyze the data. Kaiser concluded that the GRE-Verbal score was the single best predictor of success in graduate school in education when success is defined by graduate grade point average. However, the predictive validity did not hold true for the GRE-Quantitative or for the GRE-Total. In addition, using undergraduate grade point average, sex, and year of enrollment did not increase the predictability significantly. The composite of GRE-Verbal scores and undergraduate GPA was determined to be the best set of predictors. For the computer science students, none of the factors contributed significantly to prediction of the criterion variable. However, data did confirm that
undergraduate GPA was a better predictor than the GRE scores (10).

The results of these studies are not inconsistent with the philosophy of the Educational Testing Service or the Graduate Record Examinations Board which administer the GRE. In fact, in a Spring, 1988 GRE Board Newsletter, the Board cautions that scores should not be added together and the total used as a predictor of success in a particular graduate program. Even if the scores happened to be perfect predictors for a given program (which, the Board adds, they are not), each program would require a unique mix of abilities which would best predict success in the program. In addition, the Educational Testing Service believes it is a misuse of prudent testing procedures to establish a cutoff score based on the GRE-Total score because some students may possess the appropriate mix of abilities would never pass an initial screener if the GRE-Total score was not high enough to meet or exceed the cutoff point. If such cutoff scores are published, many very capable students with a high probability of doing well in a given program might never even apply. Finally, the Board says, we must address the fact that there are a number of very bright people who simply do not test well but who should not be excluded from graduate programs without corroborating the indications of the test (11).
Studies of Multidimensional Assessment

Strategies for Graduate Programs

Although the majority of our institutions of higher learning use admissions test scores as a mainstay of their admissions screening programs, a number of attempts have been made to incorporate broader-based criteria into the admissions process in an effort to insure selection of the most appropriate candidates for a given program. As might be anticipated, many of these attempts have surfaced in the so-called "soft" disciplines, such as counseling or psychology. An attempt was made to parallel these studies with those emphasizing admissions testing. As is evident from the preceding section of this chapter, there is no definitive dividing line between the two. A number of studies emphasizing admissions testing also included a number of other admissions criteria in the study. However, for purposes of this chapter, the distinction was made based on emphasis.

In a 1977 study conducted by Lewis R. Goldberg, University of Oregon, Goldberg analyzed data from over 1000 students in the doctoral program within the Department of Psychology. Admissions criteria included grade point averages, GRE verbal and quantitative scores, quality of undergraduate and graduate institutions attended, and references. A weighted formula is applied, and those attaining a minimum score become potential candidates.
Further screening varies from year to year. Based on correlations he obtained while analyzing his data, Goldberg recommends what he believes to be a more accurate and predictive admissions formula using only grade point average and GRE verbal and quantitative scores, stating that adding as a predictive factor the quality of institutions attended actually increases the possibility of clerical error without enhancing predictive capability. He would add to that formula either references from professors with whom students have worked closely or samples of written work. As a final recommendation, he suggests development of a centralized national application system to reduce costs to both applicants and institutions and to encourage research (8).

Another 1977 study examined methods for optimizing selection of graduate library science students. Richard Blue and James Divilbiss assessed the effectiveness of a variety of admissions criteria, including grade point average, GRE test scores, personal references, work experience, and personal goal statements to predict performance for 97 students in a master's program in library science. The researchers concluded that while different factors and combinations of factors prove to be the best predictors for a given class, the overall best predictors for the program are grade point average and the GRE quantitative test score, a significant departure from
findings in other studies. However, it would suggest that perhaps the library science program relies more heavily on quantitative than qualitative skills (1).

The focus of a subsequent study in 1978 was an attempt to develop a model for predicting graduation from graduate programs. This study focused both on admissions factors and on post-admissions factors. Marlene Cook and Austin Swanson selected 214 doctoral students from the Department of Educational Administration at the State University of New York at Buffalo and correlated eleven predictor variables with program completion using a path analysis. The final recommended path model incorporated nine of the eleven hypothesized variables and proposed application of the model to most accurately predict success in programs such as the doctoral program studied by Cook and Swanson (5).

A 1979 study focusing on admissions to a graduate program in counseling at the University of Toronto was conducted by Larry Pass and Shawn Scherer. In this study, faculty members responsible for conducting admissions screening were polled to determine relative importance of admissions criteria. An Admissions Assessment Index was designed containing twenty-six categories, each using a twenty-one point bipolar rating scale. These categories were grouped into three major general groups: demographics, objective indices, and subjective indices. The major
categories were further divided into subcategories. The researchers concluded that demographic factors were viewed as having little importance in assessing applicants. Objective factors played a significant role in admissions decisions, but so did subjective factors. Factors particularly salient to making a decision to admit an applicant were the nature of prior academic training, applied experience in the field of human relations, and demonstrated or perceived academic competence and scholarship (13).

Also in 1979, L. J. Pristo studied 129 doctoral students in a single doctoral program to attempt to determine whether or not a canonical correlation would prove to be effective in predicting success in graduate programs. Pristo's dependent variables were success or failure in the doctoral program as defined by active participation or lack of participation for one academic year and the cumulative grade point average in the program prior to cessation of the doctoral program. Predictor variables included number of years since receipt of last undergraduate degree; number of years since receipt of last master's degree; master's grade point average; junior-senior grade point average; undergraduate grade point average in the major college; undergraduate grade point average; college where the master's degree was received; number of graduate hours previously earned at the
time of application; sex; number of colleges attended; and
type of degree the subject was seeking (PhD. or EdD.).
Five of these predictors were dropped during the course of
the analysis because they did not contribute significantly
or were highly inter-correlated. The remaining eight
factors were not statistically significant, leading to the
conclusion that the scores did not allow generalization
outside the standardization sample (15).

Probably the most extensive multicriteria admissions
program discovered in the survey of the literature was that
studied by John Childers and Donald Rye in their assessment
of the admissions requirements for the doctoral program in
counselor education at the University of Arkansas.
Although no data were collected for statistical analysis,
Childers and Rye describe an extensive admissions procedure
which includes a two-day, on-campus selection process.
Included in the procedure are assessments of counseling
skills, level of professional knowledge, interpersonal
effectiveness, and credentials. Assessment tools include
personal interviews with both faculty and other doctoral
students, an essay examination, standardized test scores,
official transcripts, letters of recommendation,
autobiographical information, and statements of
professional goals. To be admitted, students must have the
support of two-thirds of the faculty. The writers
concluded that a multidimensional selection process in
which an applicant comes to the campus and meets other
doctoral students and faculty members enhances the
selection of students enrolling in the program and provides
a sound basis upon which faculty members can make
admissions decisions (4).

Walter R. Borg provided a noteworthy caution concerning
correlational research in his discussion of the subject.
During a critical review of the Hebert and Holmes study
discussed earlier, Borg suggests that although the study
found a statistically significant correlation, it is
questionable whether the correlation is of practical value
in predicting success in graduate school when that success
is defined as graduate grade point average. He further
suggests that a better way of estimating usefulness of a
measure such as the Graduate Record Examination is to
square the correlation with the criteria (in this case, the
researchers used a Spearman rank-difference correlation.)
Borg does concede, however, that the research supports the
recommendation by the authors to combine the Graduate
Record Examination scores with other predictors, such as
graduate grade point average, to provide more valid
prediction (2).

Perceptions of Applicants Concerning
Admissions Criteria and Procedures

An interesting discovery during the review of the
literature had little to do with institutions discovering
the ideal method for predicting success in a graduate program. This discovery concerned the perception of applicants in reference to admissions policies and procedures. In a 1983 study, Donald Powers and James Lehman examined the perceptions of a representative sample of GRE test takers (6,600 of the registrants from the June 1980 test registrants). Initially, the researchers pointed out that while test scores more often than not are only one element in the total admissions picture, the general public believes admission test scores are at least the primary factor determining admissions to undergraduate, graduate, and professional schools.

To determine perceptions of the test registrants concerning use of the test scores, questions were asked concerning eight graduate admissions factors which are widely used. The researchers concluded the candidates perceive undergraduate grades as the most significant factor in graduate admissions, while recommendations and the undergraduate field were somewhat less important. GRE scores were perceived as considerably less important than any other factor. These perceptions did differ markedly based on both graduate field to which application was being made and ethnic group, although perceptions did not differ markedly by sex or age (14).
Summary of Research

Research reviewed revealed a generally heavy emphasis on several factors used as criteria for admission to graduate programs. The most universally used criterion was the admissions test, especially the Graduate Record Examination or the Miller Analogies Test. Other criteria frequently encountered in the literature included age, gender, undergraduate or master's grade point average, and quality of undergraduate institutions attended. Attempts to develop models for predicting success in graduate programs have met with limited success.
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CHAPTER 3

METHODOLOGY

This chapter describes the procedures used in collecting and treating data for this study. This study focused on an investigation of the admissions criteria used in doctoral programs of vocational-technical education in Texas and Oklahoma and the relationship between these factors and success in the doctoral program as evidenced by doctoral grade point average (GPA). Major sections in the chapter include selection of the population for the study, development of the instrument, and treatment of the data.

