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Michigan State University PH.D. 1985

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THE PREDICTION OF FOREIGN GRADUATE STUDENTS' ACADEMIC ACHIEVEMENT AT MICHIGAN STATE UNIVERSITY

By

Ali Saeed Aseeri

A DISSERTATION

Submitted to
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ABSTRACT

THE PREDICTION OF FOREIGN GRADUATE STUDENTS' ACADEMIC ACHIEVEMENT AT MICHIGAN STATE UNIVERSITY

By

Ali Saeed Aseeri

The main purpose of this study was to determine the extent to which the foreign student index of previous academic achievement (IPAA), average of their English scores on the MSU English Test (MSU-AETS), GPA 1-term, and demographic information can predict their graduate academic success in MSU graduate schools, as measured by GPAs, academic credit load, and advisor's rating of the doctoral student's academic competence. To maintain adequate control over the sources of heterogeneity of the foreign student population, the study sample included all foreign graduate students enrolled in MSU graduate schools between fall term 1978 and spring term 1982 who had completed at least 12 credits (N = 1,103).

The principal statistical techniques used were zero-order correlation, rank-order correlation, stepwise multiple regression, t-test, and one-way ANOVA, followed by post-hoc comparison analysis (Tukey procedure) when F was significant.

Although the predictors differed with respect to the magnitude of their validity coefficient for the various groups, the overall

findings suggested that the prediction of foreign graduate students' academic success is possible from the available preadmission data. Based on the findings of the various analyses, the following conclusions were drawn: (1) MSU-AETS was a good predictor of foreign students' academic success, particularly of those students from non-English-speaking countries; (2) IPAA appeared to exhibit an encouraging sign as a predictor of foreign students' academic success as measured by GPA; (3) GPA 1-term was the best single predictor that yielded a consistent validity coefficient with all the defined criterion measures; (4) GPA 1-term, MSU-AETS, and college type were the best predictors of foreign students' academic achievement, as measured by GPA; (5)P accurate prediction of foreign graduate students' academic success should result from separate validation on a homogeneous group rather than validation on a heterogeneous group.

On the basis of the findings, conclusions, and discussion, a two-stage selection model was recommended for use in judging the admissibility of foreign graduate students into MSU graduate schools. Further recommendations included a detailed description of how the model can be used and how it can be evaluated objectively.

DEDICATION

To the memory of my father,

SAEED ASEERI,

for his love, guidance, and
the sincere effort he devoted to the cause of
his children's education.
May his soul rest in peace.

To the memory of my former advisor,

ROBERT EBEL,

for the rich academic experience I had with him
throughout my graduate program at
Michigan State University.
Dr. Ebel was an excellent instructor,
a productive scholar in his field,
and, above all, a modest, humble human being.

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Completion of this dissertation would have been impossible without the interest and direct participation of a number of individuals to whom I owe everlasting gratitude. Sincere appreciation is extended to everyone who has worked in connection with this project. In particular, I would like to acknowledge the efforts of:

My academic advisor and the chairman of my dissertation committee, Dr. William Mehrens, for his valuable suggestions, unique insights, wisdom, and leadership skill in securing an agreement for the release of the data needed for this study.

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My mother; my brothers Mohammed, Morazen, and Solomon; and my sisters for their patience, tolerance, sacrifices, and constant encouragement, which made the pursuit of the Ph.D. degree possible.

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Last, I wish to acknowledge with gratitude the contribution of my wife, Badreah. Her constant encouragement and willing assistance made this study a family accomplishment. Mere words are inadequate to express a fitting tribute to the moral support she has given me during all of these years of schooling.

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LIST OF ABBREVIATIONS

AACRAO	The American Association of Collegiate Registrars and Admission Officers
ACT	The American College Testing Program
ALIGU	The English proficiency test of the American Language Institute at Georgetown University
CGPA	Cumulative grade point average
GGPA	Graduate grade point average
GMAT	Graduate Management Admission Test
GPA	Grade point average
GRE	Graduate Record Examination
GRE-A	Graduate Record Examination (Advanced)
GRE-Q	Graduate Record Examination (Quantitative)
GRE-V	Graduate Record Examination (Verbal)
IPAA	Converted previous academic standing
MAT	Miller Analogy Test
MSU-AETS	The average of the MSU-English subtests (grammar, vocabulary, listening, reading, and writing)
MTELP	Michigan Test of English Language Proficiency
pAA	Actual previous academic achievement reported on a scale from 1-100
ROAC-A	Rating of overall academic competence compared to American students
ROAC-F	Rating of overall academic competence compared to foreign students

SAT	Scholastic Aptitude Test
SAT-Q	Scholastic Aptitude Test--Quantitative
TOFEL	Test of English as a Foreign Language
TRA-A	Total rating compared to American students
TRC	Total rating compared to foreign students
UGPA	Undergraduate grade point average

CHAPTER I

INTRODUCTION AND BACKGROUND OF THE STUDY

Background

Selection and placement of students in a particular program is the major problematic issue encountered by admission decision makers. As they attempt to make a rational decision, admission decision makers subject the student's records to an extensive evaluation. Normally, such an evaluation is based on a number of criteria against which the student's academic potential can be judged or predicted.

Basically, the student's future academic success can be judged in two ways. Some decision makers make such judgments actuarially. They combine preadmission data according to known formulas and tables developed from the findings of sound research. In contrast, other decision makers approach such judgments clinically. They rely heavily on intuition, beliefs, and subjective judgments as they attempt to estimate the probability of a student's academic success in a particular program. Once the decision maker processes the preadmission data through either of the two aforementioned approaches and makes a judgment about the student's future acdemic potential, he then decides to admit some students and to reject others. The degree to which the final decision is correct depends largely on the types of selection devices (criteria) employed, techniques by which the data on these

criteria were interpreted, and the decision rule used to make such decisions.

Decision committees at particular institutions may use different criteria and strategies to arrive at a particular decision. Deciding which of the available decision policies will maximize the institution's desired benefits requires well-designed evaluative research. For an institution to ensure that its admission program is functioning properly, the whole program must be subjected to an extensive evaluation. Such an evaluation must be concerned with examining the effectiveness of the preadmission data in terms of their validity, relevance, and fairness to the decision situation for which they will be used. Also, the evaluation must consider the adequacy of the strategies employed to process the preadmission data, and formulate rules for making the final decision.

Evaluating the accuracy and adequacy of decision-making programs for a particular situation has been and will continue to be a subject of continuing interest in the fields of education and psychology. As higher education programs grew, decision makers in these fields began to encounter various decision problems for which they lacked adequate data to make rational decisions. Therefore, measurement specialists produced a vast number of tests and scales to gather the necessary information for making a rational decision. For example, as the number of students seeking graduate education increased, admission decision makers were placed in a position of needing accurate indicators of graduate academic success. Consequently, several

assessment techniques for graduate success were developed to meet their immediate needs.

As admission decision makers attempted to use the aforementioned devices to help them make rational decisions about who should enter graduate school, they were faced with the following questions: Which of the available selection devices should be used? How can one evaluate the benefits to be gained from using a particular selection device? The pressing need to answer these questions opened the doors wide for sound research. As a result, various independent researchers, research centers, and doctoral students have evaluated the value of particular selection devices for specific decision situations.

During the first half of the twentieth century, evaluation researchers focused on estimating the predictive validity of a selection device as it related to a well-defined criterion. The resultant validity coefficient was used as an index of benefits to be gained from using a particular selection device to make a certain decision. The popularity of prediction research was enhanced by two factors: (1) admission decision makers' awareness of the validity of the selection devices they used to screen students for a particular program and (2) test constructors' desire to convince decision makers of the benefits to be gained from using a particular selection device.

The available evidence suggests that using a validity coefficient as an index of a selection device's worth was found to be very effective in improving selection programs. As research techniques in this field advanced, several other techniques emerged to compensate for

the deficiencies inherent in the classical validity approach as a tool for evaluating the worth of selection devices. Tyler and Russell's (1939) and Brogden's (1946) approaches suggested a number of parameters of the decision situation that were thought to be important for determining the overall value of selection techniques.

During the 1960s, Cronbach and Glaser (1965) introduced decision theory as a complete framework that takes into account all factors that determine the net benefit to be gained from using a particular selection instrument for making a rational decision. In addition to the psychometric parameters of the selection device (measurement accuracy and prediction efficiency), decision theory recognizes the importance of selection ratio, base rate, standard deviation of criterion distribution, and cost of obtaining selection-device information as necessary factors that should be considered when evaluating the contribution of selection devices to making correct decisions.

Because of the limitations imposed by the nature of the educational/psychological outcome (criterion) and the difficulty of obtaining the necessary data, decision theory was not widely diffused as a technique for evaluating the worth of selection devices in these fields. Therefore, classical validity approaches remained the best practical techniques for evaluating the selection devices used to make rational decisions in these fields.

Since World War II, the number of foreign students entering American institutions has increased dramatically, and their presence has become a part of academic live of various schools. These students

have come to the United States in a quest for knowledge. To fulfill their obligations toward those students, American institutions must maintain the appropriate conditions for academic success. The first step toward achieving this goal is to improve the selection process so as to select those students who are most likely to succeed academically.

Selecting students to study in a particular program is a difficult task for admission decision makers. The task becomes even more difficult when decision makers lack the necessary information for making their final decision. Most admission decision makers have found it extremely difficult to make accurate judgments about the probability of a foreign student's success in a particular program because such students differ widely in terms of educational background, cultural heritage, language, and the manner in which their previous grades have been reported. These differences, along with the lack of adequate standardized aptitude tests or any type of uniform information against which decision makers can judge the applicant's academic potential, have increased the difficulty of the decision maker's task.

As the influx of foreign students increased, it became evident that many of those students were failing to cope with school academic standards or were unable to reach the academic level they had achieved at their home schools. Therefore, it became important for admission decision makers to define a number of criteria against which they could judge the academic potential of these students. Decision makers at various universities developed certain policies to select foreigners

seeking admission to their graduate schools. Although such selection policies differ widely across schools and across departments within each school, they share a number of common elements. Most well-known schools require foreign students to submit a complete record of previous academic achievement, English test scores, letters of recommendation, and biographical information. Further, some schools and departments require students' scores on standardized tests such as the Graduate Record Examination (GRE), the Miller Analogy Test (MAT), and the Graduate Management Admission Test (GMAT).

Generally, the aforementioned predictors are used by admission decision makers at various schools as a basis for admitting foreign students to graduate school on a rather indirect basis--namely, that these criteria have been found to be effective in predicting American students' academic success. Although the factors that determine American students' graduate-school success may resemble those of the foreign graduate student, there is no scientific evidence on which to base such a generalization. The available evidence suggests that most decision makers have little objective direct evidence to support using the aforementioned criteria as predictors of foreign graduate students' academic success. Furthermore, the distinct variation in the characteristics of foreign and American students provides a very limited basis for valid generalizations. The two student populations differ widely with respect to educational background, cultural heritage, and ability to use the English language. Accordingly, one can argue that the predictors employed to select foreign students for a particular

program may not represent valid indicators of their academic success. It can also be argued that foreign-student populations may possess different characteristics that have a strong relationship to their future academic success. These arguments are possible and logical until further evidence emerges to prove otherwise.

Therefore, for admission decision makers to define accurately the characteristics of foreign students that relate to their future academic success, it appears that they must

1. evaluate the current admission policy or ensure that such an evaluation is conducted elsewhere in the institution. Such an evaluation must be concerned with estimating the benefits to be gained from using the current criteria as a basis for judging foreign students' academic potential. In addition to estimating the predictors' validity, the evaluation must also be concerned with the relevance and fairness of these predictors to the decision situation for which they will be used.

2. conduct exploratory research to identify other foreign-student characteristics that have a strong relationship to their future academic success.

When admission decision makers at various schools follow the preceding two procedures, they will be able to identify accurately the indicators that best predict foreign graduate students' academic success. The accumulated findings will provide a scientific basis for improving their decisions and therefore will help prevent the great

economic, social, and psychological losses that may result from making a wrong decision.

Despite the early presence of foreign students in American schools and the increased interest in prediction research, little effort has been made to identify the characteristics of foreign students that have a strong relationship to future academic success. However, the literature revealed that a number of studies have been concerned with examining the validity of predictors used to screen foreign students for a particular graduate program. Most of these studies have focused on examining the predictability of preadmission variables such as English test scores (Test of English as a Foreign Language [TOFEL], Michigan Test of English Language Proficiency [MTELP], local English tests), standardized tests (GRE, MAT, and GMAT), and biographical data as they relate to various measures of graduate students' academic success (GGPA or rating). Very few studies have examined the credibility of foreign students' previous academic achievement as a predictor of their future academic performance. Because of small sample sizes and heterogeneity of samples, researchers have been unable to devise consistent estimates of the predictive validity of the aforementioned variables.

The prese.. study is a continuation of previous efforts to evaluate foreign-s t-selection devices. In an attempt to assess more sensitive predi ors of foreign students' academic potential, the research was designed to examine the predictive validity of some of the

selection variables used by Michigan State University admission decision makers in various departments to screen foreign students for their graduate programs. The study was undertaken with the assumption that examining the benefits to be gained from using the current preadmission data will provide admission decision makers with some guidelines for improving the admission decision process and therefore will prevent the social and economic losses that may result from making a wrong decision.

Statement of the Problem and Need for the Study

Michigan State University is one American institution that hosts a large number of foreign students. The university literature indicates that most foreign applicants are college graduates seeking admission to almost all major graduate programs, with most demand in such fields as agriculture and natural resources, engineering, natural science, education, and business. The admission policy for these students states that English test scores as measured by the TOFEL, MTELP, or MSU English test; the record of previous academic achievement; letters of recommendation; and biographical information are required before the student's application is processed for making the final admission decision.

In addition to the previously mentioned criteria, some departments require the student's scores on standardized tests such as the GRE, MAT,and GMAT. Generally, all foreign students are required to meet the university-defined standards regarding the quality of previous

academic records and proficiency in using the English language (see Appendix H) before they are granted provisional or regular admission. Some departments also require foreign students to meet specific standards regarding standardized test scores. Admission decision makers in various departments have been using the foregoing variables as the basis for making admission decisions, yet no study has been devoted to examining the effectiveness of these variables in predicting foreign students' academic performance in a particular program.

Although such variables as previous academic achievement and standardized test scores have been found to be good indicators of American graduate students' academic performance, their use for foreign-student admission may not be appropriate. The distinct characteristics of foreign students and the lack of objective data by which to interpret their previous academic achievement provide no basis for definite generalizations. Further, university standards regarding the score foreign students must achieve on the MSU English test (see Appendix H) before being granted regular or provisional admission are based on a rather subjective judgment. Unlike TOFEL, the MSU English test has not been validated as an indicator of foreign students' English readiness for starting their academic program.

Overall, the available information suggests that admission decision makers at MSU base their decisions regarding foreign students' admissibility on rather subjective judgments. No objective evidence justifies their choice of the current criteria, the process by which

they judge the quality of foreign students' previous academic achievement, and their standards for defining students' English readiness for starting their academic program.

Generally, adequate use of foreign students' previous academic records and scores on English tests and standardized measures as a basis for judging their academic potential requires accurate interpretation of what the data on these admission criteria mean in terms of students' academic performance at a particular university. Such interpretation should be based on an examination of a large number of foreign students' previous grades and English and standardized test scores as they correspond to the students' GPA distribution.

Based on the foregoing argument, the present study was designed to estimate the predictive validity of a number of criteria used by admission decision makers at MSU as a basis for screening foreign students for graduate school. Because of the difficulty involved in obtaining complete data about all the major admission criteria, the writer was concerned only with the predictive validity of previous academic achievement, English test scores as measured by the TOFEL and MSU tests, and demographic variables such as sex, marital status, age, major field, and degree level. The simple and multiple prediction validities of these variables were estimated as they were related to students' academic success as measured by their GGPA, credit load, and the major academic advisor's rating.

The findings of this study should be valuable to admission decision makers. Knowledge of how the admission criteria correlate

with students' academic performance will provide admission decision makers with objective information by which they can develop accurate interpretations of what the data on these predictors mean. Such accurate interpretations can help them make accurate decisions about whom to admit to graduate school. Making accurate admission decisions is an important matter for both foreign students and university officials because it can help to decrease the rate of academic failure and thereby prevent great financial, psychological, and social losses.

Purpose of the Study

The present study was based on the premise that identifying foreign-graduate-student attributes that are correlated with their academic success, as measured by GGPA and major-advisor rating, would provide a baseline for admission decision makers to make accurate judgments of foreign applicants' academic potential. Such judgments would help them make correct decisions about whom to admit to graduate school. Accordingly, the purpose of this study was to discover which of the preadmission criteria used by MSU decision makers in making admission decisions accurately predict foreign students' academic performance.

Because of the difficulty involved in gaining access to complete information about all of the preadmission criteria, the writer focused only on the following variables: (1) the foreign-student index of previous academic achievement, (2) English test scores as measured by the TOFEL and MSU English-language tests, and (3) demographic variables such as sex, marital status, age, major field, and degree level.

The simple and multiple validity coefficients of these variables were estimated as they were related to a number of graduate-academic-success criterion measures. These criterion measures were GGPA, number of completed credits computed at various periods, and the major academic advisor's rating of the student in the doctoral program.

Because of the diversity of the study subjects, the writer attempted to examine the extent to which such variables as sex, marital status, age, major field, and country of origin could be used to identify subgroups of individuals for whom the major predictor (previous academic achievement and English test scores) could have increased validity. Finally, the writer was concerned with a number of general questions related to predicting foreign graduate students' academic success.

Definition of Terms

The following terms are defined in the context in which they are used in this dissertation.