Population Selection

Letters and appropriate questionnaires were mailed to graduate school officials of four universities in Texas and Oklahoma which offer doctoral degrees in vocational-technical education. These universities included Oklahoma State University at Stillwater, Oklahoma; East Texas State University at Commerce, Texas; North Texas State University (subsequently University of North Texas) at Denton, Texas; and Texas A and M University at College Station, Texas. An attempt was made to include the state of New Mexico in the regional survey, and a questionnaire was mailed to the
University of New Mexico, the only institution in the state offering a doctoral program in vocational-technical education. However, the University of New Mexico discontinued the program in 1988 and did not respond with a usable data sample. Each of the universities was requested to select a random sample of twenty students who were admitted to candidacy in the doctoral programs between 1980 and 1988. In addition to information concerning admissions for each individual (e.g., admissions test scores, master's grade point average, and the like), demographic information such as birthdate, gender, number of colleges attended, year of latest master's-level degree, and similar data were requested. Each university was also asked to provide general information concerning the types of doctoral programs offered in the area of vocational-technical education, selection and admissions criteria, and procedures for waivers of these requirements, if any.

Three of the four universities surveyed responded with data for twenty students, while the fourth university responded with usable data for only seven students (N=67).

**Development of the Instrument**

Since a totally suitable survey instrument for this study could not be found, a simple and direct questionnaire was developed. A copy of this questionnaire is included as Appendix E. The replication of sections of the
questionnaire previously developed and validated by Pat N. McLeod (1) and Jessie W. Teddlie (2) is gratefully acknowledged. The added section of the questionnaire requested various items of admissions information, including birthdate, gender, Miller Analogies Test (MAT) scores (if applicable), Graduate Record Examination (GRE) scores, type of master's degree, grade point average in the master's program, the year the latest master's degree was completed, the number of colleges attended, and the cumulative doctoral grade point average.

Treatment of the Data

The data gathered from the survey instruments were transferred to a microcomputer floppy diskette using the Multiplan software program through the Faculty Development Division at Sheppard Air Force Base, Texas. All statistical procedures were accomplished using the StatPac Gold software package on a Zenith 248 microcomputer. A one-way analysis of variance was accomplished using each admission factor as a treatment, or independent variable, and doctoral grade point average as the dependent variable (the established criterion for "success" in the doctoral programs).
CHAPTER BIBLIOGRAPHY


CHAPTER 4

PRESENTATION AND ANALYSIS OF DATA

The purpose of this study was to determine the relationship between a variety of admissions factors and the relative success of students admitted to candidacy in doctoral programs in vocational-technical education in universities in Oklahoma and Texas. Included in the admissions factors were certain demographic details concerning the applicants (e.g., gender and birthdate). For purposes of this study, success was defined as graduate grade point average in the doctoral program in which the student was enrolled.

This chapter consists of the analysis of those relationships based on data collected during the study. Subsequent sections of the chapter present both summaries of raw data and an outline of the statistical procedures and results obtained from executing those statistical procedures.

Presentation of the Data

The data collected during this study were entered into the Multiplan Program on the Burroughs computer system, a program containing a spreadsheet which allowed the data to be structured and sorted for analysis. The summary of this
data is contained in Appendix F. Data collected for each subject included birthdate, gender, scores on the Graduate Record Examination (verbal, quantitative, and composite), Miller Analogies Test scores, type of master's degree held, grade point average achieved for the master's degree, year master's degree was attained (most recent only), number of colleges attended, and cumulative doctoral grade point average. In addition, generic admissions data for each university were attributed to each individual (e.g., if the university required references or interviews, those factors were given positive values for the individual).

Once the data were entered into the spreadsheet format, they could be readily sorted into categories of relatively equal numbers for purposes of the analysis of variance. Dichotomous variables were assigned only the two available levels; no provision was made for "no response" because information was provided for all subjects. Most other variables were categorized into three levels, each containing approximately twenty-two cases. Exceptions were those variables with missing data or those for which a more logical categorization required additional levels. Because the analysis program automatically allows for missing ordinal-level data, no additional provisions had to be made to deal statistically with that data.

Analysis of the data was effected using the StatPac Gold Statistical Analysis Software Package and a Zenith 248
microcomputer. Nine separate one-way analyses of variance were computed. In each instance, the dependent variable (criterion variable) was the doctoral grade point average. The independent variable (factor) in the first analysis was birthdate; in the second, gender; third, Graduate Record Examination-Verbal; fourth, Graduate Record Examination-Quantitative; fifth, Graduate Record Examination-Composite; sixth, Miller Analogies Test scores; seventh, master's grade point average; eighth, year latest master's degree was attained; and, lastly, the number of colleges attended.

The StatPac Gold analysis produces an analysis of variance table using the F-test to reveal whether or not there are significant differences between the levels of the experimental factor(s). When a significant F-ratio is obtained in the program, indicating there is a significant difference between the means of the dependent variable for at least two of the groups (levels), the program automatically conducts a t-test to determine where the significant differences occur. The t-tests are only performed if the F-ratio is significant at the critical F probability. The critical F probability for these analyses was .05. Only those t values with probabilities of .05 or less were printed.

In order to perform these statistical tests, it was first necessary to compile descriptive statistics for each
factor. Table 1 presents descriptive statistics for the sixty-seven subjects for birthdate and doctoral grade point average. For purposes of the statistical treatments, grade point averages were input into the computer program without decimal points, allowing calculations to four decimal places during execution of the analysis of variance program. This procedure was initiated at the suggestion of Dr. David Martin, Midwestern State University, Wichita Falls, Texas. Consequently, a grade point average recorded as 3.76 in the raw data was transformed to 376, a 4.0 to 400, and so on. Birthdates were categorized at three levels. Level one included persons whose birthdates fell in the period 1926-1939. Level two included 1940-1946, and level three included 1947-1959.

TABLE 1
MEAN GRADE POINT AVERAGE BY AGE GROUPS

<table>
<thead>
<tr>
<th>Birthdate</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1926-1939</td>
<td>21</td>
<td>376.7619</td>
<td>16.3582</td>
</tr>
<tr>
<td>1940-1946</td>
<td>24</td>
<td>379.8333</td>
<td>15.6613</td>
</tr>
<tr>
<td>1947-1957</td>
<td>22</td>
<td>374.1364</td>
<td>22.8667</td>
</tr>
</tbody>
</table>
The data were further analyzed using a one-way analysis of variance. Because the study was formulated based on the null hypothesis, that hypothesis is intended to apply to each factor. Consequently, the hypothesis for the first calculation was that there would be no significant difference in doctoral grade point average based on age. The analysis of variance revealed that there was, in fact, no statistically significant difference among the groups. Table 2 depicts the results of that analysis.

**TABLE 2**

**ANALYSIS OF VARIANCE SUMMARY BY AGE**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DP</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birthdate</td>
<td>2</td>
<td>374.2662</td>
<td>187.1331</td>
<td>0.5450</td>
<td>0.5879</td>
</tr>
<tr>
<td>Error</td>
<td>64</td>
<td>21973.7338</td>
<td>343.3396</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>22348.0000</td>
<td>343.3396</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 presents descriptive statistics for the subjects according to gender and doctoral grade point averages. Because gender was the one dichotomous variable, only two levels were assigned, with level one categorized as male and level 2 as female.
TABLE 3
MEAN GRADE POINT AVERAGE BY GENDER

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>50</td>
<td>374.3000</td>
<td>19.3499</td>
</tr>
<tr>
<td>Female</td>
<td>17</td>
<td>384.9412</td>
<td>12.6613</td>
</tr>
</tbody>
</table>

Data were again analyzed using the analysis of variance against the null hypothesis. This analysis, however, revealed that there were statistically significant differences based on gender. Table 4 presents the summary of data for the analysis.

Since the F value was significant, a t-test between cell means was conducted, and results of that analysis are included. Values of p are for a two-tailed test.

According to this analysis, the doctoral grade point averages of females are significantly higher than those of males. However, because this analysis had unequal cell numbers, a possible source of bias was introduced. Although the samples from participating universities were random, and it would be anticipated that gender is almost equally distributed, it appears likely that there are fewer females enrolled in doctoral programs of this nature, at least at the participating universities.
TABLE 4
ANALYSIS OF VARIANCE SUMMARY BY GENDER

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>1</td>
<td>1436.5588</td>
<td>1436.5588</td>
<td>4.4653</td>
<td>0.0362</td>
</tr>
<tr>
<td>Error</td>
<td>65</td>
<td>20911.4412</td>
<td>321.7145</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>22348.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$t$-test Between Cell Means:
t = 2.1131 for gender comparing levels one and two
t = .0362

The third analysis of variance used verbal scores from the Graduate Record Examination. These scores were reported for only forty-seven of the subjects. Scores were broken down into three primary levels and a level for no response. Level one was reserved for no response. Level two included scores from 340-450. Level three included scores from 460-520. Level four included scores from 530-640. Table 5 presents descriptive information.

An analysis of variance was then executed using the data. Table 6 contains a summary of the results of that analysis.
### TABLE 5

**MEAN GRADE POINT AVERAGE BY GRE-VERBAL SCORES**

<table>
<thead>
<tr>
<th>GRE-Verbal</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No score</td>
<td>20</td>
<td>375.6000</td>
<td>14.3761</td>
</tr>
<tr>
<td>340-450</td>
<td>15</td>
<td>366.1333</td>
<td>26.4166</td>
</tr>
<tr>
<td>460-520</td>
<td>16</td>
<td>382.3125</td>
<td>15.3784</td>
</tr>
<tr>
<td>530-640</td>
<td>16</td>
<td>383.6250</td>
<td>11.9436</td>
</tr>
</tbody>
</table>

### TABLE 6

**ANALYSIS OF VARIANCE SUMMARY BY GRE-VERBAL SCORES**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRE-Verbal</td>
<td>3</td>
<td>2964.2792</td>
<td>988.0931</td>
<td>3.2115</td>
<td>0.0283</td>
</tr>
<tr>
<td>Error</td>
<td>63</td>
<td>19383.7208</td>
<td>307.6781</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>22348.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**t-test Between Cell Means:**

* t = 2.5664 for Levels 2 and 3
  * p = .0122
* t = 2.7746 for Levels 2 and 4
  * p = .0073
The fourth analysis of variance used quantitative scores from the Graduate Record Examination. Once again, scores were divided into four levels. Level one was reserved for no response. Level two included scores from 370-510. Level three included scores from 520-550. Level four included scores from 560-720. Table 7 summarizes the descriptive statistics for this analysis.

<table>
<thead>
<tr>
<th>Table 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEAN GRADE POINT AVERAGE BY GRE-QUANTITATIVE SCORES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GRE-Quantitative</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No score</td>
<td>20</td>
<td>375.6000</td>
<td>14.3761</td>
</tr>
<tr>
<td>370-510</td>
<td>15</td>
<td>370.8000</td>
<td>23.2324</td>
</tr>
<tr>
<td>520-550</td>
<td>14</td>
<td>379.6429</td>
<td>19.7040</td>
</tr>
<tr>
<td>560-720</td>
<td>18</td>
<td>381.6667</td>
<td>16.6486</td>
</tr>
</tbody>
</table>

The analysis of variance, summarized in Table 8, showed no statistically significant difference between the groups based on the quantitative scores from the Graduate Record Examination.

The fifth analysis of variance used the composite score from the Graduate Record Examination (the sum of the verbal and quantitative scores). Scores were categorized into
### TABLE 8
ANALYSIS OF VARIANCE SUMMARY BY GRE-QUANTITATIVE SCORES

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRE-Quant.</td>
<td>3</td>
<td>1105.5857</td>
<td>368.5286</td>
<td>1.0930</td>
<td>0.3591</td>
</tr>
<tr>
<td>Error</td>
<td>63</td>
<td>21242.4143</td>
<td>337.1812</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>22348.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Four categories: level one—no response; level two—scores from 790-970; level three—scores from 980-1070; and level four—scores from 1080-1220. Descriptive data are presented in Table 9.

### TABLE 9
MEAN GRADE POINT AVERAGE BY GRE-COMPOSITE SCORES

<table>
<thead>
<tr>
<th>GRE-Composite</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No score</td>
<td>20</td>
<td>375.6000</td>
<td>14.3761</td>
</tr>
<tr>
<td>790-970</td>
<td>15</td>
<td>365.8667</td>
<td>21.1149</td>
</tr>
<tr>
<td>980-1070</td>
<td>16</td>
<td>382.8750</td>
<td>15.3574</td>
</tr>
<tr>
<td>1080-1220</td>
<td>16</td>
<td>383.3125</td>
<td>19.2413</td>
</tr>
</tbody>
</table>
When the data were analyzed using the analysis of variance procedure, it became apparent that the results would parallel those obtained during the analysis of variance conducted on the Graduate Record Examination using only the verbal scores. The results were not as significantly impacted by quantitative scores as might have been anticipated based on the review of the literature.

Scores for subjects from levels three and four showed a statistically significant difference from scores for subjects from level two. There was no statistically significant difference between levels three and four. Results of the analysis of variance are summarized in Table 10. The t-test between cell means were computed and values for p were obtained. The probability values (p) presented are for a two-tailed test, and statistics were included in the table only when p was less than or equal to .050.

The sixth analysis of variance was based on the scores from the Miller Analogies Test. These scores were reported only for those individuals for whom Graduate Record Examination scores were not reported. Consequently, only twenty of these scores were available for analysis. Data received were categorized in three categories. Level one was reserved for individuals for whom no scores were reported. Level two represented scores 15-46, while level
### TABLE 10

**ANALYSIS OF VARIANCE SUMMARY BY GRE COMPOSITE SCORES**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRE-Comp.</td>
<td>3</td>
<td>3088.2792</td>
<td>1029.4264</td>
<td>3.3673</td>
<td>0.0235</td>
</tr>
<tr>
<td>Error</td>
<td>63</td>
<td>19259.7208</td>
<td>305.7099</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>22348.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**t-test Between Cell Means**

- $t = 2.7066$ for levels 2 and 3
- $p = .0086$
- $t = 2.7763$ for levels 2 and 4
- $p = .0072$

Three included scores from 47-67. Descriptive statistics are presented in Table 11.

### TABLE 11

**MEAN GRADE POINT AVERAGE BY MAT SCORES**

<table>
<thead>
<tr>
<th>MAT</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No score</td>
<td>47</td>
<td>377.5957</td>
<td>19.9811</td>
</tr>
<tr>
<td>15-46</td>
<td>10</td>
<td>379.1000</td>
<td>8.6384</td>
</tr>
<tr>
<td>47-67</td>
<td>10</td>
<td>372.0000</td>
<td>18.2452</td>
</tr>
</tbody>
</table>
The analysis of variance conducted revealed no statistically significant difference in the two groups. This result is not totally consistent with findings from the review of the literature. Results of the analysis are summarized in Table 12.

**TABLE 12**

**ANALYSIS OF VARIANCE SUMMARY BY MAT SCORES**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT</td>
<td>2</td>
<td>315.0809</td>
<td>157.5404</td>
<td>0.4576</td>
<td>0.6406</td>
</tr>
<tr>
<td>Error</td>
<td>64</td>
<td>22032.9191</td>
<td>344.2644</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>22348.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The seventh analysis of variance considered master's grade point average and doctoral grade point average. As indicated earlier, grade point averages were reported as whole numbers rather than as decimals. Data were categorized into four categories, with level one being reserved for the twenty subjects for whom no grade point averages at the master's level were available. Level two included 3.0-3.6 (300-360); level three included 3.7-3.92 (370-392); and level four represented 4.0 (400). Descriptive data are presented in Table 13.
The analysis of variance revealed statistically significant differences between levels one, two, and three and level four. Results are presented in Table 13. Interestingly enough, the mean grade point average for subjects for whom no master's grade point averages were reported paralleled the mean of subjects in level two, with both showing a high level of significance.

**TABLE 13**

**MEAN GRADE POINT AVERAGE BY MASTER'S GPA**

<table>
<thead>
<tr>
<th>Master's GPA</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No score</td>
<td>20</td>
<td>369.4500</td>
<td>20.5541</td>
</tr>
<tr>
<td>3.0-3.6</td>
<td>14</td>
<td>367.5714</td>
<td>18.8912</td>
</tr>
<tr>
<td>3.7-3.92</td>
<td>12</td>
<td>377.4167</td>
<td>14.3556</td>
</tr>
<tr>
<td>4.0</td>
<td>21</td>
<td>390.2381</td>
<td>8.20926</td>
</tr>
</tbody>
</table>

Significance was at the .0003 level. Subjects' scores categorized in level four were significantly higher than those in any other group—not a startling finding, because past history had already shown them to be academically competent (4.0 at the master's level). These results are also relatively consistent with the results of studies reviewed in Chapter II. Results of the analysis are summarized in Table 14.
### TABLE 14
ANALYSIS OF VARIANCE SUMMARY BY MASTER'S GPA

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masters GPA</td>
<td>3</td>
<td>6066.8952</td>
<td>2022.2984</td>
<td>7.8253</td>
<td>0.0003</td>
</tr>
<tr>
<td>Error</td>
<td>63</td>
<td>16281.1048</td>
<td>258.4302</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>22348.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ t = 4.1388 \quad \text{for Levels 1 and 4} \]
\[ p = 0.0003 \]

\[ t = 4.0865 \quad \text{for Levels 2 and 4} \]
\[ p = 0.0003 \]

\[ t = 2.2040 \quad \text{for Levels 3 and 4} \]
\[ p = 0.0293 \]

The eighth analysis of variance included the year the most recent master's degree was awarded and doctoral grade point average. Data were categorized into four levels: level one covered 1960-1971; level two covered 1972-1977; level three covered 1978-1980; and level four covered 1981-1987. Descriptive statistics are reflected in Table 15 below.
TABLE 15
MEAN GRADE POINT AVERAGE BY YEAR OF MASTER'S DEGREE

<table>
<thead>
<tr>
<th>Master's-Year</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960-1971</td>
<td>17</td>
<td>380.0000</td>
<td>14.1951</td>
</tr>
<tr>
<td>1972-1977</td>
<td>16</td>
<td>380.6875</td>
<td>15.0852</td>
</tr>
<tr>
<td>1978-1980</td>
<td>16</td>
<td>373.5000</td>
<td>23.7009</td>
</tr>
<tr>
<td>1981-1987</td>
<td>18</td>
<td>374.0000</td>
<td>19.6379</td>
</tr>
</tbody>
</table>

When the analysis of variance procedure was executed, there was no statistically significant difference. Results of the analysis of variance are presented in Table 16.