Prediction: The term "prediction" refers to "the process of determining the magnitude of statistical variates at some future point of time" (Kendall & Buckland, 1971, p. 117). Kerlinger and Pedhazur (1973) stated that prediction research is a "special case of explanation and can be subsumed under theory and explanation" (p. 4).

Prediction and explanation reflect different concerns and emphases. Whereas prediction research emphasizes practical application, explanatory research emphasizes the explanation of the

variability of a dependent variable by using information from one or more independent variables. Further, prediction research is concerned primarily with using available information to build a regression equation to predict the criterion variable, which is usually measured by some index of performance or accomplishment. On the other hand, explanatory research is concerned with determining the amount of dependent-variable variation accounted for by each of the independent variables. Finally, the choice of independent variables (predictors) in prediction research is determined by their credibility in enhancing the prediction of the criterion. In contrast, the choice of the independent variables in explanatory research is determined on a theoretical basis.

Predictor and criterion: The term "predictor" refers to the data collected on particular attributes, which can be used to predict the variation of some future performance or accomplishments (criterion measures). In the context of this study, variables such as foreign student index of previous academic achievement, English test scores as measured by the TOFEL and MSU English-language test, age, sex, nation of origin, marital status, degree level, and major curriculum field were the main predictors that were used to predict foreign students' academic success, as measured by GGPA, number of credits completed, and the major academic advisor's rating.

Suppressor variables and moderator variables: A suppressor variable is any variable that has a low or zero relationship with the criterion and a high relationship with a part of a particular predictor

that is unrelated to the criterion. When a suppressor variable is added to the regression equation, it leads to an increase in the magnitude of the multiple regression. This occurs because suppressor variables usually act to partial out the invalid component of the other predictor that is unrelated to the criterion and thus leads to an increase in prediction accuracy. In general, a suppressor variable is rarely found in psychological or educational research (Allen & Yen, 1979; Ghiselli, Campbell, & Zedeck, 1981; Horst, 1966).

In contrast, moderator variables are more common in psychology and education and are usually encountered by researchers concerned with predictor research. Moderator variables refer to the distinct characteristics of a subgroup that influence the magnitude of the major predictor's validity coefficient and the structure of the total-sample regression equation.

Both moderator and suppressor variables are important considerations in prediction research because they help improve the accuracy and efficiency of the prediction estimates. Whereas suppressor variables improve predictions only through their power to suppress the other predictor's invalid component which is unrelated to the criterion, moderator variables have been found to improve prediction in three distinct ways: (1) Moderator variables can improve prediction when they are used to locate a distinct group within the total sample for which the major predictor has a different validity coefficient (differential validity). (2) Moderator variables can improve prediction when they are added to the regression equation of the total sample

(moderator regression equation). (3) Moderator variables can improve prediction when the criterion measures of some group are thought to be more predictable than the criterion measures of the other groups. Such use is mainly concerned with examining a particular group's predictability (differential predictability).

Most measurement specialists agree that the three uses of moderator variables are difficult to cross-validate because cross-validation procedures require a large sample for which the researcher must have complete information (Saunders, 1956; Ghiselli et al., 1981; Allen & Yen, 1966). In the context of the present study, such variables as sex, age, marital status, curriculum, country of origin, and degree level were thought to be possible moderator variables. In attempting to improve the predictive validity of the main predictor, the aforementioned variables were included in the equation used to estimate the total multiple correlation for the total sample. These variables were also used to group all study subjects into subgroups; the predictive validity of the main predictor was then estimated separately.

Validity coefficient: Validity coefficient refers to the size of the correlation between an individual predictor or a group of predictors and the criterion measure.

Foreign student: In this study, the term "foreign student" refers to all students enrolled in MSU's graduate programs who were not American citizens and who had completed their B.A. or M.A. degrees in their home countries before attending Michigan State University.

Index of Previous Academic Achievement (IPAA): The IPAA is the foreign student's previous academic standing after the grades or scores achieved at his home school have been converted on the basis of a four-point scale.

Previous Academic Achievement (PAA): PAA refers to the foreign student's previous academic achievement, reported on a scale from 1 to 100.

Organization of the Dissertation

The chapters of this dissertation are organized as follows. Chapter I contained a description of the study background, a statement of the problem, and need for the study. Chapter II includes a historical overview of the decision mechanism, with emphasis on the scientific method (prediction theory and decision theory) in relation to the admission decision problem. The chapter also includes a detailed presentation of the literature about the prediction of academic achievement in general and foreign students' academic achievement in particular. The hypotheses and research questions, study variables, nature of the sample and population, procedures of using previous grades as a predictor, and the statistical methods used in analyzing the data are presented in Chapter III. Chapter IV contains the results of the data analysis and the study findings. Finally, the summary of the study, conclusions, and recommendations are included in Chapter V.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

The evaluation of benefits to be gained from using selection devices has been an issue of continuing interest in the fields of education and psychology. Decision makers in these fields are continually faced with the problem of making decisions for which the information is incomplete or totally lacking. Selection of applicants for jobs and advanced training are examples of decision problems in these fields. As decision makers try to make rational decisions, they rely heavily on a number of available selection devices. Decision makers' awareness of the benefits to be gained from using these devices opens the door for sound research. Accordingly, a vast number of studies have been designed to evaluate the benefits gained from using particular selection devices to screen students at particular schools. Most studies have focused on estimating the validity coefficient as the best index of the value of a particular selection device.

The main purpose of the present study is to evaluate the benefits to be gained from using a number of selection devices to screen foreign applicants to graduate school at Michigan State University. The evaluation is concerned with estimating the predictive validity of these selection devices. The resultant validity coefficient will be

used as an index of benefits to be achieved by using the defined selection measures.

Validity coefficients have been used as an index for evaluating the value of selection devices for a number of years. Recently, decision theory has emerged as a complete framework that takes into consideration all the factors that determine the worth of a particular selection device. To show how these two approaches were developed and how they have contributed to the improvement of admission decision making, the literature review was developed as follows.

Discussed first is the nature of decision problems and how man has managed to live with the uncertainties of daily decisions. Specifically, a brief historical review of man's history with the problem of decision making is presented. This historical approach discusses the various techniques that have been developed to solve the problem of making daily decisions. Emphasis is given to the scientific method and how it has been used to facilitate the problem of admission decision making. The second topic of the chapter is the nature of prediction theory and how it has been used in the context of school admission decisions. Further, a number of studies are reviewed that have employed prediction theory to forecast the academic performance of American students. Such a review furnishes a background for the final section of this chapter, which contains a detailed review of studies that have focused on the evaluation of selection devices used by many schools to screen foreign students.

Mankind and Decision Problems

A decision problem is a situation in which one is forced to choose a particular action from a set of alternative actions (Bross, 1953). During their daily lives, people encounter several decision problems in which they have to decide between a number of available alternative actions. They usually make a decision while they are partially or completely uncertain about the nature of the outcome. Although decision problems share similar characteristics, they differ with respect to the degree of complexity, structure, and the process one must follow before making the decision. According to decision theorists, all types of decision problems can be classified into three categories:

1. Decision problems that can be made with complete certainty. In such problems, the decision maker has complete knowledge about the nature of the outcome and the results of the possible courses of action. Therefore, his role does not go beyond manipulating the data to select the best course of action from the available courses of action.

2. The second category consists of decision problems that are made under partial uncertainty. This type of decision problem has a known law of randomness that controls the state of nature (outcome). In such problems, decision makers usually have prior knowledge about the relative probability of the outcome for each decision action that can be taken.

3. The third category of decision problems comprises those problems that are decided under complete uncertainty. These types of decision problems occur when the decision maker does not know which state of nature will occur and therefore does not know the law of randomness that controls it. In such problems, the uncertainty is caused by the fact that the decision maker does not know the relative probability associated with each possible course of action (Dinkel, Kochenberger, & Plane, 1978; Chernoff, 1959).

Most actions in the real world are complicated by either partial or complete uncertainty. People are continually faced with the problem of making choices from among a number of actions under one of these types of uncertainty (Bross, 1953). The puzzle of uncertainty has been and will continue to be a great challenge for all living organisms. Simple organisms are equipped with biological mechanisms that help them make the decisions necessary for survival. The problems of more complex organisms are also more complex, and biological mechanisms are less effective in helping the organism make the necessary decisions.

Man as a living organism has been challenged by the uncertainty of his actions. Throughout existence, he has resisted this challenge and has attempted to create various sophisticated methods to clarify the reality of his world. The historical record of mankind represents a clear picture of how he has managed to live with the uncertainty of his actions.

During the early stage of man's history, several cultural patterns emerged as a result of his need to survive and settle in a permanent social group. The emergence of these cultural patterns produced a significant contribution to the solution of man's daily decision problems. Each social group attempted to combine the individuals' experiences into a set of rules and advice that was used to guide their daily decisions.

With the advent of civilization, decision problems became too complex and diverse for the cultural decision maker. It became difficult to specify in detail the appropriate courses of action for every situation. Therefore, a class of professional decision makers emerged to systemize the decision process. Every known civilization has produced a number of intellectuals whose job was making decisions and devising intellectual mechanisms for the decision process. They have tried to develop certain broad principles that can be used to deal with a large number of decision problems. Although professional decision makers in each civilization were trying to alleviate the uncertainty of man's actions, they differed significantly with respect to the principles they evolved. Such differences existed because the intellectuals themselves differed with regard to their conception of world reality and the causes behind the uncertainty of daily actions.

Bross (1953) identified three different classes of professional decision makers, who have devised three distinct intellectual mechanisms for decision making. The first class of professional decision makers were those who advocated the "devil theory" as the mechanism for

decision making. They stated that the world reality (events) is a product of intangible causes called the devil. Accordingly, they developed certain principles by which people can act and make decisions. Although the devil theory brought significant advancement toward clarifying the uncertainty of man's actions, it was not strong enough to cope with the demands of more complex problems. Further, the outcome of this theory as a scheme for making decisions did not satisfy people's common sense. People began to judge the principle of this theory by the results, and the results did not please them. Therefore, many intellectuals began to question the devil theory's effectiveness as a mechanism for decision making and initiated an effort to devise a better intellectual mechanism.

During the Golden Age of Greece, the second class of professional decision makers emerged as a reflection of man's need for a logical concept of how he can live with the uncertainty of his daily decision problems. This class of individuals managed to depart from the myth of the devil theory and developed more logical rules for explaining the world reality. They used deductive logic and reasoning as the mechanism for arriving at a particular decision. This mechanism represented a substantial advancement beyond devil theory. Both points of view agreed that world events are a product of causes, but they differed with respect to the sources of these causes. Whereas advocates of the devil theory attributed the events of the real world to invisible causes named "devils," the supporters of reason theory

attributed these causes to natural factors that can be controlled and manipulated (Bross, 1953).

Generally speaking, the reason theory as a mechanism for making decisions has contributed to the development of rational and consistent principles that have helped man cope with the uncertainty inherent in his daily actions. These rational and consistent principles established the basis for the emergence of the third class of professional decision makers--proponents of the scientific method as a mechanism for decision making. However, the intellectuals failed to realize the connection between reason and the world reality. They did not realize that reason can be inferred from the world reality. Therefore, the reason theory failed to be diffused on a large scale until scientists discovered its connection with the real world. Scientists later introduced inductive logic (scientific procedure that uses experimentation, measurement, observation, and symbolic language to develop statements about the world reality). The gap between reason and the real world became very clear (Bross, 1953).

The emergence of the scientific method as a mechanism for arriving at decisions clarified most of the causes underlying man's daily decision problems. Advocates of the scientific method attributed the causes of uncertainty to factors that can be measured quantitatively. They argued that world events are repeatable and occur according to a particular pattern of regularity. This notion of the repeatability of events motivated several mathematicians to examine the theory very carefully. Consequently, several techniques and formulas were

developed to determine the likelihood of the occurrence of particular events (Levin, 1978). These new developments were followed by further advancements, which enhanced the application of probability theory in examining the nature of social phenomena. The development of normal-curve distribution, theory of error, theory of statistical decision tests, and theory of regression and correlation contributed to the emergence of the inductive scientific method as a tool for making decisions (Stilson, 1966).

Use of the inductive scientific method as a decision-making tool gained wide popularity during the first half of the twentieth century. Decision makers in various fields had encountered several decision problems for which information was incomplete, uncertain, or completely lacking. Therefore, they turned to classical statistics to aid them in making rational decisions in the face of uncertainty.

The term "classical statistics" refers to the techniques and theory that can be used to promote rational decision making in the face of uncertainty. Specifically, it refers to the various hypothesis-testing techniques and estimation procedures that employ probability theory as a basis for making rational decisions from incomplete data. When the decision maker encounters a decision problem for which the information is incomplete, he tends to use classical inferential statistics as a means of minimizing the risk of making wrong decisions. The decision maker begins by gathering information about a random sample. Then he uses hypothesis-testing procedures to formulate strategic policies that can be used. Usually the choice among the

alternative hypotheses is based on the probability error alpha (Hamburg, 1970).

Although classical hypothesis testing has been successful in assessing diverse decision-making problems in various fields, it has been the subject of considerable controversy. As a result of its wide application, statisticians began to notice that classical hypothesis testing fails to consider some of the most important ingredients for successful decision making. They found that hypothesis testing was concerned with Type I and Type II errors and neglected to consider the consequences of wrong decisions. Also, they noticed that hypothesis testing neglected to use prior knowledge about the hypothesis under consideration. Therefore, statisticians extended hypothesis testing to a more coherent framework that considers all of the factors necessary for successful decision making. This new method (statistical decision theory) was based on baysian statistical theory. The application of this method has helped the decision maker form decisions in a way that takes into consideration the profit and loss associated with each alternative course of action. As statisticians apply the principles of statistical decision theory, they attempt to combine the prior knowledge concerning the decision problem with the relative probability of the current information. Then they estimate the relative probability associated with each alternative course of action. Finally, they compare the various outcomes in terms of their likelihood and choose the action that will maximize the outcome payoff and minimize the loss function (Haburg, 1970).

By comparing classical hypothesis testing with statistical decision theory, it can be seen that the methods resemble each other in the structure of the problem to which they address themselves and the purpose they want to achieve. Both methods strive to achieve the optimum decision. However, while the classical method focuses only on the conditional probabilities of sample outcomes as the basis for developing a decision rule, statistical decision theory goes further to include more factors necessary for achieving optimal decisions. In addition to the conditional probability of sample outcome, statistical decision theory provides a method by which one can combine the prior probability distribution with current sample probability distribution and incorporates losses into the formal structure of the decision problem (Haburg, 1970).

The advent of statistical decision theory as a mechanism for making decisions has led to considerable controversy between those who advocate its use and those who adhere to the classical statistical method. Practitioners in each field have begun to evaluate the effectiveness of both methods and to take a stand on how decision problems should be solved (Cronbach & Glaser, 1965). For example, decision makers in the field of education and psychology have applied the principles of both approaches to solve many of their decision problems. Specifically, the selection of a particular applicant for a particular job or advanced training was, and continues to be, the most complex decision problem encountered by decision makers in their fields. As a result of the uncertainty involved in the selection process, decision

makers have relied heavily on classical statistics to aid them in making rational decisions. More recently, many concerned scholars have begun to adopt the statistical decision theory as the best technique to use in the selection process (Cronbach & Glaser, 1965).

Because the present study is concerned with selection problems as they relate to foreign students, the following section includes further details on this topic. In particular, the discussion concerns the admission decision process and how classical statistics and statistical decision theory are used by decision makers to increase the accuracy of their decisions.

Admission Decision Making

Practitioners in the fields of education and psychology are constantly faced with decision problems for which the information is uncertain, incomplete, or entirely lacking. Selection of applicants for a job or advanced training is an example of such decision problems. In selection, the decision maker has the option of rejecting or accepting the prospective applicant. Usually, the decision is based on known information about the applicant (Cronbach, 1971).

Before World War II, admissions policies were very simple and were among the least important issues occupying the thinking of those responsible for the institution. After the war, the problem of admission decisions became more complex. The massive increase in the number of students entering colleges presented decision makers with a great challenge. It placed them in a position of needing a better method for selecting students who had a high probability of success. This urgent

need led many selective schools to design a complete admissions program. In developing these programs, schools differed in the ways they conceptualized the characteristics of a sound admission policy. In spite of these differences, however, there are a number of criteria by which one can judge the quality of a particular school's admission program.

Hill (1971) argued that, whatever the academic status of an institution, a number of criteria can be used to differentiate between sound and unsound admission programs. He stated that, for the admission program to be sound, it must be "rational, logical, clear, thoroughly planned, and modifiable on the basis of objective evaluation of its operation and its success in meeting the specified objective efficiently" (p. 700). He went on to say,

> As the institution decides to develop a sound selection program, it must take a stance on a number of issues, including the kind of benefit or utility it desires to achieve with its operation, whether it will be adaptive in its treatment of students, to what extent it will recruit applicants for its classes, what measures it will use in making its admission decisions, how those measures will be combined, and where the cutting scores will be placed. (p. 682)

Figure 1 shows a schematic representation of how Hill defined the characteristics and logical steps involved in developing a sound admissions program. At the beginning, an institution's philosophy, goals, and objectives are the main factors that determine its academic status (selective or nonselective). As the institution decides to be selective, it must develop a sound admissions program and state clearly its stands on the six issues listed in the diagram. The first four issues compose the major element of the admission decision model.