TABLE 16
ANALYSIS OF VARIANCE SUMMARY BY YEAR OF MASTER'S DEGREE

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master's-Year</td>
<td>3</td>
<td>728.5625</td>
<td>242.8542</td>
<td>0.7077</td>
<td>0.5542</td>
</tr>
<tr>
<td>Error</td>
<td>63</td>
<td>21619.4375</td>
<td>343.1657</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>22348.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The final analysis of variance included the number of colleges attended and doctoral grade point average. Data were categorized at three levels. Level one reflected
subjects who had attended two colleges. Level two included those who had attended three colleges, and level four included subjects who had attended either four or five colleges. No subject had attended only one college, and no subjects had attended in excess of five colleges. Descriptive data for this factor are presented in Table 17.

**TABLE 17**

**MEAN GRADE POINT AVERAGE BY NUMBER OF COLLEGES**

<table>
<thead>
<tr>
<th>Colleges</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>23</td>
<td>374.1739</td>
<td>20.5949</td>
</tr>
<tr>
<td>3</td>
<td>26</td>
<td>375.1923</td>
<td>19.1562</td>
</tr>
<tr>
<td>4-5</td>
<td>18</td>
<td>383.2222</td>
<td>13.0093</td>
</tr>
</tbody>
</table>

The analysis of variance revealed no statistically significant difference between the groups. Results of the analysis are summarized in Table 18.

**Summary of Findings**

Based on information from the nine analyses of variance, the null hypothesis was retained for five of the nine factors analyzed: birthdate, Graduate Record Examination quantitative scores, Miller Analogies Test scores, year most recent master's degree was received, and
TABLE 18

ANALYSIS OF VARIANCE SUMMARY BY NUMBER OF COLLEGES

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colleges</td>
<td>2</td>
<td>965.5461</td>
<td>482.7730</td>
<td>1.4450</td>
<td>0.2421</td>
</tr>
<tr>
<td>Error</td>
<td>64</td>
<td>21382.4539</td>
<td>334.1008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>22348.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

number of colleges attended. The null hypothesis was rejected for four of the nine factors because the analysis of variance revealed statistically significant differences at or above the .05 level. Those factors are gender, Graduate Record Examination verbal and composite scores, and master's grade point average.
CHAPTER 5

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This study was initiated in order to identify and investigate admissions criteria used in doctoral programs of vocational-technical education in Texas and Oklahoma and to study the relationship between these factors and success in the doctoral program as evidenced by grade point average (GPA). This chapter presents a summary of the methods and procedures used to collect and analyze the data, the findings, and conclusions derived by the researcher from the study. In addition, recommendations suggested by the results are included.

Summary

The sixty-seven subjects which formed this study were doctoral students in vocational-technical education in the states of Texas and Oklahoma. The subjects were selected by random sampling procedures from university records. A simple and direct questionnaire was developed and mailed to the Graduate Dean of each institution. General information was requested concerning the overall admission requirements of the doctoral program in vocational-technical education. Specific data were requested on a random sample of twenty students from each university program. Those students were
selected from the population of students admitted to candidacy between 1980 and 1988.

All universities surveyed provided data for twenty subjects with the exception of one university which only contributed usable data on seven subjects. Subjects were not involved in responding to the questionnaire or providing individual data. After the data were gathered and tabulated, the results were statistically analyzed by using the one-way analysis of variance procedure.

The null hypothesis was tested in the study, with an alternate hypothesis developed as a working hypothesis. The hypotheses were as follows:

1. Null hypothesis: There will be no significant difference in rankings of grade point averages of students who are admitted to vocational-technical doctoral programs and their respective rankings on a variety of admissions factors.

2. Alternate (working) hypothesis: Rankings of grade point averages of students in vocational-technical doctoral programs will be directly related to their rankings on a variety of admissions factors.

Admissions factors included some individual demographic data such as birthdate and gender. In total, nine analyses of variance were conducted using the cumulative grade point average in the doctoral program (the stated criterion for success in the doctoral programs) as the dependent
variable. Independent variables included birthdate, gender, Graduate Record Examination scores (verbal, quantitative, and composite), Miller Analogies Test scores, master's grade point average, year latest master's degree was attained, and number of colleges attended.

Findings

Statistical treatment of the data presented in Chapter IV comprised the basis for retention or rejection of the null hypothesis. The hypothesis was retained when the probability level computed by analysis of variance was greater than .05. Conversely, probability levels less than or equal to .05 were considered significant and justified the rejection of the hypothesis.

1. The differences between birthdate and doctoral grade point average were not statistically significant. Therefore the null hypothesis was retained.

2. The differences between gender and doctoral grade point average, on the other hand, proved to be statistically significant at the .03 level, with females achieving doctoral grade point averages significantly higher than those of their male counterparts. The null hypothesis was therefore rejected for this factor.

3. The differences between Graduate Record Examination verbal scores and doctoral grade point average also proved to be statistically significant at the .0283 level. A t-test between cell means showed that individuals scoring
between 530 and 640 on the test scored significantly higher than individuals scoring in the 340 to 450 range ($p = .0122$) or the 460 to 520 range ($p = .0073$). No similar difference was found between individuals in the lower two ranges. The null hypothesis was rejected for this factor.

4. Differences between Graduate Record Examination quantitative scores and doctoral grade point average yielded no such results, with no statistically significant difference being found for any of the three levels. The null hypothesis was retained for Graduate Record Examination quantitative scores.

5. Differences between Graduate Record Examination composite scores (the sum of verbal and quantitative scores) and doctoral grade point average proved to be statistically significant and paralleled the findings on the Graduate Record Examination verbal scores. Again persons scoring in the 1080 to 1220 range had significantly higher doctoral grade point averages than did either the group which scored in the 790 to 970 range ($p = .0086$) or the group which scored in the 980 to 1070 range ($p = .0072$). No similar significance was discovered for the lower two ranges. The null hypothesis was rejected for the Graduate Record Examination composite scores.

6. No statistically significant difference was found between MAT scores and doctoral grade point average. Significance level was .6406. The null hypothesis was retained for this factor.
7. There was a highly significant difference between master's grade point average and doctoral grade point average. The significance level of .0003 resulted in execution of a t-test between cell means which revealed that individuals who had achieved a 4.0 master's grade point average attained significantly higher doctoral grade point averages than students earning grade point averages from 3.0 to 3.6 ($p = .0003$) or those earning grade point averages from 3.7 to 3.92 ($p = .0293$). No similar difference was found between the lower two ranges. The null hypothesis was rejected for master's grade point average.

8. There was no statistically significant difference between groups of individuals based on date of receipt of latest master's degree (1960-1971; 1972-1977; 1978-1980; or 1981-1987). The significance level of .5542 justified retention of the null hypothesis.

9. Finally, there was no statistically significant difference based on number of colleges attended. Significance level was .2421. The null hypothesis was retained.

Conclusions

Based on the findings of the study and subject to the limitations of the study, the following conclusions are submitted for consideration.
1. Findings of this study basically parallel the findings from most of the literature reviewed in this study. Determining which admissions factors can best predict success in doctoral programs remains an enigma.

2. Because four of the nine factors studied were statistically significant, perhaps progress in identifying the best combination of factors to predict success in graduate programs has been achieved.

3. Additionally, the results of this study support the premise that no single predictor is the answer to the admissions dilemma. Even the most widely used and probably least suspect of the predictors is the Graduate Record Examination. The executive program director for Graduate Record Examination, Charlotte Kuh, cautions institutions to use the tool prudently.

Recommendations

1. While admissions testing can serve a useful role in selecting students most likely to succeed in a given program, those tests must provide the most accurate prediction possible. To insure that accuracy, updating and redesigning of tests should be an ongoing effort. Even the Educational Testing Service reported in its 1988 report that groundwork has been laid to redesign the Graduate Record Examination, including formation of a technical advisory committee composed of psychometricians and people
experienced in the areas of graduate education and admissions (1).

2. Another recommendation is to restructure admissions tests to increase their effectiveness. For example, Graduate Record Examination staff members are exploring possibilities to increase the effectiveness of the Graduate Record Examination, including adding a test of writing ability and restructuring verbal and analytical questions so they relate more directly to specific fields (1).

3. With increasingly sophisticated computer capabilities, the recommendation to design individual admissions examinations becomes more feasible. In fact, the Graduate Record Examination Board is exploring possibilities of computerizing the examination to provide an individualized test for each student (1).

4. Although conducting a stepwise regression on the factors which proved to be significant predictors was not part of the design of this study, making such an analysis seems like a logical step in trying to determine the best combination of predictors of success in doctoral programs for vocational-technical education. One recommendation growing out of this study is to pursue that analysis.

5. The results of this study should be disseminated to admissions personnel to encourage pursuit of the best admissions model for each doctoral program.
6. The results of this study should also be provided in legislative arenas where decisions concerning appropriate and prudent use of testing and admissions criteria are closely associated with allocation of funding.

7. In light of these promising developments and the ongoing search for better admissions criteria, additional research is appropriate. Such research is particularly important as the nature of graduate education evolves and as the environment in which that education is delivered continues to change.
CHAPTER BIBLIOGRAPHY

APPENDIX A

PROPOSED BILLS FROM THE TEXAS LEGISLATURE
A BILL TO BE ENTITLED
AN ACT
relating to standardized tests used by public educational
institutions.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Title 2, Education Code, is amended by adding
Chapter 34 to read as follows:

CHAPTER 34. STANDARDIZED TESTS

Sec. 34.001. STATE POLICY. (a) This chapter may be cited
as the Fair Educational Testing Practices Act.