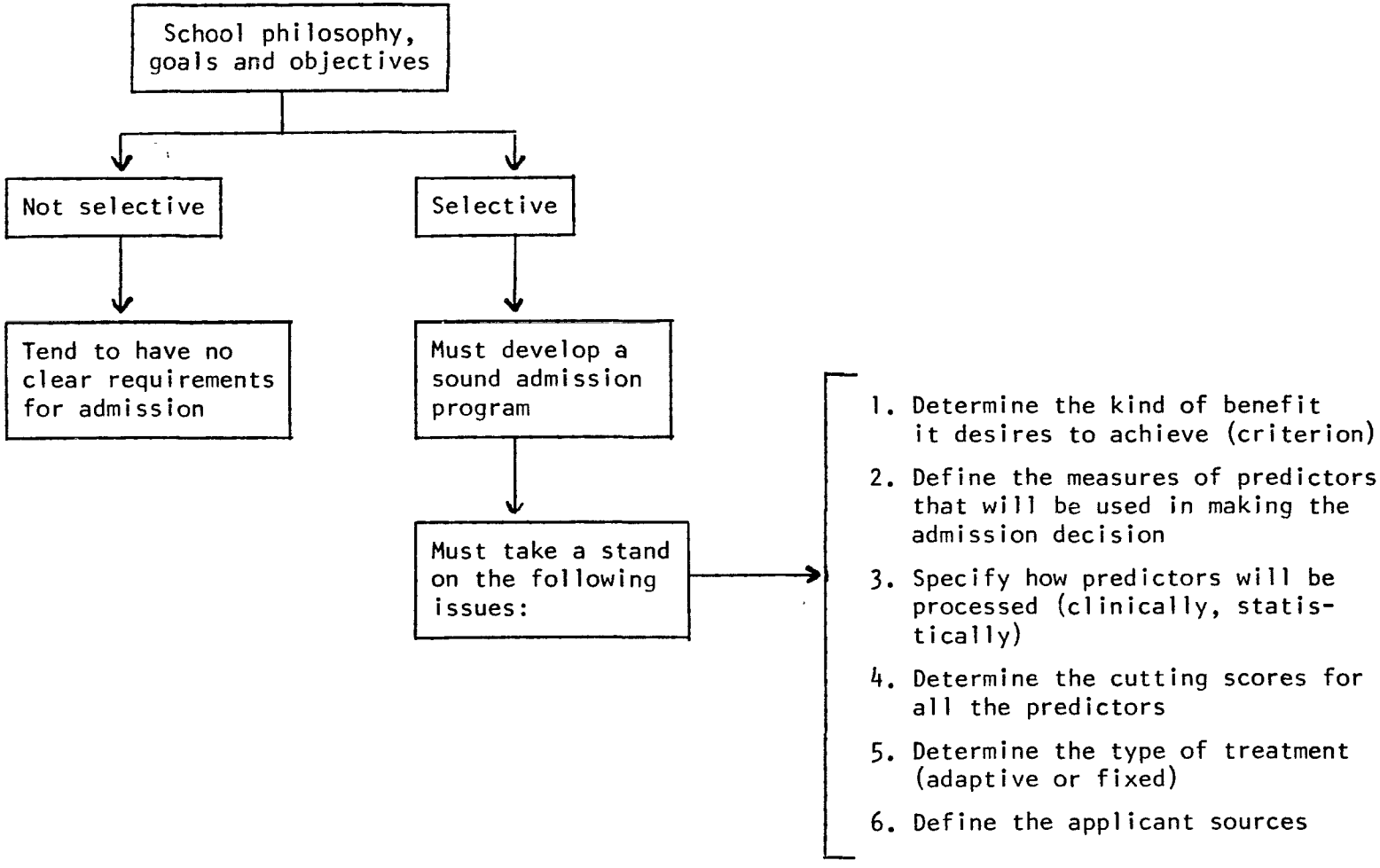

Figure 1.--Admission model elements.

Admission Decision Process

Cronbach and Glaser (1965) argued that all personnel decisions can be characterized in the same manner because they involve the same elements and the same steps that one must take before making a decision. Admission decision making is a typical example of a personnel decision in which the individual makes decisions regarding a large number of applicants. For an admissions decision maker to be successful, he must seek a strategy that will work best on the average over a series of decision actions. He must employ the measures and the strategies that will maximize the school-defined utilities and minimize the losses that may result from a wrong decision.

School admission decision processes differ according to the school's philosophy. However, most selective schools practice a certain type of central control over undergraduate admissions. They employ the same strategy to make decisions about all new applicants. At the graduate level, the actual decision making is made on a departmental basis (Quann & Associates, 1980). However, whether the admission is made on a central or a departmental basis, the decision maker must use the same strategy in similar cases (Cronbach & Glaser, 1965).

Whether the admission is made by the central graduate office or by an individual department, the decision model must involve the elements and the process represented in Figure 2. The decision maker must collect the needed information, process it according to a defined strategy, and then make the decision that, on the average, will

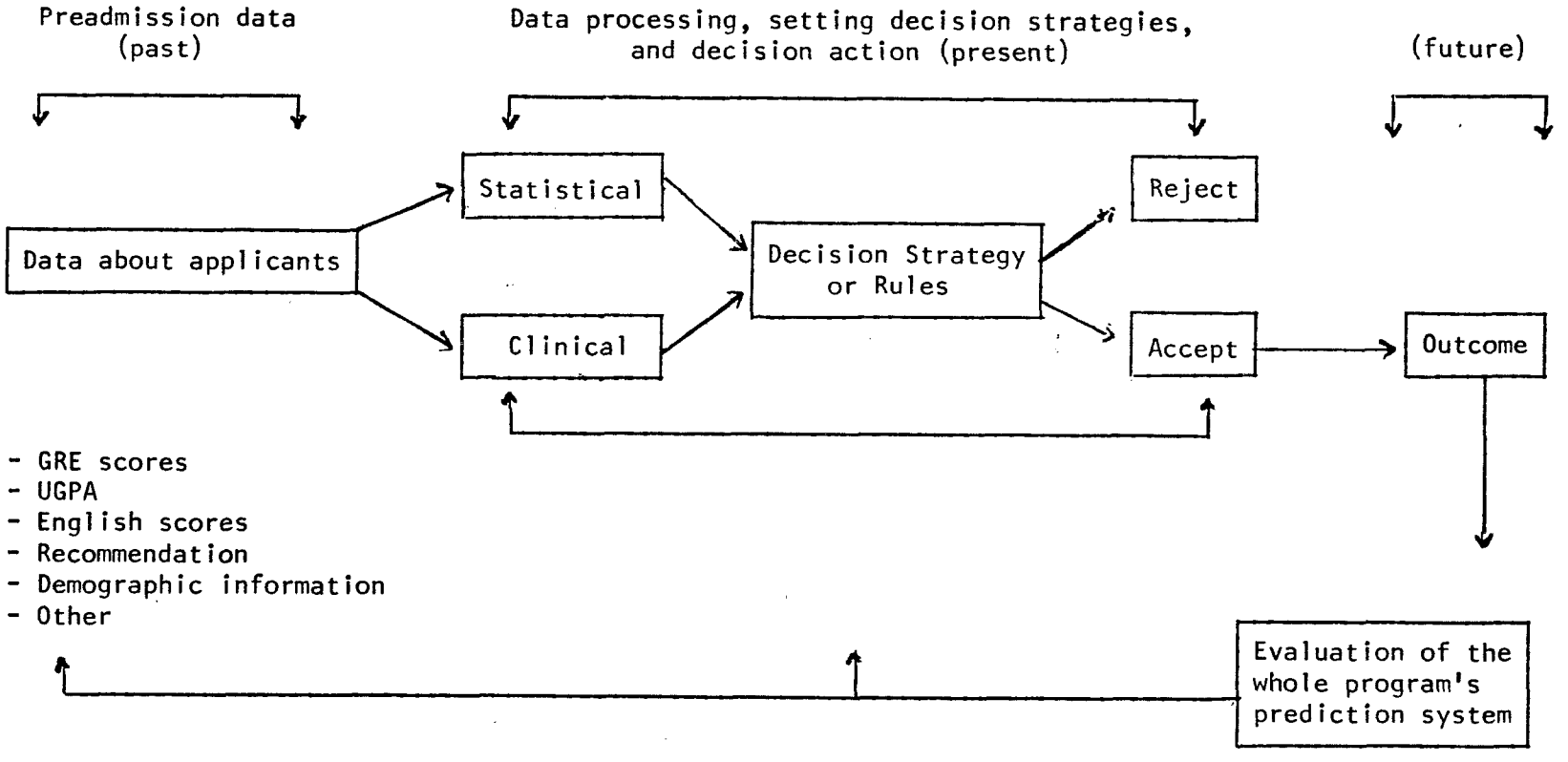

Figure 2.--Admission decision process (general).

maximize the school-defined benefits and minimize the losses that may result from making a wrong decision.

By examining the admission model (Figure 2), it can be seen that admission decisions are part of an interrelated process that takes place over a period of time. In this process the decision strategy leads to an action, which then leads to a particular outcome.

For the decision maker to make optimum decisions, he must consider past, present, and future outcomes. This means that the prediction system is an important element of the admissions decision process because it provides a probability distribution, which shows the joint distribution between the preadmission data and the future outcome. This probability distribution provides a quantitative measure of the uncertainty inherent in admission decision outcomes. Based on this quantification, the decision maker chooses the decision strategy that will maximize (on the average) the school's desired outcome.

After the decision maker chooses the preadmission measures, processes them, and makes his decision, he must subject the entire program to an extensive evaluation. Decision makers choose different admission strategies, and "what constitutes the best strategies depends on some subtle question of evaluation" (Cronbach & Glaser, 1965, p. 21). This means that, for the institution to make sure the admission program is functioning, it must subject the whole program to extensive evaluation. Quann and Associates (1980) stated that "evaluation of admission requirements must be ongoing; the admissions office should conduct validity studies--or be sure that they are conducted elsewhere

in the institution" (p. 46). In addition to the evaluation of their predictive validity, admission requirements must also be evaluated in terms of their visibility and fairness.

The evaluation of selection devices has been a problem of continuing interest in the fields of psychology and education. A vast number of evaluative studies in these fields have been designed to estimate the utility of a particular selection device. In the earliest stages, evaluation research was concerned solely with estimating the predictive validity of a particular selection device. The resultant validity coefficient was used as an index of the test's benefit. For selection decisions, the higher the validity coefficient, the more beneficial the selection device was in making a rational decision.

Actually, the widespread use of predictive validity was motivated by the desire of test constructors to convince decision makers that the benefit of using such tests in decision making justifies their cost. As test constructors attempted to give test users an idea of the potential payoffs to anticipate from using particular tests, several approaches to interpreting the validity coefficient were advanced. During the early stages of the prediction movement, the index of forecasting efficiency, $E = 1 - \sqrt{1 - r^2}$ was used as a measure of a test's value. Then, during the 1930s and 1940s, the coefficient of determination r^2 became a more popular measure of a test's worth (Cronbach &

Glaser, 1965). r^2 refers to the amount of outcome variation that can be predicted or explained by a particular test score. The higher this value, the greater the worth of the test as a selection device.

Although these two measures have been and will continue to be used for interpreting a test's validity, they have been subjected to constructive criticism. Cronbach and Glaser (1965) argued that the widespread use of E and r^2 as a measure of a test's worth has led to considerable pessimism with regard to the value of tests in selection procedures. This is because both interpretations of test worth emphasized high validity coefficients as a necessary condition for the test to have practical value. Both approaches emphasized measurement accuracy and predictive efficiency and ignored various parameters that actually determined the overall worth of a selection device. For example, they ignored the effect of test cost, selection ratio, and the systematic nature of the selection process (Cronbach & Glaser, 1965).

The third approach to judging a selection measure's value was developed by Taylor and Russell (1939). This approach recognizes the fact that the value of a particular selection measure depends heavily on the nature of the decision for which it is to be used. Taylor and Russell's interpretation went beyond the validity coefficient to consider the selection ratio and base rate as necessary parameters in evaluating the value of any selection device. According to their argument, the utility of any selection device depends on whether the selection ratio is high or low. A test with moderate validity (.30-.50) is considered to have a practical value, particularly when the

selection ratio is low. Such an interpretation produces better measures of the test's utility (Taylor & Russel, 1939, 1950).

A fourth approach to evaluating the benefit of a selection measure was developed by Brodgen (1946, 1949). He argued that the benefit of using a particular selection device is linearly related to the validity coefficient of that selection device with the criterion. According to his argument, the gain of using a selection device with a validity coefficient of .60 is equal to 60% of the gain that may result from a device with a perfect validity coefficient. He derived the following formula to estimate the average gain of a particular selection device:

$$A_u = r_{xy}\ \sigma y\ E\ (x^2)$$

Based on Brodgen's work and the logic of statistical decision theory adapted for economic decision problems, Cronbach and Glaser (1965) developed a comprehensive approach that outlined the ways in which statistical theory can be used to appraise the usefulness of a particular selection-decision device. They stated that the value of any selection device "can be stated only in terms of a specific type of decision problem, the strategy employed, the evaluation attached to the outcome, and the cost of testing" (p. 32). In deriving the formula for estimating the utility of a selection device, they went beyond Brodgen's (1949) formula to incorporate the cost component.

Brodgen's formula:	$A_u = r_{xy}\ \sigma y\ \ E(x')$
Cronbach & Glaser's formula:	$A_u = r_{xy}\ \sigma y\ \ E(x') - C_x$

where:

A_u = Net gain of selection device utility

r_{xy} = Validity coefficient of the selection device obtained currently on present population institution

σy = Standard deviation of the criterion distribution

$E(x')$ = The ordinal of the normal curve at the cutting score of the used selection device

C_x = Cost of obtaining selection-device information

Cronbach and Glaser's formula went beyond the classical approach to consider the factors that determine the optimum utility of a particular selection device. In addition to including a validity coefficient, Cronbach and Glaser's approach incorporated selection ratios and the cost of gathering information as important factors that determine the actual utility of a selection device.

Although Cronbach and Glaser's approach to estimating the utility of a selection device brought significant advances beyond the classical approach, the decision theory's applicability to the selection of students and employees proved to be very limited (Hill, 1972). Anastasi (1982), Lord and Novick (1968), and Schmidt and Hunter (1980) examined this approach and explained its limited popularity. In educational selection, the applicability of this approach is complicated by various factors. Anastasi (1982) argued that "the lack of adequate system for assigning value to outcome in terms of a uniform utility scale has been one of the chief obstacles to the application of decision theory" (p. 168). In educational selection, outcome criteria

cannot be precisely determined. Lack of a simple measurable criterion that permits the substitution of a cost component complicates the use of this approach in educational selection. In addition to criterion problems, the Cronbach and Glaser model was based on certain assumptions and requires estimation of some values (σy) that are difficult to meet in practical settings (Lord & Novick, 1968; Hill, 1971).

In spite of the aforementioned difficulties, the decision-theory approach has addressed a number of questions for sound research, and when these questions are answered, decision theory may provide a solution to the uncertainty inherent in the admission decision process.

In summary, the evaluation of benefits to be gained by using a particular selection device has been an attractive topic for measurement research. The evaluation movement began with a concern for predictive validity in the form of correlation coefficients. The inadequacy of validity coefficients led to a concern with predictive accuracy in the form of the proportion of correct prediction in excess of the base rate. Finally, the evaluation effort moved in a limited way to a concern with the predictive usefulness (utility) of a selection device (Ghiselli, Campbell, & Zedeck, 1981). Utility analysis is seldom used in educational selection because of the nature of educational outcome (criterion) and the difficulty of obtaining the information required by the formula. Therefore, the predictive-validity and predictive-accuracy approaches will continue to be used until these limitations are resolved.

The next two sections of the literature review discuss in detail the contribution of prediction research to the improvement of admission decision making. The nature of prediction research is described, including definition and history of the process, problems involved in prediction research, and how experts respond to these problems. Prediction research that has been conducted on both American and foreign students is also reviewed.

Academic Prediction: American Students

The term "predictive validity" refers to the accuracy with which existing data on a person's attributes or characteristics indicate his future performance. Specifically, predictive validity refers to the degree to which such data as previous academic achievement, test scores, personality patterns, study habits, sex, marital status, and ethnocultural background can be used to predict a person's future performance (Mehrens & Lehmann, 1984). The predictive validity coefficient is usually determined by correlating the predictor data with information obtained on a particular criterion measure of future performance. The resultant predictive coefficient is normally used as a direct indication of the predictor's validity (Nunnally, 1978).

The validity coefficients of individual predictors are normally determined by using the Pearson product-moment correlation technique. When a combination of predictors is examined, however, their validity coefficient is determined by using multiple- correlation techniques. Because of the unreliability of predictors and criteria, restricted-range scores, and the problem of pooled samples, the coefficient

validity of predictors used for forecasting students' academic success have never been perfect. According to Nunnally (1978),

> In most prediction problems it is reasonable to expect only modest correlation between a criterion and either individual predictor test or a combination of predictor tests. People are far too complex to permit a highly accurate estimate of their performance from any predictable collection of test material. (p. 79)

Nunnally went on to describe the problems inherent in using cumulative GPA as a criterion of academic success in prediction research:

> Equally complex are the situations in which criterion data are obtained, e.g., the immense complexity of all variables involved in determining the averages of students over four years of college. Considering the immense complexity of all the problems, it is remarkable that some predictor tests correlate as highly as they do with criterion variables. (p. 79)

The foregoing statements describe the challenges facing researchers concerned with academic prediction. However, measurement theorists and concerned specialists have devoted much time and effort to solving the problems inherent in predictive research. For example, such techniques as the coefficient of attenuation, differential prediction, and equating grades from different school systems have been found to be useful in enhancing the validity coefficients of commonly used predictors. However, current prediction still suffers from various problems. These problems cannot be solved without the contribution of sound research. Schmidt and Hunter (1980) discussed the future of predictive research and concluded that "the future . . . will see a widespread utilization of validity generalization and rational method of estimating validity" (p. 57).