(b) The legislature recognizes the increasing importance of
standardized tests used in schools and colleges to determine a
student's educational objectives and to enroll, admit, and place
students. The legislature also recognizes the need to protect
students from unfair decisions based on inappropriate uses of
standardized test scores.

(c) It is the policy of the state to ensure equal
educational opportunity to every student with consideration for
the student's educational and cultural background. The legis-
lature recognizes the inordinate negative effect of standardized
tests on racial and ethnic groups in this state.

(d) The legislature declares that this Act is based on the
following policy assumptions:

(1) developers of standardized tests have an
obligation to inform users of the tests regarding the tests
scores' strengths and limitations, and users have a concomitant
obligation to use the test scores in the most appropriate manner;

(2) the purpose of any standardized test is to provide
information that, in combination with other information, assists in making better decisions, and

(3) test scores should be used in combination with other information in reaching educational decisions, and with full recognition of what the test can and cannot do.

Sec. 34.002. DEFINITIONS. As used in this chapter:

(1) "Educational agency" means any public educational institution, including:

(A) an elementary (grades 1-5), junior/middle (grades 6-8), or secondary (grades 9-12) school;

(B) a junior college;

(C) a senior college or university;

(D) the Central Education Agency;

(E) the Coordinating Board, Texas College and University System; and

(F) a business, nursing, professional, secretarial, technical, or vocational school.

(2) "Predictive validity" means the degree to which a test score is related to success in some future activity or task.

(3) "Reliability" means the consistency or stability of the test scores received by test subjects.

(4) "Standardized test" means a test in which the same test administration procedures and scoring are fixed and followed at different times and in different settings, resulting in a common measure of intellectual or academic accomplishment. The
term includes only those tests used for purposes of admission, placement, or advancement in an educational program or institution and does not include teacher-made tests or other assessment instruments used as a means of comparing performance of students only within a particular classroom or other assessment instruments used within a supplemental resource program. These provisions do not apply to any tests used to grant credit by examination for advanced standing or placement in any course of study or program including the advanced placement program or college-level examination program tests.

(5) "Test score" or "score" means the value given to a test subject's performance on a standardized test administered by a test agency, whether reported in numerical percentile or any other form.

(6) "Test score recipient" means any person, organization, association, corporation, educational institution, or governmental agency designated to receive a report of a test score by the test agency.

(7) "Test subject" or "subject" means an individual who takes a standardized test.

(8) "Validity" means the degree of accuracy with which a test measures what it is intended to measure. The validity of the same test may vary for different racial and ethnic groups of test subjects.

(9) "Racial and ethnic groups" means the five groups of students (American Indian, Asian, Black, Hispanic, and White).
that educational agencies in this state use for their testing and
data-gathering procedures.

(10) "Composite score" means an average of the scores
received by the test subject on the various sections of an
examination that consists of more than one section.

Sec. 34.003. TEST INFORMATION REQUIRED. (a) Any educational
agency that administers or requires standardized tests for
admission, enrollment, or placement of students in educational
programs or courses of study shall provide a clear, written
description, in nontechnical language of each standardized test
it administers or requires. The standardized tests must be
described as required in this section in the native language of
the student's parents only for grades 1 through 8 and only in
those languages for which a school district must offer a
bilingual or special language program under the Texas Education
Code, Section 21.453(c).

(b) The developer of a standardized test shall provide
sufficient information to the educational agency for use in
providing a description of the test.

(c) A copy of the appropriate description shall be provided
to each test subject, or in cases in which parental permission is
required before testing, to the test subject's parent or
guardian. The description shall be provided before the adminis-
tration of the test, if the test is used for placement purposes,
or with the general information about the institution provided to
the student or with the admission form signed by the student, if
the test is used for admission purposes.

(d) The description must contain the following information:

(1) the purposes for which the test is designed and intended to be used;

(2) information necessary to interpret the test score, including an explanation of the test, the standard error of measurement; and at the student's option, evidence of the validity of the test, including the relation between the test score and performance or aptitude;

(3) statements concerning the effects and uses of the test score, including:

(A) use of the test score by itself or with other information to predict future academic performance and the source of any other information used;

(B) the manner in which the test score will be used in making placement or admissions decisions, and the weight assigned to the standardized test score in the decision-making process;

(4) the minimum composite score index if used, and its derivation determined by the agency as acceptable for consideration for enrollment, admittance, or placement in an educational program, course of study, or institution; and

(5) the procedure to be followed by the test subject or parent/guardian to review under secure conditions a copy of the questions and answers used in calculating the test subject's raw score.
(e) If any of the information required by Subsection (d)'s (1), (2), or (3) of this section is provided regularly to the test subject by another agency before the administration of the test or before the time test scores are reported, that information need not be duplicated in an educational agency's description.

Sec. 34.004. PROHIBITED PRACTICES. (a) An educational agency may not:

1. base the determination of admission, placement, or enrollment in any course of study or program, or of a student's educational objectives, solely on a test score;

2. use test scores in ways that are not based on appropriate consideration of their validity or reliability;

3. establish a minimum cutoff or elimination test score as the sole criteria to deny enrollment or placement in a course of study or program. This prohibition does not preclude use of multiple criteria to establish the basis for enrollment or placement in a course of study or program;

4. use any question on a standardized test for which the correct answer rate of any two racial or ethnic groups differs by more than 15 percentage points;

5. use any question on a standardized test that fewer than 30 percent of all those taking the examination or fewer than 30 percent of any racial or ethnic group answer correctly;

6. base a test subject's failure on a standardized test solely on one section of an examination that consists of
more than one section;

(7) fail to train staff in the, limitations and appropriate uses of tests.

Sec. 34.00 PREENTRY INFORMATION. A student enrolling in a
course of study at a public educational institution shall be
advised of the relationship between test scores and success in a
course or program and shall be given information as to available
preparatory courses for each standardized test.

Sec. 34.006. PROCEDURE FOR VERIFICATION OF "SCORES. An
educational agency that administers any standardized test shall
develop written procedures outlining methods for verifying the
test scores of test subjects who question the accuracy of their
scores, and outlining methods for responding to the inquiries or
complaints of test subjects regarding questions or test adminis-
tration procedures. The test subject may make a request within
30 days after the results of the tests are made public and must
be supplied information not later than the 30th day after the
date on which the request is made.

SECTION 2. This act takes effect September 1, 1985.

SECTION 3. The importance of this legislation and the
crowded condition of the calendars in both houses create an
emergency and an imperative public necessity that the constitu-
tional rule requiring bills to be read on three several days in
each house be suspended, and this rule is hereby suspended.
A BILL TO BE ENTITLED

AN ACT

relating to standardized tests used by public educational institutions.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Title 2, Education Code, is amended by adding Chapter 34 to read as follows:

CHAPTER 34. STANDARDIZED TESTS

Sec. 34.001. STATE POLICY. (a) This chapter may be cited as the Fair Educational Testing Practices Act.

(b) The legislature recognizes the increasing importance of standardized tests used in schools and colleges to determine a student's educational objectives and to enroll, admit, and place students. The legislature also recognizes the need to protect students from unfair decisions based on inappropriate uses of standardized test scores.

(c) It is the policy of the state to ensure equal educational opportunity to every student with consideration for the student's educational and cultural background. The legislature recognizes the inordinate negative effect of standardized tests on racial and ethnic groups in this state.

(d) The legislature declares that this chapter is based on the following policy assumptions:

(1) Developers of standardized tests have an obligation to inform users of the tests regarding the test scores.
strengths and limitations, and users have a concomitant obligation
to use the test scores in the most appropriate manner;

(2) the purpose of any standardized test is to provide
information that, in combination with other information, assists in
making better decisions; and

(3) test scores should be used in combination with
other information in reaching educational decisions, and with full
recognition of what the test can and cannot do.

Sec. 34.002. DEFINITIONS. As used in this chapter:

(1) "Composite score" means an average of the scores
received by the test subject on the various sections of an
examination that consists of more than one section.

(2) "Educational agency" means any public educational
institution, including:

(A) a public school;

(B) a junior college;

(C) a senior college or university;

(D) the Central Education Agency;

(E) the Coordinating Board, Texas College and
University System; and

(F) a business, nursing, professional,
secretarial, technical, or vocational school.

(3) "Predictive validity" means the degree to which a
test score is related to success in some future activity or task.

(4) "Racial and ethnic groups" means the five groups
of students (American Indian, Asian, black, Hispanic, and white)
that educational agencies in this state use for their testing.
data-gathering procedures.

(5) "Reliability" means the consistency or stability of the test scores received by test subjects.

(6) "Standardized test" means a test in which precisely the same test administration procedures and scoring are fixed and followed at different times and in different settings, resulting in a common measure of intellectual or academic accomplishment. The term includes only those tests used for purposes of admission, placement, or advancement in an educational program or institution and does not include teacher-made tests or other assessment instruments used as a means of comparing performance of students only within a particular classroom or other assessment instruments used within a supplemental resource program.

(7) "Test score" or "score" means the value given to a test subject's performance on a standardized test administered by a test agency, whether reported in numerical percentiles or any other form.

(8) "Test score recipient" means any person, organization, association, corporation, educational institution, or governmental agency designated to receive a report of a test score by the test agency.

(9) "Test subject" or "subject" means an individual who takes a standardized test.

(10) "Validity" means the degree of accuracy with which a test measures what it is intended to measure. The validity of the same test may vary for different racial and ethnic groups of test subjects.
Sec. 34.003. APPLICATION. The provisions of this chapter apply to standardized tests but do not apply to any tests used to grant credit by examination for advanced standing or placement in any course of study or program, including the advanced placement program or college-level examination program tests.

Sec. 34.004. TEST INFORMATION REQUIRED. (a) Any educational agency that administers or requires standardized tests for admission, enrollment, or placement of students in educational programs or courses of study shall provide a clear, written description, in nontechnical language, of each standardized test it administers or requires.

(b) For grades 1 through 8 only, the standardized tests must be described as required by this section in the native language of the student's parents. This subsection applies only if the native language of the student's parents is one of the languages for which a school district must offer a bilingual or special language program under this code.

(c) The developer of a standardized test shall provide sufficient information to the educational agency for use in providing a description of the test.

(d) A copy of the appropriate description shall be provided to each test subject, or, in cases in which parental permission is required before testing, to the test subject's parent or guardian. The description shall be provided before the administration of the test, if the test is used for placement purposes, or with the general information about the admitting institution provided to the student or with the test admission form signed by the student.
the test is used for admission purposes.

(e) The description must contain the following information:

(1) the purposes for which the test is designed and intended to be used;

(2) information necessary to interpret the test score, including an explanation of the test, the standard error of measurement, and, at the student's option, evidence of the validity of the test, including the relation between the test score and performance or aptitude;

(3) statements concerning the effects and uses of the test score, including:

(A) use of the test score alone or with other information to predict future academic performance and the source of any other information used; and

(B) the manner in which the test score will be used in making placement or admissions decisions, and the weight assigned to the standardized test score in the decision-making process;

(4) the minimum composite score index, if used, and its derivation determined by the educational agency as acceptable for consideration for enrollment, admittance, or placement in an educational program, course of study, or institution; and

(5) the procedure to be followed by the test subject or the test subject's parent or guardian to review under secure conditions a copy of the questions and answers used in calculating the test subject's raw score.

(f) If any of the information required by Subsection (d)(1),
Sec. 34.005. PROHIBITED PRACTICES. (a) An educational agency may not:

(1) base the determination of admission, placement, or enrollment in any course of study or program, or of a student's educational objectives, solely on a test score;

(2) use test scores in ways that are not based on appropriate consideration of their validity or reliability;

(3) establish a minimum cutoff or elimination test score as the sole criterion to deny enrollment or placement in a course of study or program;

(4) use any question on a standardized test for which the correct answer rate of any two racial or ethnic groups differs by more than 15 percentage points;

(5) use any question on a standardized test that fewer than 30 percent of all those taking the examination or fewer than 30 percent of any racial or ethnic group answer correctly;

(6) base a test subject's failure on a standardized test solely on one section of an examination that consists of more than one section; or

(7) fail to train staff concerning the limitations and appropriate uses of standardized tests.

(b) Subsection (a)(3) of this section does not preclude the...
use of multiple criteria to establish the bases for enrollment or
placement in a course of study or program.

Sec. 34.006. PREENTRY INFORMATION. A student enrolling in a
course of study at a public educational institution shall be
advised of the relationship between test scores and success in a
course or program and shall be given information about available
preparatory courses for each standardized test.

Sec. 34.007. PROCEDURE FOR VERIFICATION OF SCORES. An
educational agency that administers any standardized test shall
develop written procedures outlining methods for verifying the test
scores of test subjects who question the accuracy of their scores
and outlining methods for responding to the inquiries or complaints
of test subjects regarding questions or test administration
procedures. The test subject may make a request for information
about test results within 30 days after the results of the tests
are made public and shall be supplied information not later than
the 30th day after the date on which the request is made.

SECTION 2. This Act takes effect September 1, 1987.

SECTION 3. The importance of this legislation and the
crowded condition of the calendars in both houses create an
emergency and an imperative public necessity that the
constitutional rule requiring bills to be read on three several
days in each house be suspended, and this rule is hereby suspended.
A BILL TO BE ENTITLED

AN ACT

relating to the testing of and remedial education opportunities for students at public institutions of higher education.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Subchapter F, Chapter 51, Education Code, is amended by adding Section 51.306 to read as follows:

Sec. 51.306. TESTING AND REMEDIAL COURSEWORK. (a) In this section, "coordinating board" and "institution of higher education" have the meanings assigned by Section 61.003 of this code.

(b) Each student enrolling for the first time in an undergraduate degree program at an institution of higher education must be tested by the institution for reading, writing, and mathematics skills. For that purpose, the institution shall use a test instrument prescribed by the coordinating board. The same instrument shall be used at all institutions of higher education.

(c) The test instrument adopted by the coordinating board must be designed to provide a comparison of the skill level of the individual student with the skill level necessary for a student to perform effectively in an undergraduate degree program. In developing the test, the board shall consider the recommendations of faculty from various institutions of higher education.

(d) An institution may not use performance on the test as a condition of admission into a degree program of the institution.

(e) The coordinating board shall prescribe minimum
performance standards for the test instrument. An institution must refer to remedial courses a student whose performance is below the standard for a tested skill. An institution may adopt a higher standard for remedial course referrals.

(f) If the test results indicate that remedial education is necessary in any area tested, the institution shall refer the student to remedial courses offered by the institution. Each institution shall offer those courses on the same campus at which the student would otherwise attend classes. The courses may not be considered as credit towards completion of degree requirements.

(g) A student whose test results indicate a need for remedial courses shall be retested at an appropriate time and may not enroll in upper division courses in any area until the student has been shown to have the skill levels necessary to perform effectively in an undergraduate degree program.

(h) Each institution shall establish an advising program to advise students at every level of courses and degree options that are appropriate for the individual student.

(i) Each institution shall report annually to the coordinating board, on or before a date set by rule of the board, concerning the results of the students being tested and the effectiveness of the institution's remedial program and advising program.

SECTION 2. The test required by this Act shall be administered to students beginning with those students entering institutions of higher education for the first time for the fall semester 1989.
SECTION 3. The importance of this legislation and the crowded condition of the calendars in both houses create an emergency and an imperative public necessity that the constitutional rule requiring bills to be read on three several days in each house be suspended, and this rule is hereby suspended, and that this Act take effect and be in force from and after its passage, and it is so enacted.
APPENDIX B

PRESENTATION BY DR. FRED DIETRICH

TO THE TEXAS SELECT COMMITTEE ON HIGHER EDUCATION
REMARKS TO THE TEXAS SELECT COMMITTEE
ON HIGHER EDUCATION

Fred Dietrich             March 13, 1986

Thank you, Mr. Chairman and members of the Select Committee, for inviting me to participate in this meeting.

Although I can't even begin to bring you the experience and wisdom of a President Norman Francis, who is a former chairman of the College Board Trustees, I am very pleased and honored to be here and be able to discuss with you issues so important to higher education in Texas and the nation.

I bring greetings from President George Hanford and others at the College Board. The Board is a membership association with 120 school and college members from this state. Dr. Ashworth, your Commissioner, knows and serves the Board well, currently as Chairperson of the Advisory Committee to our Washington D.C. office.

The College Board has a long history of cooperative involvement in educational matters in this state and others. One of our most important long-term organizational efforts has been on facilitating access to higher education. Examples of activities in this area include: the Options for Excellence project in San Antonio; involvement in a similar, new activity in Dallas; provision of guidance and college information materials for students and parents; and allocations of fee waivers to the needy for all major testing activities.
There is a recent and rapidly growing interest in more systematically assessing the abilities and progress of students at the collegiate level.

This increasing attention to academic assessment in higher education follows, and seems to be a natural shifting from, the considerable focus over the last five years or so on student learning in elementary and secondary schools. This newer trend seems derived from the convergence of several concerns — declining abilities associated with students entering and receiving degrees from both two year and four year colleges, large and increasing rates of attrition among college students, and the general call for accountability by public officials and others, especially in light of the large public expenditures committed to higher education.

Such assessment in higher education is typically administered on three occasions during a student's collegiate years:

1. at entry, to assist with course placement and remediation decisions, and as a baseline for later "value added" analysis;

2. at midpoint, or "rising junior" level, for entry to upper division, for transfer from a two- or four-year institution, and for final determination of major or program of study; and

3. at graduation, for establishing a minimum standard for receipt of a baccalaureate degree and for completing the "value added" calculation initiated at entry.
At each of these points, different types of learning can be assessed including: basic competencies in reading, writing and mathematics; cognitive development or higher order thinking and reasoning skills; general education; and knowledge in specific subject matter fields.