The development of academic prediction studies can be traced to the beginning of the twentieth century. As early as 1917, Lincoln examined the relationship between high school grades and freshman grades of 253 students at Harvard University. The findings indicated that high school grades had a moderately high correlation (.69) with freshman grades. Three years later, Jordan (1922) detected a correlation of .50 for the same variables. In 1934, Segel summarized the findings of 23 studies. His review indicated that the correlation between high school grades and student academic achievement at colleges ranged between .29 and .69, with a median of .55.

During the first one-third of this century, the popularity of prediction research was limited to a small scale. At the beginning of the 1950s, many researchers became interested in academic prediction. Lavin (1965) gave three reasons for the sudden popularity of academic prediction research:

1. The immense increase in student population entering colleges created an urgent need for admission decision makers to define the most accurate criteria which can be used for screening the prospective applicant. This urgent need motivated many researchers to conduct several prediction studies attempting to discover the student characteristics which have the greatest relationship with their future academic performance.

2. The second reason for researchers' great interest in prediction studies was the growth of programs that were designed to identify and train talented students.

3. The third reason was the desire of researchers to study the current issues in education.

These reasons, along with the availability of financial support from various agencies, contributed to the development of numerous studies. Whereas early prediction studies focused on previous grades

and test scores as the main predictors of academic achievement, research since the 1950s has been concerned with examining the non-intellective characteristics of students as possible predictors of future academic performance. This new development, along with researchers' realization that students' academic ability is a function of several interrelated variables, changed the direction of academic prediction research (Smith, 1981). In addition to intellective variables, many researchers began to examine the possibility of using some nonintellective variables, such as student motivation, personality pattern, sex, marital status, and age, as predictors (Eyesenck, 1965; Mayhew, 1972). Other research focused on combining some of these variables with previous grades and test scores to enhance their predictive validity coefficient. A third group of researchers focused on designing methodological techniques and models for improving prediction from previous academic grades and test scores (Bloom & Peter, 1965; Tucker, 1963; Lindquist, 1963; Linn, 1966).

In general, the movement toward academic prediction research at the college level during the 1950s and 1960s led to the publication of a large number of studies. The following conclusions can be drawn from the findings of these studies:

1. High school grade point average (HSGPA) or rank was the predominant variable for predicting future success (Lavin, 1965; Rose & Trent, 1973). The correlation coefficient between HSGPA and grades obtained in the first year of college averaged .50 for males and .52 for females. When the HSGPA was combined with standardized test scores

(SAT), the mean increased from .50 to .52 for males and from .52 to .55 for females (Fishman & Pasanlla, 1960).

2. Nonintellective variables (biographical and demographic characteristics of students) were found to be effective in improving the prediction of academic achievement (Lavin, 1965; Smith, 1981). Prediction of achievement improved when variables such as sex, race, and socioeconomic level were taken into consideration.

3. First term or semester grades are the best criteria that can be used to assess undergraduate students' academic success.

After World War II, most prediction research focused on examining the predictive validity of the various selection devices used to screen undergraduate students. Two decades later, the demand for graduate education became very high. Most schools began to have more qualified applicants than they could admit. Therefore, admission decision makers and faculty members began to face the same types of problems as those presented by undergraduate admissions. They were placed in a position of needing precise measures for predicting graduate academic success. Consequently, many graduate schools began to require applicants to submit a complete record of previous academic achievement, test scores, and recommendations. The widespread use of these measures as a basis for graduate admissions has aroused considerable controversy.

As a result of grade inflation and variations in grading systems at the college level, many educators began to doubt the usefulness of UGPA as a predictor of academic success in graduate school. Other

educators directed their criticism toward standardized tests. They argued that standardized tests measure unimportant knowledge and rote recall, focus on limited types of competencies, penalize deep thinking, and therefore are invalid predictors of graduate academic success.

The controversy regarding previous grades and standardized test scores, along with admission decision makers' awareness of the validity of these selection measures, led to various predictive studies. Most of these studies focused on examining the effectiveness of previous grades and standardized tests (GRE, MAT, and GMAT) in predicting academic success at the graduate level, as measured by various criteria (graduate grade point average, rating of faculty or academic advisor, graduated, nongraduated, and comprehensive scores). In spite of the problems involved in graduate-level predictive research (mainly criterion problems and adequate sample size), the current literature includes a number of dissertations and articles concerned with predicting academic success at the graduate level.

Prediction research at the graduate level has followed the same procedures employed in predicting academic success at the undergraduate level. Most studies have employed zero-order correlation, multiple correlation, and stepwise multiple regression to examine the validity of various selection devices used by particular schools to screen graduate applicants. Although first-semester GPA and cumulative GPA were practical measures of academic success at the undergraduate level, they were proven inadequate for assessing academic success in graduate school.

Many educators have argued that graduate academic success involves various aspects that cannot be represented by the first-semester GPA or cumulative GPA. In addition to achieving a good GPA, a successful graduate student must pass the comprehensive exams, show persistence in meeting academic challenges, be creative, and prove his ability to be a productive scholar in the future. As a result of the difficulty involved in accurately assessing these criteria, most researchers have continued to use GGPA as a criterion for measuring academic success at the graduate level. Others have attempted to use other criteria, in addition to GGPA. Researchers' tendency to use GGPA in spite of skepticism about its adequacy was explained by Hill (1971). He wrote:

> Grades are alluring as criteria because they are usually obtainable, readily quantifiable, and of greater importance in making other decisions such as whether the students graduate or not, whether they are allowed to remain in school or not. . . . Clearly, regardless of what institutions say about what they desire to accomplish with students, they behave as though they value most the students who obtained grades. (p. 689)

By looking at Table 1, one can notice that most researchers have used GGPA alone or with complementary criteria as a measure of academic success. Kaiser (1982), Borg (1963), Sleeper (1961), Stuit and Peterson (1951), Neman (1968), Maddus and Walsh (1965), Striker and Huber (1967), and Camp and Clawson (1979) examined the predictive validity of GRE and UGPA. They used the GGPA as a criterion measure of graduate success. The GRE-V had a zero-order correlation range between .08 and .42, with a median r of .23. With regard to GRE-Q, the correlation range was between .11 and .49, with a median of .18. When researchers

Table 1.--Summary of findings of research conducted on American students.

Variables Examined	Broadus & Elmore, 1983 N = 257 C:GPA & comprehensive scores	Furst & Roelfs, 1979 N = 348 C:Analytic exam, grade in statistics, research; GPA	Kaiser, 1982 N = 407 C:GPA of student in educ. & com. sci.	Hackman, 1970 N = 46 & 48 C:1st-year GPA, rating of success after six years	Williams, Harlow & Gab, 1970 N = 84 C:GPA & graduated/non-graduated	Borg, 1963 N = 175 C:GPA	Sleeper, 1961 N = 24 C:GPA	Roscoe & Houston, 1969 N = 252 C: GPA & graduated/ nongraduated	Ayers, 1971 N = 241 C:GQPA (GPA)	Stuit & Peterson, 1951 N = 411 C:GPA	Powell & Geisinger, 1981 N = 114 C:Master comp. exam
GRE-V	.35(.001) .31(.001)	.44 .42 .33 .44 α.01	.21 (.05) .05	.22 .19	-.01 .08	.36	.37 (.05)	.32 (.01) .21 (.01)		.42	.43(.001)
GRE-Q	.30(.001) .11	.27 .37 .31 .35 α.01	.11 .17	.15 .32 (.05)	-.01 .34 (.01)	.37 .37	.49 (.02)	.21 (.01) .28 (.01)		.17	.27 (.01)
GRE-AD	.21 .01	ED .46 .31 .48 .45 α.01		PSY .23 -.11	.08 .34 (.01)			ED .28 (.01) .26 (.01)		.50	PSY .32 (.01)
Composite Measures	GRE-V+Q .39(.001) .25(.001)	.47 .52 .48 .57 α.01	GRE-V+Q .19 .12		All var. .50 .65 (.01)		GRE-Total .54 (.01)			UGPA+ GRE-AD .61	
U-GPA	.23(.001) .13(.001)		.12 .27	.28 -,22	.13 .02				.49 .01	.51	.08
Sex					-.14 .22 (.05)						
Age of admission					-.15 .02						
MAT		.16 .18 .21 .24 α.05			.01 .11				.34 .01		.34(.001)
Educational level	M S. Library Science	Ph.D. Education			Ph.D. Education	Ph.D. Education	M.A.	Ph.D. Education	M.A. Education	General	M.A. Psychology

Table 1.--Continued.

Variables Examined	Stordhal, 1967 N = 534 C:GPA	Newman, 1968 N = 66 C:GPA	Maddus & Walsh, 1965 N = 569 C:GPA at end of first semester	Striker & Huber, 1967 N = 37 C:GPA	Williams, 1970 N = 86 C:GPA & graduated/ nongraduated	Bean, 1975 N = 91 C:GPA & master's comprehensive exam	Frederics & Schuerger, 1974 N = from 15 to 54 C:GPA & faculty rating	Paolillo, 1982 N = 220 C:GPA	Dole & Baggaley, 1979 N = 61 C:Faculty rank of scholarship & professionalism	Camp & Clawson, 1979 N = 135 C:GPA	Omizo & Michael, 1979 N = 107 C:GPA & master's comprehensive scores
GRE-V		.08	.19 α.01	.20	-.01 .08	.31 (.05) .19	.30 (.05) .32		.35 (.05) .22	.26(.001)	.24 (.01) .24 (.01)
GRE-Q		.21*	.18 α.01	.26	-.01 .34* α.05*	.10 -.13	.01 -.004		.24 .15	.14	.05 .13
GRE-AD		PSY .09		PSY .35 α.05	EDUC .08 .34* α.05*		PSY .37 (.05) .22		.34 (.01) .40 (.01)		GRE-Total .14 .22 (.05)
Composite Measures	UGPA+MAT .45*	GRE-Total .18	GRE-V+Q .22 α.01	GRE-V+Q+ ADV .28	All var. .50 .65**					GRE-Total .24 (.01)	
U-GPA	.41*			.47 α.01		.05 .13	.37 (.01) .19	.35(.001)			.17 (.05) .38(.001)
Sex								.14 (.05)			
Age of admission								-.05	.45 (.01) .47 (.01)		
MAT	.32*				-.03 .10		.20 .26				
GMAT								.26(.001)			
Educational level	M.A. Education	Ph.D. Psychology	General	Ph.D. Psychology	Ph.D. Education		M.A. Psychology	M.A. Business	Ph.D. Education	M.A. Counseling	M.A. Counseling

combined GRE-V and Q, the multiple-r ranged from .19 to .45, with a median of .23.

Broadus and Elmor (1983), Bean (1975), and Omizo (1979) attempted to use a comprehensive exam score in addition to GGPA as a criterion of graduate success. The findings of these studies indicated that the GRE-V had correlations of .37, .31, and .24 with GGPA and of .31, .19, and .24 with the comprehensive exam score. Also, the GRE-Q showed correlations of .11, .10, and .05 with GGPA and of .17, -.13, and .13 with the comprehensive exam scores. Other studies by Willian, Harlow, and Gab (1970), Federics and Schuergen (1974), and Rescoe and Houston (1969) employed, in addition to GPA, faculty rating or graduated/nongraduated as criteria of academic success.

Although most of the studies included in Table 1 focused on a direct examination of the relationship between traditional measures and the index of graduate success as measured by various criteria, other studies have used various methodological approaches to improve the predictability of commonly used selection devices. Some studies have gone beyond examining the validity coefficients of current predictors to determine the effectiveness of a new predictor. Others have focused on developing better criteria of graduate success. Still other research has concentrated on improving prediction research design and analysis. A complete review of these studies was conducted by Lannholm (1968, 1972) and Thuncker, Williams, and Williams (1974). Based on these reviews and the findings detected by various researchers, the following conclusions were drawn:

1. Prediction research at the graduate level is less successful than at the undergraduate level. The restricted range of the predictors and criteria data prevent the researcher from detecting meaningful and accurate validity coefficients. Further, the difficulty of locating an adequate homogeneous sample has led researchers to pool sample subjects from different academic departments or from the same department over several years. Since grading standards and rating procedures differ across departments and across faculty members in the same department, the predictor's validity has been underestimated.

2. GRE-V scores have a higher correlation coefficient with various criterion measures of graduate success, particularly when the criterion is students' performance in fields of a descriptive nature. On the other hand, GRE-Q scores tend to have a higher correlation when they are related to the students' performance in subjects of a quantitative nature, such as statistics and research methodology.

3. GRE-Advanced scores seem to have promising predictive validity, especially when combined with other predictors such as UGPA and GRE aptitude test scores.

4. Combination of GRE scores with UGPA has shown a higher validity coefficient than when the two measures were used alone.

5. Ratings of the student's undergraduate schcol and performance there tend to be promising predictors of graduate academic success.

6. Prediction research at the graduate level has shown consistent findings when it was conducted on a departmental basis rather than with a pooled sample.

Based on the preceding review of studies concerned with academic prediction of American students, the review of research on prediction of foreign students' academic success will be developed in such a way as to provide answers to the following questions:

1. To what extent has research on foreign students' academic prediction been successful in identifying the predictors that are relevant to their academic achievement?

2. Are the predictors that have been employed to predict American students' academic achievement also effective in predicting foreign students' academic achievement?

3. If the answer to Question 2 is yes, what major predictors can be used effectively in making such a prediction?

4. If the answer to Question 2 is no, what credentials of foreign students are relevant to their academic success?

5. Finally, what major problems have been encountered by researchers who have addressed the question of foreign students' academic prediction?

Academic Prediction: Foreign Students

As foreign students became an important segment of the student population in many American universities, the question of their academic achievement became an important concern. Many of those students failed or were unable to reach the optimal level they had achieved at

their home schools. The emergence of this problem created the need for admission decision makers to identify the variables that can be used to predict foreign students' probability of success in particular programs.

Despite the long-standing presence of foreign students in the American colleges and universities, and the great interest of American researchers in prediction research, little has been done to answer the question related to the prediction of such students' academic achievement. An examination of the current literature revealed that the prediction of foreign students' academic achievement has not received enough attention from concerned researchers.

Actually, the prediction of students' academic achievement is a problematic issue that is intensified when the subjects are from a foreign country. Some researchers have stated that predicting foreign students' academic achievement is a discouraging process (Moore, 1953). More stated that predicting foreign students' academic achievement is complicated because of the difficulty of using previous grades as a predictor of the students' future performance. Further, the lack of standardized tests that measure foreign students' potential aptitude has prevented researchers from attempting this type of research.

Another problem involved in predicting foreign students' academic performance is the criterion problem. The use of first term or cumulative GPA is subject to the same deficiencies found in making predictions concerning American students' achievement. Also, use of GPA is subject to other deficiencies, such as faculty double standards

in grading practices and foreign students' tendency to carry a few credits each term and to avoid demanding courses to keep their grade average high (Putman, 1961; Paraskovopoulos & Dremuk, 1969). Further research by the American Association of Collegiate Registrars and Admission Officers (AACRAO, 1971) and Paraskovopolous and Kirstein (1968) indicated that first-term GPA does not reflect a reliable criterion of foreign students' academic achievement because the first term is a period of adjustment to the new academic environment.

These problems, along with the difficulty of locating a large, homogeneous sample of foreign students, have prevented researchers from achieving consistent findings and therefore have discouraged them from attempting further research. In spite of these problems, a number of researchers have been courageous enough to initiate this type of research.

Because of the difficulty involved in using foreign students' previous academic achievement and the lack of adequate standardized aptitude tests for these students, most prediction research has focused on examining the effectiveness of English proficiency, as measured by various tests, in predicting foreign students' academic success. A number of researchers have opposed using an English test to predict academic success (Riggs, 1981; Perren, 1967). They have argued that English test scores, as measured by TOFEL, MTELP, and the English proficiency test of the American Language Institute at Georgetown University (ALIGU), are an index of foreign students' English proficiency and do not have any bearing on students' academic success. On

the other hand, several other researchers have advocated using scores on English tests as predictors of success. They have argued that, to achieve academic success, foreign students must acquire the English-language skills that will help them keep up with the pace of instruction. For example, in his argument about the importance of using English test scores in screening foreign students, Sharon (1972) stated that

> Competence in the English language is one factor which has been assumed to be crucial for the success of foreign students studying at an American university. It is difficult to imagine how a student can learn in an American graduate school without being able to read, write, and comprehend the English language. Thus English proficiency might be thought of as a necessary, although not sufficient, prerequisite for graduate success. (p. 425)

Sharon's statement suggested that low English scores contribute to various academic difficulties but that high English scores do not insure foreign students' academic success. However, English proficiency is one of the factors that determines the extent to which foreign students can cope with the academic challenge at American schools. When English scores are used in combination with other prescreening devices, admission decision makers can determine with sufficient accuracy the extent to which a prospective foreign student can cope with the academic standards at a particular school. For this reason, many graduate schools require foreign applicants to provide records of their English proficiency.

Garrett (1979) conducted a survey to investigate the stated policies and actual practices of selected American graduate schools regarding foreign student affairs. His findings indicated that 91% of

the surveyed schools require foreign students to achieve a minimum English score before being granted unconditional admission. Also, Garrett found that the TOFEL, ALIGU, and the Michigan Test of English Language Proficiency (MTELP) were the most widely used tests. Further, 16% of the surveyed schools used the scores on tests designed by the local English-language center. Garrett's survey showed that admission decision makers in various schools viewed English test scores as important predictors of foreign students' academic success.

A number of prediction studies have examined the effectiveness of English test scores alone or in combination with other preadmission data in predicting foreign students' academic success, as measured by GPA or a rating scale. Hamlin (1972) examined the relationship between MTELP scores and the academic achievement (GPA of first two terms) of foreign students at Oregon State University. His findings indicated that MTELP scores were significantly correlated (.37) with the number of credits earned. On the other hand, a nonsignificant correlation (.12) existed between MTELP scores and GPA. However, the correlation of the test scores with both criteria increased when the sample was subgrouped by country of origin and major field of study. Further, the study confirmed that students with scores below 80 points on the MTELP test had a greater tendency to drop their classes and to receive incomplete grades than did those students who achieved scores higher than 80 points.

Upshur (1967) and Allen (1965) examined the effectiveness of MTELP total scores, aural comprehension scores, and writing scores in

predicting foreign students' academic achievement, as measured by their GPA. The findings of both studies showed that MTELP scores had a consistently significant relationship with foreign students' GPA.

In their research, Thomas and Marguerite (1968) examined the predictive validity of the Lado test of aural comprehension. They used GPA and grades in an English course for foreign students as the criterion measures. The findings indicated that Lado aural scores had a correlation of .16 with GPA and of .26 (alpha = .05) with the grade in the English course. Accordingly, the researchers concluded that the detected correlation provided some justification for using Lado aural scores as predictors of foreign students' academic success.

Jones and Michael (1961) examined the predictive validity of a number of aptitude and achievement tests as related to foreign students' achievement in an English course designed for foreign students. The correlation coefficients of the various tests ranged from .45 to .64, with a multiple correlation of .766 (alpha = .01). Three years later, Jones, Kaplan, and Michael (1964) replicated the study using a modified form of the battery examined by Jones and Michael in 1961. The students' scores on the six tests were related to their academic performance, as measured by GPA in courses taken over a period of four semesters and by a composite rating of the students' transcripts. Correlations of the six tests with GPA ranged from -.02 to .20, with a multiple correlation of .32 (alpha = .01). On the other hand, correlations of the test with the rating of student achievement ranged from .11 to .30, with a multiple correlation of .377 (alpha = .05). Based

on these findings, the authors concluded that the validity coefficients of the various tests were below the magnitude of those found for American students. They hypothesized that the differences in magnitude of validity coefficients may be attributed to the foreign students' use of a pattern of ability different from that employed by the American students, or to instructors' double standard in grading practices.

According to Garrett's (1979) survey of the policies and practices of American universities, the TOFEL was found to be the English test that most admissions decision makers considered when deciding whether to admit a foreign student. A number of predictive studies have been conducted in an attempt to evaluate the benefits to be gained from using the TOFEL. For example, Howang and Dizey (1970) conducted a study of 32 male and 31 female graduate students from China. Of the 63 students, 20 took a course in English as a Second Language (ESL) during their first term of graduate study. The authors correlated the TOFEL scores with the students' first-term GPA and with the 20 students' scores in ESL classes. The authors found that TOFEL scores had greater predictive validity for ESL scores (.66, alpha = .05) than for students' academic success as measured by the first-term GPA.

A complete examination of the TOFEL's predictive validity was conducted by Gue and Holdaway (1973). Data were collected over four years on 123 graduate students from Thailand. The predictor data consisted of (1) the students' TOFEL scores collected at two different periods and (2) the students' interview scores. The researchers conducted several correlational analyses between the TOFEL scores and the

students' final GPA. The findings, as presented in Table 2, indicated that TOFEL total scores and subtest scores tended to have a significant positive correlation with the students' final GPA.

Table 2.--Correlation between TOFEL scores and students' final GPA.

TOFEL Subtest	TOFEL Summer (1)	TOFEL Fall (2)
Listening comprehension	.38*	.52*
English structure	.51*	.55*
Vocabulary	.34*	.48*
Reading comprehension	.38*	.51*
Writing	.51*	.53*
Total TOFEL score	.49*	.59*

Source: Gue and Holdaway, 1973, p. 98.

*Significant at alpha = .01.

Note: Numbers in Table 2 indicate Pearson product-moment correlation coefficient between final GPA and TOFEL scores administered in (1) summer and (2) fall for the total group (N = 123).

Although some of the subtest correlations were somewhat low, the trend of the total correlation result indicated that TOFEL scores adequately predicted students' academic achievement as measured by their final GPA. Further, scores on the TOFEL administered after students had completed the summer English program showed a somewhat higher consistent correlation than did scores on the TOFEL administered immediately after the students' arrival. This finding suggests that the summer English program helped the students improve their English and test-taking skills and enhanced their ability to achieve scores

that reflected their actual English competency. When the TOFEL subtest scores and total scores were used as predictors in stepwise multiple regression analyses, the total-group and subgroup analyses showed no consistent findings. All of the TOFEL scores failed to show a consistent superiority in predicting students' final GPA. However, according to Gue and Holdaway, the various correlation analyses

> provided some support for the continued use of objective test language proficiency in predicting academic achievement. It also indicated that further experimentation should be conducted with the use of interview panels as a selection procedure for foreign students applying for admission to universities wehre English is the language of instruction. (p. 103)

Although most of the studies reviewed thus far examined the predictive validity of English test scores, other studies have been concerned with the predictive validity of other preadmission data. Many researchers have argued against complete reliance on English test scores as a predictor of foreign students' academic achievement. Based on the literature concerned with the TOFEL's predictive validity, Riggs (1981) argued that

> The TOFEL does not, nor does it purport to, yield a measure of prediction of academic success. . . . Based on the premise that TOFEL scores for foreign students applying for regular admission to American colleges and university are an inadequate measure of prediction of success as measured by GPA, it is now suggested that another measure, a cloze test score, should be employed because cloze tests on actual course material will predict a foreign student's success better than TOFEL scores. (pp. 12, 14)

Accordingly, Riggs conducted a study to compare the predictive validity of TOFEL scores and cloze test scores as they relate to student GPA. Both tests were administered within a one-week period to 23 foreign undergraduate students. After the students completed two semesters of

academic work, official reports of their GPA's were obtained. Finally, the Spearman rank-order correlation technique was used to complete the correlation coefficient. The findings presented in Table 3 lend support to the use of cloze test scores as predictors of foreign students' academic achievement. Although the sample in Riggs's study was very small, the direction of the findings confirmed the superiority of cloze test scores in predicting students' GPA.

Table 3.--Correlation of TOFEL and cloze test scores with student overall GPA, fall GPA, spring GPA, and cumulative GPA in chemistry and composition courses.

Variable	Overall GPA	GPA Fall Semester	GPA Spring Semester	GPA in Chemistry and Composition
TOFEL	.29	.33	.10	.50
Cloze test	.57*	.67	.27	.70

*Significant at alpha = .05.

Additional studies of foreign students have been concerned with evaluating the possible benefits to be gained from using standardized aptitude test scores (SAT, ACT, GRE, MAT, and GMAT) as a basis for judging foreign students' academic potential. Some of these studies focused on comparing foreign students' scores on these tests with those obtained by American students. The findings of these studies confirmed that foreign students are at a disadvantage when their academic success

is judged according to their performance on standardized tests. Therefore, it was suggested that these tests should not be used when considering the admission of foreign students.

Other researchers have argued that foreign students' aptitude scores do have a meaning and that they can be used as predictors of their future academic success. Howell (1968) stated this argument as follows:

> The main pcint we are making . . . is that SAT scores of foreign students of non-English background do have one meaning of the same kind--if not of the same strength--as they have for students who are natives of the United Sites. This meaning is derived from the fact that they enable us to predict college grade point average with at least a slight measure of confidence. (p. 230)

He went on to say,

> If SAT scores are to be used in the selection or placement of foreign students of non-English background, the scores should not be interpreted as having identical meaning with that of U.S. students, unless there is specific evidence that this is true for the particular institution and group in question. (p. 232)

Howell's argument was based on the logic of prediction theory, which states that the value of any selection device can be derived from the degree of its association with the student's probable performance. In an attempt to test the merit of his argument, Howell investigated the predictive validity of foreign students' SAT scores. The findings of the study were consistent with his argument. Whereas the correlation of SAT-Verbal with GPA was inconsistent, the SAT-Mathematics correlation with GPA was almost comparable to that achieved with the American sample. The correlations ranged from .19 to .31, with a median of .28. Further findings showed that SAT-V + SAT-M had multiple correlations that ranged from .19 to .43, with a median of .31.

Moreover, the findings showed that the foreign students' mean GPA was more favorable than their test scores. This finding implies that when foreign students' aptitude test scores are judged according to the same criteria as those used with the American students, such scores tend to underpredict their academic achievement. Accordingly, Howell stated that a valid use of foreign students' test scores as predictors of their academic achievement requires accurate interpretation, based on the findings of a scientific examination of a large number of foreign students' test scores as compared to their GPA in various fields.

Additional evidence supporting Howell's argument was found in studies conducted by Carlson (1967), Wilcox (1973, 1975), AACRAO (1971), Sokari (1980), and Eliting (1970). The findings of these studies indicated that, despite the low performance of foreign students on verbal aptitude tests, their scores tended to show consistent predictive validity of their GPA. While SAT-V tended to have lower validity coefficients, SAT-M showed validity coefficients similar to those found in prediction research on American students (AACRAO, 1970; Eliting, 1970; Sokari, 1980).

Ainsworth (1957) conducted a study of 50 Arab students at the University of Texas. He examined the possibility of predicting foreign students' academic achievement by using their scores on the following tests: (1) the Diagnostic Reading Test (DRT), (2) the Culture-Free Test of Intelligence (CFTI), (3) the Survey of Study Habits and Attitudes (SSHA), and (4) the Test of Aural Comprehension of English for native speakers (TAC). The first two tests were administered in their

standard form. Tests 3 and 4 were translated into Arabic. Using Pearson product-moment correlations, Ainsworth computed the relationship between students' test scores on the four scales and their GPA. Results of the analysis indicated that GPA had a correlation of .46 (alpha = .05) with students' scores on the SSHA, .35 (alpha = .05) with scores on the DRT-Vocabulary, .34 (alpha = .05) with scores on the DRT-Comprehension, and .32 (alpha = .05) with total scores on the DRT. The multiple-correlation analysis showed that SSHA and DRT-Vocabulary had a correlation of .52 (alpha = .01). The remaining variables showed no apparent evidence of a significant relationship with student GPA. Based on these findings, the researcher concluded that the measures of foreign students' study habits and attitudes and English language can be used to predict their academic achievement as measured by GPA.

At the graduate level, a number of researchers have attempted to evaluate the benefits to be gained from using aptitude test scores to predict foreign students' future performance. Ayers and Peters (1977) investigated the effectiveness of TOFEL and GRE scores in predicting the GPA of 50 foreign students. The correlational analysis indicated that foreign students' overall GPA had a correlation of .40 (alpha = .01) with the TOFEL scores, .27 with the GRE-V, .55 (alpha = .05) with the GRE-Q, and a multiple correlation of .71 (alpha = .01) with the TOFEL and GRE-V. Based on these findings, the authors concluded that TOFEL scores may be used as predictors of foreign students' overall GPA. Further, they concluded that the combination of TOFEL and

GRE-V scores appeared to be a reasonable predictor of foreign students' academic success.

Another study, slightly different in nature from Ayers and Peters's study, was carried out by Sharon in 1972. He designed the study to determine (1) the predictive validity of TOFEL scores and GRE scores and (2) to examine the possibility of using TOFEL scores as a mediator of the relationship between the GRE-V and students' GPA. Subjects of the study were 975 graduate students from 24 American institutions. Because of school variations in grading standards, the researchers introduced an additive and multiplicative constant for adjusting the predicted grades in each school. The constant factor was determined by the variability and average level of performance of particular schools' GPA distributions. The study findings, as shown in Table 4, suggest that the TOFEL, GRE-V, and GRE-Q can be used as predictors of foreign students' future academic success. Although some of the correlations were low, the overall results indicated that the various test scores bore a somewhat consistent positive relationship with students' GPAs. Also, the findings confirmed that GRE-Q was the best predictor of all of the subjects' GPA. Further, when subjects were subgrouped according to their performance on the TOFEL (low, middle, or high scores), the correlation of GRE-V and GRE-Q with GPA increased significantly for subjects with TOFEL scores in the low and middle ranges. On the other hand, for subjects with high TOFEL scores, the correlation of GRE scores with GPA did not increase. This suggests that English test scores can be used to moderate the validity

coefficient of aptitude test scores. In contrast to the two preceding studies, Maberly (1963) examined the predictive validity of the GRE scores and found little evidence of their ability to predict foreign students' academic GPA.

Table 4.--Correlations between students' scores on the GRE-V, GRE-Q, and TOFEL and their GPA in various disciplines.

Subject	GRE-V	GRE-Q	TOFEL	TOFEL+GRE-V	TOFEL+GRE-Q
Engineering, tech. and math	.22	.39	.21	.23	.39
Natural science	.41	.59	.39	.42	.61
Other	.35	.28	.28	.39	.39
All subjects	.24	.32	.32	.27	.34

Moghrabi (1966) examined the factors that influenced the degree of success or failure of foreign students at Texas A & M University. The study results revealed that GRE-V, GRE-Q, and GRE-Advanced were good predictors of students' GPA. The student GPA had a correlation of .54 (alpha = .05) with GRE-V, .57 (alpha = .05) with GRE-Q, and .59 (alpha = .05) with GRE-Advanced. Further, the study indicated that both age and marital status correlated significantly with student GPA (.33, alpha = .05).

Cieboter (1969) examined the interrelationship between foreign students' GPAs, GRE scores, country of origin, and major field of study. Specifically, he addressed several questions regarding the interrelationship of (1) GRE scores with country of origin and major

field and (2) GPA with country of origin, major field, and GRE scores. As a result of the overall analysis, Cieboter drew the following conclusions:

1. Foreign students' GRE-V scores were substantially lower than those of the normal population.

2. GRE-V scores varied significantly according to the distance of the student's home from America and Western culture. The closer the student's home to the United States, the higher his GRE-V scores.

3. The foreign students' GRE scores showed no significant variation across major field, except for the GRE-Q for the Engineering Department.

4. GPA had a considerable relationship with the student's geographical region of origin.

5. GRE scores did not have a consistent relationship with students' GPA.

6. Finally, the best predictor of GPA was students' first-semester GPA.

A comprehensive study that examined the predictive validity of a number of business-school preadmission data was carried out by Hendel and Doyle (1978). The study sample comprised 67 foreign graduate students working toward their master's degrees in a business administration program. The study was designed to examine the predictive validity of the following variables: (1) age; (2) months between bachelor's degree and graduate study; (3) quality of undergraduate school, as rated by the director of graduate study in business;

(4) overall UGPA; (5) UGPA in business; (6) number of undergraduate business courses to be made up; (7) amount of previous business experience; and (8) scores on the ATGSB (verbal, quantitative, and total). The criterion measures that were used to assess academic success were first-quarter GPA, cumulative GPA, number of incomplete grades received, number of course withdrawals, number of credits completed with A or B grades, number of months between the beginning of graduate study and graduation, and graduation status. The researchers performed several simple and multiple-correlation analyses, but the resultant correlations showed no consistent pattern. However, for the foreign student group whose primary language was English, only 7 of the 77 bivariate correlations were significantly different from zero. On the other hand, for the non-English-speaking group, 24 correlation coefficients were significant. Table 5 shows some of the correlational findings. The lack of consistency in the correlations prevented the researchers from drawing a general conclusion that could be generalized to the entire group. However, the researchers stated,

> No linear combination of predictor variables dependably predicted any available criteria. More subtle findings, largely from inspection of bivariate correlations, seemed to suggest that, if predictable at all, success for the two types of students would be differentially predictable and that different criteria would be differentially predictable. (p. 414)

Table 5.--Correlational findings of the Hendel and Doyle (1978) study.

English-Speaking			Non-English-Speaking		
Predictor	Criterion	r	Predictor	Criterion	r
Age	# of months from entry to graduation	.41	Age	# of months from entry to graduation	.34
Reputation of undergraduate school		.47	ATGSB-Total	First-quarter GPA	.51
Undergraduate GPA	Graduation status	.25	ATGSB-Q	"	.39
ATGSB-Total	A/B credit	.27	ATGSB-V	"	.40
ATGSB-Q	A/B credit	.29	ATGSB-Total	CGPA	.51

The American Association of Collegiate Registrars and Admission Officers (1971) conducted a large-scale study with 1,004 foreign students (438 undergraduates and 566 graduates) from 40 countries. The study was designed to examine the predictive validity of birth year, various types of home-school qualities, English scores, TOFEL scores, SAT-V and SAT-Q scores, and GRE-V and GRE-Q scores. The criterion measures employed were first-semester GPA, second-semester GPA, first-year GPA, AI = $(GPA)^2$ x credits earned, and graduate student rating by major advisor. Correlational analyses at the undergraduate level

indicated that all predictors correlated significantly with all the criterion measures. Although some of these correlations were low or negative, the overall resultant correlations suggested that the examined predictors had varying degrees of positive correlation with the various criterion measures. Also, the findings showed that SAT-Q was the best consistent predictor of the criterion measures. The correlations ranged from .12 to .50, with a median of .48. Further, the multiple-correlation analysis result was .61 using SAT-Q, Q-campus, and age as predictors of first-semester GPA. Finally, the findings confirmed that the subgrouping analysis by country, major field, and level of English test scores contributed to the improvement of predictor validity.

The analysis of graduate-student data yielded a number of significant positive correlations. The English test scores and the institutional rating of student quality were the only predictors that consistently had significant correlations with all of the criterion measures. Faculty rating possessed promise as a criterion measure of foreign graduate students' academic success. Overall, the study results suggested that graduate students' academic success was less predictable than that of undergraduates. This observation is consistent with findings of prediction research concerning American students' academic success.