It is the entry level that the widest spectrum of assessment instruments exists. At the College Board, for instance, we offer the Scholastic Aptitude Test (SAT), an assessment of higher order verbal and mathematical reasoning skills; Achievement Tests in 13 subjects; the Degrees of Reading Power, which measures the difficulty of prose a student can handle; the Multiple Assessment Programs and Services (MAPS), composed of a large number of tests including the verbal and mathematical components of the New Jersey College Basic Skills Placement Test (NJCBSPT), about which I'll say a little more in a minute, as well as instruments to assess ability in English as a second language. We have recently developed batteries of MAPS tests to meet the differing needs of entering students in Florida, Tennessee, and at the California community colleges. We would be pleased to work with educators from Texas in tailoring a battery for your needs, if you are interested in that approach. These instruments assist colleges in determining whether entering students should be placed in regular, remedial, or advanced courses, with the need for remediation normally identified through skills or competency testing and advanced placement usually made on the basis of performance on subject matter achievement tests.

Among the College Board’s earlier higher education assessment activities at the state level has been its co-sponsorship with Educational Testing Service (ETS) of the New Jersey College Basic Skills Placement Test. In 1978 the New
Jersey Department of Higher Education began its assessment of the Reading, Writing, Computation and Elementary Algebra basic skills of the approximately fifty thousand freshmen already admitted to and planning to enter New Jersey's thirty public universities and colleges each year. The results of this annual entry-level assessment have identified from 31% (in verbal skills) to 60% (in Algebra) of entering freshmen who need and receive remedial courses in the basic skills at the colleges they enter. Of particular importance is the effectiveness of this program that combines testing and remediation. By following the cohort of students who entered the state's public institutions in the fall of 1982 for four semesters the Department found that skills-deficient students completing the appropriate remedial course sequence have an almost three times greater chance for college success than those students who need but do not complete remediation, and those students completing remediation have retention rates as high as (actually, a little higher than) those students who did not need remediation. Early identification of high-risk students and their specific needs, in combination with the provision of remedial services and proper placement, substantially improve students' chances of academic success, and thereby serve to reduce dropout rates.

Accordingly, College Board efforts to develop new assessment tools at the college entry level continue, specifically in the form of a joint venture with ETS which applies advanced computer technology to the assessment process. Two products of that venture, a Computerized Adaptive Test in college basic skills and a Diagnostic Testing Project, have strong instructional components and are suitable for use at the college entry level. These new tests rapidly tailor questions during an actual test administration to focus in on an individual student's ability level, permit immediate reporting of test results, and
provide descriptions of the student's strengths and weaknesses to assist in the instructional process.

There are then a variety of assessment instruments available at the college entry level...instruments which measure either basic academic competencies or subject matter knowledge, can be used to place students in appropriate courses...remedial, regular, or advanced...and which can provide a baseline for "value-added analysis." These analyses are important if "accountability" is taken to mean how much a student learns during the course of his or her higher education.

Quite a different mix of instruments is currently available for use at the "rising junior" level after two years of college. Used to qualify for entry to upper division work or as a basis for transfer from a two-year to a four-year institution, these instruments are focused more on general education and specific subject matter knowledge and less on academic skills or competencies. The College-Level Examination Program (CLEP) of the College Board with 42 subject-matter specific examinations in 37 subjects, plus general examinations in the Humanities, English Composition, Mathematics, Natural Sciences, and Social Sciences and History offers such examinations. Southwest Texas State University has recently adopted the CLEP English Composition Test and the College Algebra Exam as the basic skills tests to be passed by all college sophomores before they can begin junior year courses.

Recognizing the growing interest on the part of institutions in the further development of instruments for use at the end of what is in effect the fourteenth grade, the College Board is currently exploring other ways to respond. For example, we are working with the Maryland Board of Higher
Education in developing a plan for the short term implementation of the end-of-sophomore-year academic outcomes assessment process. This initiative, including standardized tests in basic and higher order skills, local tests, and questionnaires and surveys, will allow an individual institution to address its special educational needs, over time.

To summarize, at the "rising junior" level, there are a number of subject matter assessment instruments available and more are in the works.

At the exit, graduation, or baccalaureate level quite a different set of examinations is available, most of them, however, in the form of entrance examinations to the graduate level or to the professions. I am speaking here of such instruments as the Graduate Record Examination, the Graduate Management Admissions Tests, the Law School Admissions Test, the National Teacher Examination, the Medical College Admissions Test, licensure tests for nursing or engineering, and so on. Student performances on these tests are sometimes misused to evaluate the quality of undergraduate programs just as SAT scores are sometimes misused to evaluate the quality of secondary schools. To the best of my knowledge, there are no examinations specifically designed to assess what has happened to the basic academic competencies of college graduates during their undergraduate years...their abilities to communicate, deal with numbers, and reason. Nor is there any ready-made way to assess what value has been added in terms of subject matter knowledge because the exit (or entrance to graduate study) examinations are not tied directly to the assessment instruments at the point of entry.

Here at the graduation level the problem of assessment of undergraduate student learning begins to get really complicated. First of all, there is the
confusion between assessment of individuals and assessment of institutions. (The assessment instruments I have mentioned thus far are ones designed for use with individuals.) And second, there is the confusion between competencies and knowledge.

But whether one is trying to assess institutions or students, competencies or knowledge, the complexity exists. Most students don't study, say, anthropology, in secondary school. But some do in college. How does one determine what is the right amount of anthropological value to be added...for a student who takes one course in it, or one who majors in it...and how does one compare the value added in anthropology to that added in engineering or in Russian or in nursing? My own sense is that these are not the questions that those who want to see greater accountability in higher education are asking. Instead they are responding to complaints of employers who have to teach college graduates how to read, or liberal arts graduate professors who inherit bachelor's degree holders who can't write, or graduate engineering faculties facing students underprepared in math. They are interested in both competencies and knowledge.

It is in the midst of this complexity that I perceive two real dangers. First, the current national interest in reforming higher education comes in the aftermath of far-ranging efforts at the elementary and secondary school levels. The danger is that policy makers will apply the same set of principles and practices to higher education reform as they have adopted for primary and secondary education. The purposes of school and college education differ dramatically. Secondary education is common and compulsory. Higher education is diverse and by choice. The failure to recognize this difference could, by forcing colleges and universities into a more common academic mold,
have the effect of eroding one of the major strengths and globally unique aspects of American higher education...its diversity. Second, there is the danger of overreliance on test scores. For instance, they should not be used as the only criterion for deciding whether a student should graduate or be admitted to upper division study, any more than SAT scores should be used alone in deciding which students should be admitted to college. There are other measures of academic success and promise, particularly courses taken and grades. And, there are many desirable, non-academic outcomes of higher education that are not subject to scientific measurement.

Assessment, wisely conceived and sensitively used, can help to achieve meaningful reform in higher education. But assessment, poorly conceived and grossly used without regard for the fundamental nature of higher education, could undermine its foundations and ultimately lead to disaster.

Given the complexities that arise from the diversity of the higher education enterprise and the variety of subjects available for study, it is our judgment that the role of test sponsors like the College Board should be to develop a comprehensive set of assessment instruments...a menu, if you will, from which individual colleges and universities...and individual higher education state systems...can choose and then use to demonstrate to the public and to public authority, each in its own way, that value is being added, that they are being accountable, and that the public is getting its money's worth.

"What is the effect of college-level assessment on underserved students?" The question is often asked at least in part in response to the erroneous charge that standardized tests like the SAT are biased against minority students.

Let me say at the outset that it is not the test that is biased but an
educational system that fails adequately to prepare students for college study.

Having made that assertion I would also say that the major challenge facing higher education is to insure access for as many students as possible, including those who may have deficiencies in their precollege education, and at the same time maintain standards of academic excellence. I believe it can be done. The San Antonio Options for Excellence project supports this belief. Within that activity, minority youngsters are given early academic counseling, strong subject matter programs and encouragement to aspire to a college education, and they are succeeding. Large and growing numbers of such bright high school students are enriching accelerating their school programs and then taking and passing Advanced Placement Exams covering college level work while they're still in high school.

Recently the College Board Advisory Panel on Minority Concerns discussed the question of the effects of testing on minorities at the collegiate level and urged the College Board to venture cautiously in broadening availability of college-level assessment tools. The panel, consisting of educators and educational administrators from schools and colleges across the country, endorsed and encouraged the continuing use of placement and diagnostic tests in college but expressed concern over the effects of "rising junior" and "college exit" tests on minority students. What they were saying is that assessment imposed at the midpoint or at exit without attention to...and remediation of...the deficiencies noted in assessment at entry would be unfair. Because underserved minority students suffer disproportionately from inadequate secondary schooling, the imposition of such tests without needed special services would have a disproportionately harmful effect on their opportunities for higher education.
A final word: Keep in mind that there is no single instrument available to assess effectively academic achievement across all institutions. There is a need for a variety of assessment tools appropriate to difference institutions with different missions, student bodies and academic standards.

Thank you again for the opportunity to meet with you.

I would be pleased to respond to your questions.
APPENDIX C

SURVEY INSTRUMENT FOR PILOT STUDY
Survey Questionnaire

Subject of Study: The relationship between the Graduate Record Examination (GRE) scores and/or other admission standards and success or failure (graduation) in doctoral level programs in occupational and vocational education graduate schools.

Institutions Invited to Participate: All occupational and vocational education graduate schools in the United States offering a doctoral degree.

Population Samples Required: Data from at least 20 doctoral candidates in occupational and vocational education graduate schools who were admitted during the 1980-85 time frame. Please use a random selection technique so that the sample will be representative of the population. Also, please indicate whether each individual sampled is a graduate, non-graduate, or still actively pursuing the program.