Another study concerned with the predictive validity of foreign students' previous academic achievement was conducted by Putman (1953) with a sample of 546 graduate students. Putman examined the

relationship of previous academic standing, first-term GPA, various measures of English background, age, sex, national origin, admission status, age, and major with the students' GPA. The available data were compared across nation and major field of study. Further analyses concerned the relationship of the predictors with the GPA achieved at Columbia University. Table 6 shows some of the findings concerning the total sample and some of the countries for which there were complete data on an adequate sample. By examining the identified correlation coefficients, one can notice the following observations:

1. Converting undergraduate standing to a scale similar to the grading standard at Columbia University yielded an overall positive correlation (.23) with total GPA.

2. The various measures of English background tended to correlate positively with student GPA (.12, .33, .37, and .33).

3. First-term GPA had the highest predictive validity, with a correlation of .77 with GPA.

When the correlational analysis was performed for the country subgroups, English background measures and first-term GPA continued to have a consistent positive correlation with the total GPA. Other variables did not show consistent evidence in both types of correlational analyses. Accordingly, Putman recommended using converted undergraduate academic standing, English background, and academic background in major field as criteria for judging foreign students' admissibility.

Table 6.--Correlation between predictors and total GPA for the total sample and for nationality subgroups.

Predictor	Total Group	China	Puerto Rico	India	Philip-pines
Converted undergraduate standing	.23(447)	.18(62)	.46(99)	.24(132)	-.05(43)
Years postsecondary study	.03(538)	.28(73)	-.03(99)	-.06(157)	.11(46)
Points preadmission English course	.12(155)	.37(52)	.03(98)	...	...
Mean preadmission English grades	.33(155)	.36(57)	.35(98)	...	...
English exam rating	.37(203)	.72(49)	.40(52)	.44(32)	...
Mean GPA in English courses	.33(166)	.36(57)	.35(98)	...	...
Age at entrance	.12(545)	.01(73)	-.06(99)	.13(163)	.20(45)
Term of enrollment at Columbia	.07(546)	...	...	...	...
First-term GPA	.77(518)	.72(73)	.75(99)	.79(155)	.86(39)
Total points enrolled per term	.17(546)	.29(73)	.24(99)	.07(163)	.24(46)

Source: Putman (1953).

Hountras (1955) designed a study to examine the relationship between a number of nonintellective preadmission data and foreign students' academic achievement at the University of Michigan. Data on students' sex, age at admission time, marital status, type of admission, degree held at admission, and financial status were collected from the files of 597 foreign graduate students. Hountras used chi-square, Fisher t-test, and analysis of variance to examine the hypotheses. On the basis of the analysis results, he drew the following conclusions:

1. Graduate students' sex and age bear no significant relationship to their academic achievement.

2. Variables such as marital status, type of admission, degree held at admission, and financial status showed a significant relationship with student academic status.

The findings indicated that foreign graduate students who were married, received unconditional admission, had advanced degrees, and had stable financial conditions were less likely to incur probationary status than those students who were single, received a provisional admission, had a bachelor's degree, or had been admitted with no financial aid. Another study by Hountras (1953) showed that country of origin and field of study were positively related to student achievement. Students from the Far East, the Near East, and Latin America, and students in social and physical sciences, were more likely to incur probationary status than other students. In general, examination of

the nonintellective factors as predictors of foreign students' academic achievement did not reveal consistent findings.

Tellen (1971) reviewed a number of studies that had examined the predictability of several nonintellective factors. The overall results of the studies showed little evidence of a consistent association between the nonintellective predictors and the student's academic success, as measured by GPA. The inconsistency of findings may be attributed to inadequate sample size, inadequate statistical analysis, and poor study design, or it may be attributed to the lack of a relationship between these predictors and academic achievement. At any rate, the final word regarding the effectiveness of these predictors can be derived from conducting a study that examines their effectiveness in moderating the relationship of intellective predictors with measures of academic success.

Summary

The foregoing review of related literature focused on studies that were designed to estimate the predictive validity of a number of predictors thought to be effective for forecasting foreign students' academic success. The studies were selected in such a way as to insure a comprehensive coverage of all aspects of foreign-student prediction research. Specifically, selection of the studies was based on such criteria as degree level, sample size, study design, type of predictor examined, and method of analysis. Based on this review and the reviews conducted by Hale, Stansfield, and Duran (1984), Tellcen (1971), and Chai and Woehike (1979), the following conclusions seem warranted:

1. Although the number and quality of prediction studies on foreign students are not comparable to those on American students, the findings of such research revealed a promising sign for future research. Further, the findings suggested the need for more studies that permit a full control of all the variables that directly or indirectly affect the magnitude of the main predictor's validity coefficient.

2. Prediction research on foreign students' academic achievement is subject to the same deficiencies inherent in studies of American students. Further, such research is subject to other deficiencies imposed by the diversity of foreign students in terms of culture, English background, and educational experience. Such diversity introduces many problems that prevent the researcher from reaching an accurate estimate of the benefits to be gained from using a particular selection device. Additional deficiencies have resulted from the difficulty involved in using student indices of previous achievement and from the lack of an adequate aptitude test that would provide a comparable measure of foreign students' academic aptitude.

3. The predictors of foreign students' academic achievement seem to fall into two categories: intellective and nonintellective predictors. Intellective predictors are previous academic indices, standardized test scores, and English test scores. The foregoing review revealed that converted previous academic indices and standardized test scores can be used as predictors of foreign students' academic achievement. In particular, foreign students' scores on the

mathematical version of aptitude tests have shown consistent evidence of being a good predictor of GPA. However, adequate use of previous academic achievement and standardized tests requires accurate interpretation of what the data on both predictors mean in terms of the academic standards at a particular university. Such an interpretation should be based on an examination of a large number of foreign students' previous grades and test-score distribution as they correspond to GPA distribution at a particular institution.

Further, findings suggested that mastery of the English language seems to be a logical predictor of success (Schuring, 1980). In spite of the argument against the use of English test scores as a predictor of foreign students' academic achievement, the predictive validity of the commonly used tests lends support to their use in selecting foreign students for a particular program. In addition to the empirical evidence, several research efforts have provided a logical rationale for using English test scores in making admission decisions regarding foreign applicants. Such a logical rationale was based on the apparent evidence of a strong association between foreign students' English test scores and their scores on standardized aptitude tests. The rationale was also based on the fact that foreign students' academic success requires adequate mastery of the English language.

The nonintellective predictors that showed a strong association with foreign students' academic achievement were such variables as age, sex, marital status, major field of study, country of origin, and study habits. Specifically, age, major field, and country of origin were

found to be effective in increasing the validity of the intellective predictors.

4. The optimum situation in which one can estimate the benefits to be gained from using particular selection devices would be one in which full control of other variables is evident. Full control of all the variables that directly or indirectly affect the magnitude of the main predictor's validity coefficient requires the examination of large samples of foreign students. Such samples should be large enough to permit a separate estimation of the main predictor's validity coefficient according to the students' age, sex, major field, degree level, and country of origin. Another ideal situation in which one can estimate accurately the value of preadmission data would be one in which the researcher can locate an adequate sample of foreign students from a particular country, studying in a particular college in a particular United States institution (Wilcox, 1973).

5. The first-term GPA achieved at the American school seemed to be a promising predictor of foreign students' future performance.

Overall, the exploration of the literature about the prediction of foreign students' academic success revealed that the heterogeneity of the foreign student population, the small size of the foreign student population at a particular university, lack of uniform data that could be used to predict their academic success, and the difficulty of using their previous grades for the purpose of prediction are the major problems that have prevented researchers from reaching consistent findings regarding the predictability of foreign students' academic

success. Accordingly, the present study was designed in such a way as to permit adequate control over the influences of the aforementioned problems. To achieve this goal, the researcher attempted to locate a larger sample, from which stable findings could be drawn, and at the same time permit adequate control over the sources of population heterogeneity that are thought to influence the magnitude of the predictors' overall predictive validity.

Furthermore, the writer attempted to examine the extent to which foreign students' previous academic standing with respect to the grading system of their home school could predict their academic success, as measured by the defined criterion measures. Moreover, the study attempted to investigate the extent to which GPA 1-year, GPA 2-year, CGPA, academic credit load, and the advisor's rating of the doctoral student's academic competence could be used to assess foreign graduate students' academic success in American schools. Finally, the study examined the power of GPA 1-term as a potential predictor of foreign students' academic success.

CHAPTER III

METHODOLOGY AND RESEARCH DESIGN

Hypotheses and Research Questions

The present study was based on the assumption that identifying valid criteria for selection of foreign students would help admission decision makers make accurate decisions regarding prospective foreign students' admissibility into particular graduate programs. Using this assumption, the investigator focused on examining the following hypotheses, which relate directly to the problem of predicting the academic success of foreign graduate students from the common preadmission data required by MSU graduate schools.

Hypothesis 1: Foreign graduate students' index of previous academic achievement (at the undergraduate level) (IPAA) bears no significant predictive validity to their graduate academic success, as measured by (a) first-term GPA, (b) cumulative GPA achieved in MSU graduate schools, and (c) the major academic advisors' ratings of their overall academic competence.

Hypothesis 2: Foreign graduate students' English test scores (average), as measured by the test of English proficiency designed by the English Language Center at MSU, bear no significant predictive validity to their academic success, as measured by (a) first-term GPA, (b) cumulative GPA achieved in MSU graduate schools, and (c) the major academic advisors' ratings of their overall academic competence.

Hypothesis 3: Foreign graduate students' English test scores, as measured by the TOFEL, bear no significant predictive validity to their academic success, as measured by (a) first-term GPA, (b) cumulative GPA achieved in MSU graduate schools, and (c) the major academic advisors' ratings of their overall academic competence.

Hypothesis 4: There is no significant linear relationship between foreign graduate students' sex and their academic success, as measured by (a) first-term GPA, (b) cumulative GPA achieved in MSU graduate schools, and (c) the major academic advisors' ratings of their overall academic success.

Hypothesis 5: There is no significant linear relationship between foreign graduate students' chronological age and their academic success, as measured by (a) first-term GPA, (b) cumulative GPA achieved in MSU graduate schools, and (c) the major academic advisors' ratings of their overall academic competence.

Hypothesis 6: There is no significant linear relationship between foreign graduate students' marital status and their academic success, as measured by (a) first-term GPA, (b) cumulative GPA achieved in MSU graduate schools, and (c) the major academic advisors' ratings of their overall academic competence.

Hypothesis 7: Foreign graduate students in different fields of specialization do not differ significantly in terms of their academic achievement, as measured by (a) first-term GPA and (b) cumulative GPA achieved in MSU graduate schools.

Hypothesis 8: There is no significant difference in terms of academic achievement, as measured by (a) first-term GPA and (b) cumulative GPA, between foreign graduate students from different countries.

Hypothesis 9: There is no significant difference in terms of academic achievement, as measured by (a) first-term GPA and (b) cumulative GPA, among foreign graduate students admitted to MSU graduate schools on the basis of different English-proficiency statuses.

Hypothesis 10: Foreign graduate students who achieved a score of 80 or above on the MSU English test (average) do not differ significantly in terms of academic achievement, as measured by (a) first-term GPA and (b) cumulative GPA, from those who achieved a score below 80 on the same test.

In addition to the preceding null hypotheses, the writer also examined the effectiveness of GPA 1-year, GPA 2-year, and academic credits accumulated at different points in the graduate program as criteria of foreign graduate students' academic success. The writer also examined the value of first-term GPA (GPA 1-term) as a potential

predictor of foreign graduate students' academic success, as measured by cumulative GPA (CGPA) and advisors' ratings of their academic competence. Furthermore, the investigator attempted to answer the following research questions:

Research Question 1: To what extent can the nonintellective predictors (such as sex, age, marital status, national origin, and field of specialization) be used as moderator variables to increase the overall prediction accuracy of the intellective predictors (TOFEL, MSU-AETS, IPAA, and GPA 1-term)?

Research Question 2: What is the relative predictive validity of each of the subtest scores of the English test designed by the MSU English Language Center?

Research Question 3: To what extent do the MSU English test scores (average and subtests) vary according to differences in foreign graduate students' fields of specialization?

Research Question 4: Which of the MSU English subtest scores bear more predictive validity to foreign graduate students' academic achievement, as measured by (a) first-term GPA, (b) cumulative GPA achieved in MSU graduate schools, and (c) the major academic advisors' ratings of their overall academic competence?

Nature of the Study Population and Sample

The logic of inferential statistics states that estimation of a particular population parameter requires the choice of an adequate sample that is representative of the target population. Theoretically, a representative sample can be selected in many different ways. Under normal conditions, the researcher can employ commonly used sampling techniques (random, systematic, cluster, etc.) to select the sample, which will produce an accurate estimation of the population parameter. However, in social science research, there are many situations in which it is impossible to apply the logic of sampling procedure to draw a desirable sample from the target population.

For example, in prediction research where the researcher is forced to deal with an explicit selected group, it is impossible to select a sample that will represent the whole range of the population. Because of the nature of prediction research and the difficulty of obtaining data about the criterion measure of the unselected group, researchers are forced to deal only with the group of students who were accepted or remained in a particular program. Consequently, estimation of the common selection devices never reaches the optimal level that might result if the unscreened group were included in the sample. Generally, in a practical setting, it is difficult to collect data about the criterion measure from the unselected group. Therefore, researchers have estimated and will continue to estimate the utility of selection devices using a sample that does not represent the whole domain of students.

Given the foregoing limitation, which has inhibited the utility of prediction researchers, better estimation of a selection device's validity coefficient is likely to result from a sample that can be selected from the available population according to the rules of common sampling techniques. However, application of sampling techniques is appropriate when the researcher has a large, homogeneous population and has complete data on the predictors and criteria. In contrast, when the population is small and heterogeneous and the researcher does not have complete information on the predictors and criteria, application of sampling techniques would be of limited value.

In general, the problems of sample size and sample selection are considered to be the major factors inhibiting the findings of prediction research. This is particularly true when students comprising the population are from foreign countries. As a result of the heterogeneity and the smallness of the foreign-student population, most researchers have been forced to deal, at best, with an incidental or a convenience sample. Consequently, outcomes of prediction research with foreign students have been inconsistent and are of limited value for selection purposes.

This problem has been recognized by many researchers concerned with predicting foreign students' academic achievement. Some investigators have suggested possible solutions that may allow for sample biases. In this regard, Wilcox (1973) suggested:

> The ideal situation in which to predict the academic success of foreign students would be to find an adequate number of students from a particular country studying in a particular U.S. institution at a given level in a given field at a given time. With these variables under control, the predictive validity of previous academic performance, test scores and other preadmission variables could be assessed more objectively. Unfortunately, this situation does not exist and investigators have been forced to compromise the homogeneity of their sample in order to achieve an adequate sample size. Some have pooled students from a variety of countries, and others have pooled students across U.S. colleges or fields of study or time. In all cases, this pooling tends to suppress the level of actual predictor criterion relationship. (pp. 623-24)

Actually, a homogeneous sample as described by Wilcox seldom exists when research involves foreign students. The population of foreign students in most American schools is very small and heterogeneous. Unlike Americans, foreign students vary widely with respect to national origin, English-language proficiency, previous educational

preparation, and the way in which their previous grades have been reported. Therefore, it was difficult to locate a sample that met Wilcox's criteria.

Given the aforementioned limitation imposed on the prediction of foreign students' academic achievement, it became clear that pooling students across colleges, country of origin, and time was necessary to generate an adequate sample from which accurate and stable findings could be drawn. After examining the size of the foreign student population at MSU, it was difficult to locate an adequate sample that met Wilcox's criteria for the ideal situation for predicting foreign students' academic achievement.

Accordingly, the investigator attempted to pool the foreign students over a period of four years. As a result, the study population comprised all foreign graduate students who were enrolled in MSU graduate schools between fall term 1978 and spring term 1982.

After the boundaries of the population were defined, the sample was chosen in a way that would permit adequate control over the variables that would directly or indirectly affect the magnitude of the selection device's validity coefficient. To achieve this goal, the writer attempted to review the records of all foreign graduate students who had completed 12 or more credits. The sample included 1,103 students from 33 countries (see Table 3, Appendix G). Because of the diversity of the foreign student population with respect to English proficiency and the way in which their previous grades had been reported, it was difficult to locate complete information on all of the

intellective predictors and criterion measures for the defined sample. However, the available subjects with complete information seemed to fulfill the purpose of an objective predictive study. (See Tables 1, 2, 3, and 4, Appendix G.)

Predictors and Criteria of Graduate Academic Success

Predictors

Based on the study hypotheses and research questions, the validities of the following predictors were examined as they were related to the criteria of foreign students' academic success.

Intellective predictors. The intellective predictors examined in this study were (1) TOFEL scores, (2) MSU English test scores (average and subtests), and (3) the index of previous academic achievement (IPAA) (previous academic grades converted to a scale similar to the grading scale used at MSU). Further, the writer attempted to examine the effectiveness of first-term GPA achieved in MSU graduate school as a potential predictor of foreign students' long-term academic success, as measured by CGPA and advisors' ratings of students' academic competence.

Nonintellective predictors. To maximize predictive accuracy and to minimize the influence of the study subjects' heterogeneity on the magnitude of the intellective predictors' validity coefficient, the study incorporated a number of nonintellective predictors. Although most previous prediction research has focused on examining the predictive validity of intellective predictors, recent trends in prediction research have emphasized the importance of nonintellective predictors.

Many researchers have found the nonintellective predictor to be more stable than the intellective predictor in predicting students' academic achievement (Smith, 1980; Sokari, 1980). Also, it was found that considering nonintellective predictors in prediction research is effective in improving overall prediction accuracy. This was particularly true when nonintellective predictors were used as moderator variables to locate a subgroup for whom a particular predictor or set of intellective predictors predicted academic success more accurately than they did that of the total study subjects and the other subgroups (Sokari, 1980).