Point of Contact: Please provide the name and phone number of your point of contact if additional information/explanation is required.

I. Degree Offerings

What doctoral degrees are offered in area of vocational education?

A. Doctor of Philosophy in Education with Vocational Education area concentration?  Yes___ No____

B. Doctor of Philosophy in Vocational Education with area concentrations?  Yes___ No____

C. Doctor of Education with Vocational Education area concentration?  Yes___ No____

D. Doctor of Education in Vocational Education with area concentrations?  Yes___ No____
E. Doctor of Philosophy in specific vocational area (i.e., agriculture, homemaking, etc.) If yes, list as such.  

   Yes    No

F. Doctor of Education in specific vocational area (i.e., agriculture, homemaking, etc.) If yes, please list as such.  

   Yes    No

G. Doctoral degree level other than listed? Please specify.  

   Yes    No

II. SELECTION AND ADMISSION

A. Selection of vocational graduate students.

1. Are evaluative instruments used in selection of students?  
   If yes, please answer the questions below.  

   a. Miller Analogies  
      (1) Local norms  
      (2) Cutting score  
      If yes, what is the cutting score?  

   b. Graduate Record Examination  
      (1) Local norms  
      (2) Cutting score  
      If yes, what is the cutting score?  

   (3) All of the Graduate Record Examination  
   (4) Part of the Graduate Record Examination  

   Yes    No
c. Other evaluative instruments used in the selection of vocational graduate students.

(1) ________________________________

(2) ________________________________

(3) ________________________________

(4) ________________________________

2. What other factors are considered in the selection of vocational graduate students?

a. Past academic performance

   Yes___ No___

   (1) General grade point average of past academic performance (2.5, 3.0, etc.)

   Yes___ No___

   (2) Is a specific grade point average required?

   Yes___ No___

   If so, what average is required?

   ________________________________

b. Personal Interview

   Yes___ No___

   (1) Number of staff included

   ________________________________

   (2) Power of intervening agent (committee or some designated individual) to make decisions or recommendations?

   ________________________________

c. Recommendation of previous instructors, department heads, deans, etc.

   ________________________________

d. Schools attended for undergraduate studies

   Yes___ No___

   If yes, please explain how this information is weighed.

   ________________________________

e. Is teaching in the field considered desirable?

   Yes___ No___
f. Is teaching in the field required? Yes___ No__
   How many years?___________________________________________

g. Is work experience considered desirable? Yes___ No__
h. Is work experience required? Yes___ No__
   How many years?___________________________________________

B. What are the specific facts concerning admissions of students in the advanced vocational graduate program?

1. Number of students admitted between 1975-85 ____________________________

2. Number of students admitted to the program between 1975-85, but who failed to be admitted to candidacy ____________________________

3. When is the student admitted?
   a. At the completion of the master's degree program? Yes___ No__
   b. At the completion of a specific number of hours beyond the baccalaureate degree? Yes___ No__
   c. Other (requirements) ____________________________

4. Re-admission. After a specific period of time has elapsed without course work, is it necessary for the student to apply for re-admission? Yes___ No__

5. Status of student upon admission
   a. Regular Yes___ No__
   b. Provisional Yes___ No__
   c. Other ____________________________

6. Does your institution practice the issuance of waivers to the GRE or other admission standards? Yes___ No__

   If yes, please specify the conditions for waiver and so indicate in the "Remarks" column of the questionnaire for any individual in the sample who was admitted under waiver.
APPENDIX D

LIST OF COLLEGES AND UNIVERSITIES WHICH HAVE
OCCUPATIONAL AND VOCATIONAL EDUCATION
GRADUATE SCHOOLS
COLLEGES AND UNIVERSITIES WHICH HAVE
OCCUPATIONAL AND VOCATIONAL EDUCATION GRADUATE SCHOOLS

Auburn University, Auburn, Alabama
University of Arkansas, Fayetteville, Arkansas
Colorado State University, Fort Collins, Colorado
University of Northern Colorado, Greeley, Colorado
University of Florida, Gainesville, Florida
Georgia State University, Atlanta, Georgia
University of Georgia, Athens, Georgia
Southern Illinois University, Carbondale, Illinois
University of Illinois, Urbana, Illinois
Indiana State University, Terre Haute, Indiana
Purdue University, Lafayette, Indiana
Iowa State University, Ames, Iowa
Kansas State University, Manhattan, Kansas
University of Kentucky, Lexington, Kentucky
University of Maryland, College Park, Maryland
Western Michigan University, Kalamazoo, Michigan
Mississippi State University, Mississippi State, Mississippi
University of Missouri, Columbia, Missouri
Rutgers University, New Brunswick, New Jersey
University of New Mexico, Albuquerque, New Mexico
Kent State University, Kent, Ohio
Ohio State University, Columbus, Ohio
University of Akron, Akron, Ohio
Oklahoma State University, Stillwater, Oklahoma
Oregon State University, Corvallis, Oregon
Temple University, Philadelphia, Pennsylvania
University of Pittsburgh, Pittsburgh, Pennsylvania
University of Tennessee, Knoxville, Tennessee
North Texas State University, Denton, Texas
Texas A & M University, College Station, Texas
Texas Woman's University, Denton, Texas
Washington State University, Pullman, Washington
University of Wisconsin, Madison, Wisconsin
University of Wyoming, Laramie, Wyoming
APPENDIX E

SURVEY INSTRUMENT FOR STUDY
Subject of Study: The relationship between the Graduate Record Examination (GRE) scores and other admission standards and success or failure (graduation) in doctoral level programs in occupational and vocational education graduate schools.

Institutions Invited to Participate: Selected occupational and vocational education graduate schools in Texas and Oklahoma offering a doctoral degree.

Population Samples Required: Data from at least 20 doctoral candidates in occupational and vocational education graduate schools who were admitted during the 1980-88 time frame. Please use a random selection technique so that the sample will be representative of the population. Also, please indicate whether each individual sampled is a graduate, non-graduate, or still actively pursuing the program.

Point of Contact: Please provide the name and phone number of your point of contact if additional information/explanation is required.

I. DEGREE OFFERINGS

What doctoral degrees are offered in area of vocational education?

A. Doctor of Philosophy in Education with Vocational Education area concentration? 
   Yes___ No___

B. Doctor of Philosophy in Vocational Education with area concentrations? 
   Yes___ No___

C. Doctor of Education with Vocational Education area concentration? 
   Yes___ No___

D. Doctor of Education in Vocational Education with area concentrations? 
   Yes___ No___
E. Doctor of Philosophy in specific vocational area (i.e., agriculture, homemaking, etc.) If yes, list as such.

Yes___ No___

F. Doctor of Education in specific vocational area (i.e., agriculture, homemaking, etc.) If yes, please list as such.

Yes___ No___

G. Doctoral degree level other than listed? Please specify.

Yes___ No___

II. SELECTION AND ADMISSION

A. Selection of vocational graduate students.

1. Are evaluative instruments used in selection of students? If yes, please answer the questions below.

   a. Miller Analogies
      (1) Local norms
      (2) Cutting score
          If yes, what is the cutting score?

         Yes___ No___

   b. Graduate Record Examination
      (1) Local norms
      (2) Cutting score
          If yes, what is the cutting score?

         Yes___ No___

         (3) All of the Graduate Record Examination
             Yes___ No___

         (4) Part of the Graduate Record Examination
             Yes___ No___
c. Other evaluative instruments used in the selection of vocational graduate students.

(1) 

(2) 

(3) 

(4) 

2. What other factors are considered in the selection of vocational graduate students?

a. Past academic performance 

   (1) General grade point average of past academic performance (2.5, 3.0, etc.) 

   (2) Is a specific grade point average required?

   If so, what average is required?

b. Personal Interview 

   (1) Number of staff included

   (2) Power of intervening agent (committee or some designated individual) to make decisions or recommendations?

c. Recommendation of previous instructors, department heads, deans, etc.

d. Schools attended for undergraduate studies 

   If yes, please explain how this information is weighed.

e. Is teaching in the field considered desirable?
f. Is teaching in the field required?  Yes____ No____
   How many years?__________________________________________

g. Is work experience considered desirable? Yes____ No____

h. Is work experience required? Yes____ No____
   How many years?__________________________________________

B. What are the specific facts concerning admissions of students in the advanced vocational graduate program?

1. Number of students admitted between 1970-80 ________________________________

2. Number of students admitted to the program between 1970-80, but who failed to be admitted to candidacy ________________________________

3. When is the student admitted?
   a. At the completion of the master's degree program? Yes____ No____
   b. At the completion of a specific number of hours beyond the baccalaureate degree? Yes____ No____
   c. Other (requirements) ____________________________________________

4. Re-admission. After a specific period of time has elapsed without course work, is it necessary for the student to apply for re-admission? Yes____ No____

5. Status of student upon admission
   a. Regular Yes____ No____
   b. Provisional Yes____ No____
   c. Other ______________________________________________________

6. Does your institution practice the issuance of waivers to the GRE or other admission standards? Yes____ No____
   If yes, please specify the conditions for waiver and so indicate in the "Remarks" column of the questionnaire for any individual in the sample who was admitted under waiver.
APPENDIX F

TABLES OF RAW DATA
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