According to the foregoing argument, the writer attempted to examine the value of foreign students' sex, marital status, age at the time of admission, type of curriculum, and country of origin in predicting foreign graduate students' academic achievement. More specifically, the utility of the aforementioned variables was evaluated as a predictor of students' academic achievement and as a moderator of the intellective predictors' validity coefficients.

Criterion of Graduate Academic Success

The criterion of academic success is one of the unsolved problems in prediction research. This is particularly true when such research is concerned with graduate students' academic success. Although GPA has been found to be a practical measure of academic success at the undergraduate level, it has been proven inadequate for assessing success in graduate school. This is because academic success

at the graduate level involves various aspects that cannot be represented by first-term or cumulative GPA. Furthermore, the inadequacy of GPA as a criterion of academic success is intensified when prediction research is concerned with foreign students' academic success. In addition to the shortcomings inherent in GPA as a criterion of American students' academic success, foreign students' GPA is subject to other deficiencies, such as a double standard in grading practices and variations among foreign students with respect to the difficulty of courses in which they enroll and the number of credits they carry each term.

Although the potential shortcomings of GPA as a criterion of graduate students' success are legitimate, GPA is still of great importance to decision makers in determining whether a particular student is allowed to continue his program of study. Most admission decision makers consider GPA the major criterion against which they make a judgment regarding the continuation of a student in a particular program.

Based on the foregoing argument, it is clear that GPA of foreign students is worth predicting. Accordingly, the investigator employed foreign graduate students' GPA as the major criterion of their academic success. Since the first term is a period of adjustment for foreign students, and since some of them carry just a few credits or enroll in less-demanding courses to achieve the minimum grades required for continuation in the program, first-term GPA may not represent the whole picture about foreign students' long-term academic potential. First-year, second-year, and cumulative GPA were believed to be more

reliable and therefore were used in addition to first-term GPA as criteria of academic success in MSU graduate school.

Because many researchers have argued against using GPA as a measure of graduate students' academic success, the investigator also attempted to use advisors' ratings of students' academic competence as a complementary criterion of doctoral students' academic success. The researcher also used credit load computed at different points in the graduate program as a second complementary criterion of foreign graduate students' academic success.

Instrumentation and Data Collection

The data necessary for examining the hypotheses and research questions were collected from four sources. Information about students' sex, age, marital status, country of origin, GPA, and credit load computed at different points in the graduate program was collected from the students' permanent files stored in the university computer. Information concerning students' previous academic grades was obtained from the students' permanent files at the Registrar's Office. The third source of information was students' English-language test scores (TOFEL and MSU English test), which were collected from their files at the MSU English Language Center. Last, advisors' ratings of doctoral students' academic competence were collected by means of a rating scale designed by the researcher. (See Appendix H.)

Data were collected under the supervision of Dr. James Stalker, Director of the English Language Center. After the boundaries of the

study population and sample were defined, the study director asked an official in the main administration office to provide the necessary data.

To facilitate data collection and to protect subjects' anonymity, the researcher designed the data-collection chart and the rating scale in such a way that the information that might identify particular students could be removed. The information was given to the researcher without any identification of individual students.

Method of Using Previous Grades as a Predictor

One problem that has plagued researchers concerned with predicting foreign students' academic achievement has been the lack of uniform information to measure actual academic potential. The lack of adequate standardized tests and the difficulty of using previous grades to judge students' probability of academic success have forced many researchers to focus on examining the predictive validity of English test scores. However, despite the difficulty of interpreting foreign students' previous grades, they are the most important measure used by admission decision makers in determining foreign students' admissibility into American graduate schools.

Instead of using objective data, admission decision makers rely heavily on experience and intuition to interpret what foreign students' previous grades mean in terms of the academic standards of their former schools. Although admission decision makers rely on foreign students' previous grades when judging their probability of success in a particular program, little effort has been made to examine the accuracy of

their interpretation or to determine the value of such grades in making accurate admission decisions.

In the present study, the investigator attempted to evaluate the degree to which foreign students' previous grades could predict their academic achievement. Based on preliminary examination of a sample of transcripts, the writer found that it is impossible to use actual grades, as they are reported, to predict academic achievement. This is because the ways in which grades are reported differ widely across countries and among universities within each country. Also, grading systems are so diverse that none of the techniques used to equate American students' grades achieved at different universities is appropriate for use in equating foreign students' grades for purposes of prediction.

However, the researcher noticed that the grading systems in a number of countries are similar with respect to the scale categories used in reporting grades. Accordingly, he assumed that if a student's overall previous academic standing with regard to the grading system of the school from which he earned his degree could predict his academic standing on MSU's grading system, it would provide valuable information that could be used to judge foreign students' admissibility into a particular MSU graduate school.

To test the foregoing assumption, the transcripts of students from countries shown in Table 4, Appendix G, were obtained from the Registrar's Office. The transcripts were given to the researcher

without any identification other than country name, course titles, grades, and a detailed description of the grading system.

To transform the grades of foreign students from various countries into a uniform scale, the grading system of each school was rescaled on the basis of a four-point scale. (See Table 5, Appendix G.) Then the rescaled grading system was used to compute foreign students' overall previous academic standing (IPAA). Specifically, the students' grade in each course was transformed in accordance with the rescaled grading system of his school. Then all of the transformed grades were added together and divided by the number of courses taken. The resultant value was used as the student's index of previous academic achievement. Although such a procedure had not been attempted before and the converted previous grade (IPAA) may overestimate or underestimate the student's previous achievement level, this was the only procedure that could enable the use of previous academic grades as a predictor of foreign students' academic achievement in MSU graduate school.

By using the aforementioned procedures, it was possible to transform the previous grades of 346 foreign students from 12 countries (see Table 4, Appendix G). The actual previous grades of 127 of these students were reported on a scale of 1 to 100. When the actual grades of these students were correlated with the corresponding converted grades (IPAA), they yielded a correlation of .95 (see Table 7, p. 96). This correlation suggested that the transformation procedure was highly consistent and accurate. Therefore, it was assumed that if the

converted previous grades could predict foreign students' GPA in MSU graduate school, the procedure would be of great help to admission decision makers when judging foreign students' future academic potential. Also, the procedure would be valuable for those interested in accurately predicting foreign students' academic achievement.

Data Analysis

As stated earlier, the study was undertaken to examine the predictive validity of a number of preadmission criteria used by admission decision makers at MSU to judge foreign students' potential for academic success in various graduate schools. After the available data were collected and coded, they were analyzed in light of the study hypotheses and research questions.

At the first stage of data analysis, zero-order correlation was employed to compute the intercorrelation of the study predictors and criterion measures for the total study subjects. Specifically, the data analysis at this stage sought to determine the separate intercorrelations within each of the predictors and the criterion measures. Also, it was intended to compute the predictive validity of the intellective and nonintellective predictors as they were related to the criteria of academic success (GPA and credit load accumulated at different points in the graduate program and advisors' ratings of doctoral students' academic competence).

Because the study sample included a number of homogeneous subgroups whose similar characteristics may have influenced the magnitude of the intellective predictors' validity coefficients when they

were estimated for the total heterogeneous group, a separate validity coefficient was computed for all of the identifiable groups. Such an analysis was undertaken to identify subgroups for which a particular predictor or set of predictors predicted academic success more accurately than for the total sample or the other subgroups. The final correlation analysis was performed between the country means on the predictors and the criteria. In this analysis, zero-order correlation was employed to determine the extent to which countries' means on the predictor could predict their means on the criterion. Furthermore, rank-order correlation was used to determine how the country's standing with respect to the order of its mean among the other countries' means on the predictor could predict its standing with respect to the order of its mean on the criterion measures.

At the second stage of data analysis, stepwise multiple regression was undertaken to determine whether some optimal weighted combination of the intellective and nonintellective predictors would more accurately predict the foreign students' criteria of academic success than would each predictor alone. Specifically, this analysis was intended to determine the multiple contribution of the various predictors in predicting foreign students' academic achievement and the extent to which the inclusion of nonintellective predictors in the regression model would enhance overall prediction accuracy. Also, this analysis was aimed at determining the most powerful predictor that would contribute significantly to the prediction of the defined criterion measures for the various subgroups and the total study subjects.

Stepwise multiple regression is one of the methods that is used to select from a pool of predictors a small set that accounts for almost as much of the criterion variance as the total set of predictors. Traditionally, the stepwise procedure gained wide popularity among researchers concerned with predicting students' academic success because of its power in determining the preadmission criteria that account for most of the variance in the criterion measure.

In the stepwise procedure, the order in which the predictors are selected to enter into the regression is usually determined by the relative contribution of each predictor to the total possible explained variance. Accordingly, when this method is used to select the minimum number of predictors that best predict the criterion measures, one must:

1. compute the simple correlation matrix between the possible predictor and the criterion measure.

2. select the predictor with the highest correlation with the criterion and insert it into the regression model.

3. enter into the regression model the next variable with the highest squared partial correlation with the criterion.

4. reexamine the regression of the predictor already in the regression model as if it is to enter last, and remove it from the model if its partial-square correlation is not different from zero.

5. repeat steps 3 and 4 with the remaining predictors until no more predictors are admitted to or deleted from the regression model (Draper & Smith, 1979; Marascuilo & Levin, 1983; Pedhazur, 1982).

During the final stage of data analysis, the t-test and one-way ANOVA were used to compare foreign students with respect to the mean of their performance on the predictors (MSU English scores, TOFEL, IPAA) and the criterion measures (GPA and credit load achieved at different points in the graduate program). The t-tests were used when the comparison analysis involved the means of two groups. But when the analysis involved a comparison of more than two means, one-way ANOVA was used to determine the extent to which various groups' means differed from each other. Then, the Tukey pair-comparison procedure was used to detect the location of the differences when the ANOVA analysis yielded significant differences.

CHAPTER IV

RESULTS OF THE DATA ANALYSIS

Total Study Subject Analysis

The main purpose of this study was to estimate the benefit, in the form of a validity coefficient, to be gained from using a number of variables to judge the probability of foreign graduate students' academic success in various MSU graduate schools. Because graduate school admission decision makers use various strategies to make the final admission decision, and because foreign students who seek entrance to these schools are heterogeneous, the predictive validity of common admissions variables were estimated for a number of different groups. Specifically, the predictive validity of each admission variable was estimated for the total study subjects for whom the data were available. It was also estimated for a number of homogeneous subgroups for whom a predictor or set of predictors was thought to yield more accurate predictive validity. Because of the large number of correlations reported in this study, the presentation and discussion of the main findings is limited to those correlations that are related to the study hypotheses and research questions. The remaining correlations are discussed when they help clarify the findings of the main predictors.

At the first stage of data analysis, zero-order correlations were obtained (Tables 7 and 8). Specifically, the analysis at this

stage was designed to estimate the intercorrelations within and between the predictors and criterion measures. The intercorrelations among the intellective predictors are shown in Table 7, section A. Of the 43 reported correlations, 37 were significantly different from zero. In general, the TOFEL scores and MSU English test scores (average and subtest scores) exhibited significant intercorrelations, which ranged from moderate to high. Further, the intercorrelations of the student index of previous academic achievement (IPAA) with the TOFEL scores, and with the MSU-English test were usually significant and ranged from low to roughly moderate. Another finding that needs to be mentioned in this context is the intercorrelation of .95[c1] between IPAA and the actual pAA. This finding suggests that the results of converting the actual pAA into a uniform scale (IPAA) were reasonably consistent and accurate.

The criterion measures also exhibited significant intercorrelations. Student GPA, academic credits accumulated at different points in the graduate program, and indices of academic advisor's rating of student's academic competencies yielded overall highly significant intercorrelations (Table 7, section C). Of the 59 reported correlations, only six turned out to be nonsignificant. The significant correlations ranged from .09[c] to .87[c]. The highest intercorrelations were found among the indices of the major academic advisor's rating and

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[1]In succeeding pages, the significance levels are designated as follows: a = $p \leq .05$ b = $p \leq .01$ c = $p \leq .001$.

Table 7.--Intercorrelation between the predictors and criterion for the total sample.

	TOFEL	Grammar	Vocabulary	Reading	Listening	Writing	Average	Interview	IPAA	PAA	GPA 1-Term	# of Credits Completed	GPA 1-Year	# of Credits Completed	GPA 2-Year	# of Credits Completed	CGPA	# of Credits Completed	Academic Status	ROAC Compared to American	ROAC Compared to Foreign	TRC-A	TRC-F
TOFEL	1.00	.37^{c} 100	.48^{c} 100	.48^{c} 74	.22^{b} 101	.33^{c} 102	.48^{c} 100	...	.16 46	.73^{c} 19	.15^{b} 268	.28^{c} 268	.006 266	.21^{c} 266	.06 183	.23^{c} 183	.06 273	.12^{a} 237	.03 272	.12 34	-.02 33	.008 35	-.09 35
Grammar		1.00	.65^{c} 550	.62^{c} 469	.43^{c} 550	.30^{c} 551	.78^{c} 551	.36^{c} 166	.34^{c} 340	.11 124	.29^{c} 513	.20^{c} 513	.17^{c} 512	.23^{c} 509	.20^{c} 345	.20^{c} 345	.28^{c} 545	.14^{c} 545	.22 547	.25^{a} 53	.13 52	.09 53	.09 53
Vocabulary			1.00	.63^{c} 468	.38^{c} 549	.54^{c} 550	.78^{c} 550	.50^{c} 124	.35^{c} 340	.16^{a} 124	.25^{c} 512	.22^{c} 512	.19^{c} 511	.26^{c} 508	.15^{c} 345	.17^{c} 345	.25^{c} 544	.10^{b} 544	.20^{c} 546	.20 53	.04 52	.05 53	-.05 53
Reading				1.00	.48^{c} 468	.55^{c} 469	.84^{c} 469	.44^{c} 165	.23^{c} 296	.09 107	.28^{c} 438	.27^{c} 438	.20^{c} 437	.34^{c} 435	.20^{c} 294	.26^{c} 294	.28^{c} 463	.17^{c} 463	.19^{c} 466	.30^{a} 45	.19 45	.25^{a} 45	.23 45
Listening					1.00	.36^{c} 550	.72^{c} 551	.45^{c} 165	.06 341	.04 124	.25^{c} 515	.24^{c} 515	.14^{c} 514	.28^{c} 511	.19^{c} 347	.21^{c} 347	.17^{c} 546	.11^{c} 546	.20^{c} 548	.21 53	.23^{a} 52	.23^{a} 53	.23^{a} 53
Writing						1.00	.72^{c} 551	.49^{c} 166	.29^{c} 343	.18^{a} 125	.18^{c} 517	.22^{c} 517	.09^{a} 516	.26^{c} 513	.18^{c} 349	.20^{c} 349	.21^{c} 550	.13^{c} 550	.16^{c} 552	-.05 54	-.12 53	.03 54	-.07 54
MSU-AETS							1.00	...	.29^{c} 340	.15^{a} 124	.32^{c} 515	.30^{c} 515	.21^{c} 514	.36^{c} 511	.25^{c} 347	.26^{c} 347	.30^{c} 547	.16^{c} 544	.25^{c} 549	.25^{a} 53	.17 52	.20 53	.15 53
Interview								1.00	-.07 72	.21 34	.26 157	.22^{c} 157	.24^{c} 157	.22^{c} 157	.26^{b} 105	.13 105	.22^{b} 169	.02 169	-.02 171	.14 11	.25 10	-.26 12	-.36 12
IPAA									1.00	.95^{c} 127	.10^{c} 327	.03 327	.04 327	.06 326	.12^{a} 224	-.04 224	.18^{c} 346	.05 346	.08 342	-.15 35	-.17 35	.07 35	-.02 35
PAA										1.00	.14^{a} 122	.15^{a} 122	.16^{a} 122	.10 122	.10 89	-.009 89	.10 127	.02 127	-.12 126	-.10 14	-.23 14	-.14 14	-.22 14
GPA 1-term											1.00	.63^{c} 965	.38^{c} 962	.50^{c} 959	.40^{c} 635	.25^{c} 635	.40^{c} 965	.12^{c} 965	.07 959	.31^{c} 110	.26^{c} 108	.33^{c} 112	.30^{c} 111
# of credits completed												1.00	.25^{c} 962	.69^{c} 959	.27^{c} 635	.47^{c} 635	.27^{c} 965	.16^{c} 965	.02 959	.31^{c} 110	.30^{c} 108	.36^{c} 112	.33^{c} 111
GPA 1-year													1.00	.28^{c} 959	.72^{c} 635	.15^{c} 635	.73^{c} 962	.09^{c} 962	.20^{c} 956	.45^{c} 109	.39^{c} 107	.33^{c} 111	.31^{c} 110
# of credits completed														1.00	.25^{c} 635	.74^{c} 635	.27^{c} 959	.44^{c} 959	.15^{c} 953	.22^{b} 109	.29^{c} 107	.22^{b} 111	.26^{b} 110
GPA 2-year															1.00	.16^{c} 635	.91^{c} 635	.06 635	.06 632	.56^{c} 92	.50^{c} 90	.46^{c} 94	.40^{c} 93
# of credits completed																1.00	.12^{c} 635	.59^{c} 635	.15^{c} 632	.08 92	.23^{a} 90	.14 94	.23^{a} 93
CGPA																	1.00	.24^{c} 1100	.30^{c} 1093	.47^{c} 110	.43^{c} 108	.33^{c} 112	.29^{c} 111
# of credits completed																		1.00	.53^{c} 1093	.17^{a} 110	.18^{a} 108	.19^{a} 112	.21^{a} 111
Academic status																			1.00	.06 110	-.04 108	.22^{b} 112	.10 111
ROAC-A																				1.00	.80^{c} 108	.81^{c} 110	.68^{c} 109
ROAC-F																					1.00	.70^{c} 108	.81^{c} 108
TRC-A																						1.00	.87^{c} 111
TRC-F																							1.00

A, B, C

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Key: IPAA = Converted previous academic standing
PAA = Actual previous academic achievement reported on a scale from 1-100
ROAC-A = Rating overall academic competence compared to American students
ROAC-F = Rating overall academic competence compared to foreign students
TRC-A = Total rating compared to American students
TRC-F = Total rating compared to foreign students

Table 8.--Intercorrelation between predictors (demographic predictors) and the criterion for the total sample.

	TOFEL	Grammar	Vocabulary	Reading	Listening	Writing	Average	Interview	GPA 1-Term	# of Credits Completed	GPA 1-Year	# of Credits Completed	GPA 2-Year	# of Credits Completed	CGPA	# of Credits Completed	IPAA	Academic Status	PAA	ROAC Compared to American	ROAC Compared to Foreign	TRC-A	TRC-F
Sex	.08	.05	.01	-.009	.11[b]	.04	.06	.02	.02	.03	-.01	-.007	.03	-.04	.05	-.06	.13[b]	.01	.24[b]	-.01	.06	.06	.10
	272	551	550	469	522	556	553	17	964	964	961	958	635	1099	1099	346	1098	127	110	108	122	11	
Marital status	-.16[b]	-.10[b]	.01	-.06	-.14[c]	-.08[a]	-.10[b]	-.07	-.05	-.10[c]	-.02	-.06	.03	-.02	-.002	.02	.05	.02	.08	.01	.10	-.11	-.009
	272	55	550	469	552	556	557	171	964	964	961	958	635	635	1099	1099	346	1098	127	110	108	112	11
Age	-.05	-.22[c]	-.11[b]	-.13[b]	-.15[c]	-.001	-.16[c]	-.01	-.15[c]	-.15[c]	-.09[c]	-.12[c]	-.07[a]	-.06[a]	-.09[b]	-.02	-.16[c]	-.13[c]	-.15[a]	-.35[c]	-.17[a]	-.21[a]	-.10
	268	512	511	438	514	516	514	156	961	961	958	955	634	634	964	964	326	961	121	110	108	112	11
Degree level	.08	-.04	-.06	-.10[a]	-.007	-.09	-.08	-.10	-.10[c]	.02	-.08[b]	.14[c]	-.17[c]	.23[c]	-.10[c]	-.01	.04	-.06	.001	.04	-.09	-.10	-.10
	273	551	550	469	552	556	553	171	965	965	962	959	635	635	1098	1098	346	1097	127	110	108	111	11

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

among the various types of GPA criterion measures. In contrast, the lowest intercorrelations were found between the academic credit load and the indices of the major academic advisor's rating.

Contrary to the foregoing findings, the intercorrelations between the intellective and nonintellective predictors were low or nonsignificant. As shown in Table 8, the nonintellective predictors (age, sex, marital status, etc.) had a low but significant correlation with the intellective predictors (IPAA, pAA, TOFEL, and MSU English test scores). However, the sex variables exhibited correlations of $.13^{b}$ with IPAA and $.24^{b}$ with pAA. Also, the age variables yielded correlations of $-.16^{c}$ with IPAA and $-.15^{c}$ with pAA. These findings imply that females and young foreign students tended to have a better previous academic record than did males and old students. Moreover, the pattern of the intercorrelations between age, marital status, and English test scores suggested that foreign students who were single, young, or in the Ph.D. program tended to have higher English scores than students who were married, old, or studying at the master's degree level.

Although the foregoing findings are not directly related to the study hypotheses and research questions, their presentation was necessary in understanding the nature of simple and multiple correlations between the predictors and criterion measures. Extreme multicollinearity (high intercorrelation among predictors) usually leads to imprecise and inconsistent estimates of regression statistics. Also, high correlation, linear or nonlinear, between the intellective and

nonintellective predictors (sex, age, etc.) always affects the predictive validity of the major intellective predictors when they are estimated for the total sample. Therefore, knowing the pattern of the predictors' intercorrelation would provide insight into interpretation of the predictors' validity coefficient and suggest possible ways to improve the accuracy of the prediction.

Table 8 and section B of Table 7 present the predictive validity of each of the intellective and nonintellective predictors as they related to the criterion measures (GPAs, academic loads, and advisor's rating of the student's academic competencies). Based on the magnitude of the correlation coefficients in the aforementioned tables, the following findings are summarized.

1. The TOFEL scores yielded correlations of .15[b], .006, .06, and .06 with the four GPA criteria, respectively. Also, TOFEL scores showed correlations of .28[c], .21[c], .23[c], and .12[c] with academic credits completed at four different points in the graduate program. When the indices of the major academic advisor's rating were used as criteria of academic success, the TOFEL scores showed no significant correlations.

2. MSU English test scores (average and subtest scores) exhibited a significant correlation with almost all of the GPA and academic-load criterion measures. Of the 56 correlations reported, only one was nonsignificant. The average of MSU English test scores (MSU-AETS) exhibited correlations of .32[c], .21[c], .25[c], and .30[c] with the GPA criteria. Also, it yielded correlations of .30[c], .36[c], .26[c], and .16[c] with academic load. When the indices of the advisor's rating were used

as the criteria of academic success, the average English scores had correlations of .25[a], .17, .20, and .15 with the four indices of the advisor's rating.

3. The index of previous academic achievement (IPAA) had correlations of .10[c] with first-term GPA (GPA 1-term), .12[a] with GPA 2-year, and .18[c] with CGPA. The remaining correlations of IPAA with GPA 1-year, academic load, and indices of the advisor's rating were very low or nonsignificant.

4. The first-term GPA (GPA 1-term) achieved in MSU graduate school exhibited higher correlations with the criterion measures than did TOFEL scores, MSU English test scores, and the index of previous academic achievement (IPAA). As shown in Table 7, section B, GPA 1-term yielded correlations of .38[c] with GPA 1-year, .40[c] with GPA 2-year, and .40[c] with cumulative GPA. Also, it yielded correlations of .63[c], .50[c], .25[c], and .12[c] with each of the academic-load criteria. When the indices of the academic advisor's rating of the doctoral student's overall academic competence were used as the criteria of academic success, GPA 1-term yielded correlations of .31[c], .26[c], .33[c], and .30[c] with the four indices, respectively.

5. Most of the nonintellective predictor correlations with the criterion measures were either low or nonsignificant. However, the direction of the significant correlation between age and degree level and the GPA criteria suggested that the students who were young or in the doctoral program tended to achieve higher GPAs than those who were old or in the master's program.

Although most of the reported correlations between the intellective predictors and the criterion measures were statistically significant, the practical significance of some of these correlations is questionable. When examining the predictive validity of individual criteria, one can notice that the highest correlation detected between the predictors and the criterion measures predicted only about 10 percent of the variance in the criterion measure (GPA); 90 percent of the variance remained unpredictable. This low level of prediction accuracy may be due, in part, to the unreliability and restriction of range of the data on both the predictors and criteria. Also, it may be due to the heterogeneity of subjects in the study. The subjects differed widely in terms of sex, marital status, age, country of origin, major field, and the degree they were seeking.

The aforementioned sources of subject heterogeneity represent several nonintellective variable predictors that are known to be very effective in improving overall prediction accuracy. These nonintellective predictors suggested the presence of several distinct subgroup compositions within the total study subjects, whose homogeneous characteristics may have influenced the preadmission criteria's predictive validity when it was estimated for the total study subjects. To remedy this problem and to maximize prediction accuracy, the following analysis strategies were undertaken:

1. First, a stepwise multiple-regression analysis was undertaken to determine whether some optimal combination of IPAA, MSU average English test scores (MSU-AETS), GPA 1-term, and the nonintellective

predictors would result in more accurate prediction of the GPA criterion measures than would each of the predictors alone. Precisely, the stepwise regression analysis was performed to:

a. Identify the major predictors that were significantly more powerful in predicting the criterion measures (GPA).

b. Determine the extent to which inclusion of the nonintellective predictors in the regression model would moderate the intellective predictors' validity and maximize overall prediction accuracy.

2. Second, the differential-validity procedure was used to determine whether a predictor or a set of predictors would be more appropriate for predicting the GPA criterion of a particular group than of another group, and of the total combined heterogeneous groups.

Stepwise Multiple Regression for the Total Sample

In an attempt to increase overall prediction accuracy, stepwise multiple regression was used to estimate the multiple contribution of the intellective and nonintellective preadmission variables in predicting the defined GPA criteria. Because of missing information on both the intellective predictors and the criterion (GPA 2-Year), the regression analysis was performed on a number of different study-subject compositions.

The first regression analysis was performed on the total study subjects who had complete information on all the predictors and GPA criteria (N=219, Table 9). Because many of the students completed their master's degree before the end of the second year, the number of subjects who had information on GPA 2-year was less than the number who had

Table 9.--Stepwise multiple regression statistics of the predictors that contributed significantly* to the prediction of GPA for total study subjects who had complete data on all the predictors and criteria (GPA) (N = 219).

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term	MSU-AETS	.30	.09	.27	8.70					
	Nat. Science	.38	.14	.28	126					
	Business	.41	.17	.19	114					
	Engineering	.44	.20	.16	87					
GPA 1-Year	MSU-AETS	.22	.04	.22	2.50	GPA 1-term	.30	.09	.26	.94
	Communicat.	.27	.07	-.14	-39	MSU-AETS	.33	.11	.16	1.80
	Nat. Science	.30	.09	.13	22	Communicat.	.36	.13	-.14	-42
						Business	.38	.14	-.13	-29
GPA 2-Year	MSU-AETS	.21	.04	.31	1.88	GPA 1-term	.33	.11	.28	.55
	Education	.29	.08	.34	29	Education	.37	.13	.32	27
	Nat. Science	.34	.12	.24	20	MSU-AETS	.41	.17	.22	1.36
	IPAA	.37	.14	.15	.77	IPAA	.44	.19	.15	.78
	Engineering	.40	.16	.14	14	Nat. Science	.46	.21	.13	11
						South Amer.	.47	.22	-.12	-11
CGPA	MSU-AETS	.23	.05	.32	2.03	GPA 1-term	.31	.10	.26	.52
	Degree level	.28	.08	-.17	-13	MSU-AETS	.34	.12	.22	1.41
	Education	.31	.10	.21	19	Degree level	.37	.13	-.15	-12
	Engineering	.34	.11	.15	16	Education	.40	.16	.16	15
	Nat Science	.36	.13	.15	13					

Key: MR = Multiple correlation
R^2 = Amount of variation of criterion measure predicted by one or more predictors
B = Standardized beta
b = Unstandardized beta

*$p \leq .05$.

Table 10.--Stepwise multiple regression statistics of the predictors that contributed significantly* to the prediction of GPA for total study subjects who had complete data just on all the predictors and GPA 1-term, GPA 1-year, and CGPA (N = 320).

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term	MSU-AETS	.28	.08	.27	9.24					
	Nat. Science	.33	.11	.19	89					
	Engineering	.36	.13	.14	70					
GPA 1-Year	Communicat.	.20	.04	-.22	-60	GPA 1-term	.27	.07	.26	.10
	MSU-AETS	.24	.06	.15	2.07	Communicat.	.32	.10	-.19	-52
	Business	.27	.07	-.11	-29	Business	.34	.12	-.11	-30
CGPA	Communicat.	.22	.05	-.24	-43	GPA 1-term	.32	.10	.32	.86
	MSU-AETS	.26	.06	.13	1.17	Communicat.	.38	.15	-.21	-39
						Business	.40	.16	-.11	-19

*$p \leq .05$.

information on all the remaining GPA criteria. Therefore, a second regression analysis was performed on the total study subjects who had complete information on all the predictors, GPA 1-term, GPA 1-year, and cumulative GPA (N=320, Table 10). In each of the regression-analysis operations, the regression statistic was estimated for different sets of predictors. The first set comprised MSU-AETS, IPAA, and all of the nonintellective predictors (sex, marital status, age, major field, country of origin, and degree level). The second set included, in addition to the first set of predictors, the student's first-term GPA (GPA 1-term) achieved in MSU graduate school.

The regression statistics for the variables that contributed significantly to the prediction of the defined GPA criterion are shown in Tables 9 and 10. Section A of these tables presents the regression statistics for the first set of predictors (IPAA and MSU-AETS) and the nonintellective variables. Section B shows the regression statistic for the second set of predictors (IPAA, MSU-AETS, GPA 1-term) and the nonintellective variables.

According to the regression statistics presented in Tables 9 and 10, the multiple predictive validity of the combined predictors was higher than the validity of each predictor alone. In general, the different types of predictor combinations yielded multiple correlations that ranged from .30 to .47, with a median of .40. Specifically, the multiple correlations from combining IPAA, MSU-AETS, and the nonintellective predictors (sex, marital status, age, college type, country of origin, and degree level) were .44, .30, .40, and .36 against the four

GPA criterion measures (Table 9, section A). When GPA 1-term was added to the regression model, the significant predictor yielded multiple correlations of .38 with GPA 1-year, .47 with GPA 2-year, and .40 with CGPA (Table 9, section B).

The second regression analysis produced regression statistics that differed with respect to the magnitude of the multiple correlation, beta weight, and the order in which predictors were entered into the regression model. According to the regression statistics presented in Table 10, section A, the first set of predictors exhibited multiple correlations of .36 with GPA 1-term, .27 with GPA 1-year, and .26 with cumulative GPA. The second set of predictors yielded multiple correlations of .34 with GPA 1-year and .40 with cumulative GPA (Table 10, section B). Based on the comparison of regression statistics resulting from the aforementioned analysis, the following findings were evidenced:

1. In general, the magnitude of multiple correlations resulting from the first regression analysis was higher than that of the multiple correlations resulting from the second regression analysis.

2. In both regression analyses, the second set of predictors showed more power in predicting GPA criteria than did the first set of predictors.

3. Results of both regression analyses differed with respect to the type of predictor that contributed significantly to the prediction of the defined GPA criterion. ALso, they differed with respect to order in which predictors were entered into the regression model. For

example, when the first set of predictors was used to predict GPA 1-year and cumulative GPA, MSU-AETS score emerged in the first analysis as the best predictor of the aforementioned criteria. In contrast, the second regression analysis produced unexpected results. Instead of MSU-AETS, college type (communications) came forth as the best predictor of the same GPA criteria (Table 10, section A).

4. When the second set of predictors was used to predict GPA 1-year and CGPA, GPA 1-term and MSU-AETS emerged in the first analysis as the best predictors (Table 9, section B). In contrast, the results of the second regression analysis showed that GPA 1-term continued to contribute to the multiple correlation, but MSU-AETS was dropped from the regression model (Table 10, section B).

According to the foregoing remarks, it is clear that the second regression analysis produced a number of unexpected results. However, this result may be due, in part, to the unreliability and restricted range of data on both predictors and criteria. Also, it may be attributed to the predictor multicollinearity (high correlation between the predictors). Green and Carroll (1978) and Pedhauzer (1982) stated that the presence of multicollinearity among the predictors may lead to the occurrence of one or more of the following problems:

1. Imprecise estimation of the regression statistic.

2. Difficulties in estimating the separate contribution of a particular predictor to multiple correlation.

3. A particular predictor may be dropped from the regression model incorrectly or may emerge to produce unexpected regression coefficients.

4. Estimation of the regression statistic may become inconsistent when computed for different study-subject compositions. In such cases, the addition or elimination of a number of subjects may lead to a wide variation in values of the regression statistics.

The results of the regression analysis presented in Tables 9 and 10 show a number of incidents that affirm the influence of the predictor's multicollinearity on the magnitude of the multiple correlation and the weight a particular predictor should have received in predicting a particular GPA criterion. The emergence of college type as the best predictor of GPA 1-year and cumulative GPA (Table 10), and the clear variation between the values of the regression statistics (Tables 9 and 10) are good examples of the problems caused by the presence of predictor multicollinearity, and the restricted range of data on both of the predictors and criterion measures (GPA).

Despite the problems caused by predictor multicollinearity and the restricted range on both predictors and criteria, the results of the regression analysis showed (particularly the first phase) an observable increase in prediction accuracy beyond individual predictor validity. However, the highest level of correlation detected between a particular set of predictors and a particular criterion was .47. This correlation predicted only 22 percent of the criterion variation; the remaining variation was unpredicted. The failure of the predictor

combination to maximize prediction accuracy may be due to heterogeneity of study subjects. As stated earlier, the subjects were foreign students who differed widely with respect to sex, marital status, college they were attending, country of origin, and degree they were seeking. These sources of variation refer to a number of nonintellective predictors that suggest the presence of several subgroups within the total subjects. The homogeneous character of these subgroups might have introduced a source of prediction error when the validity of the intellective predictors was estimated for the total study subjects, and therefore reduced the magnitude of the sample and multiple estimates of predictive validity.

Although the mentioned nonintellective predictors have been found to be linearly uncorrelated with both the intellective predictors and the criterion measures, their consideration in prediction research has been found to be very effective in enhancing overall prediction accuracy. Enhancement of prediction accuracy was achieved either by subdividing the total study subjects on the basis of a particular nonintellective predictor (moderator variable), and predicting for each subgroups separately, or by adding the intellective predictors and the nonintellective predictors (moderator variables) in the regression model.

Despite the clear influence of study-subject heterogeneity on the magnitude of predictive validity, most researchers concerned with predicting foreign students' academic achievement have failed to control for its influence. Most investigations have focused on estimating the

predictive validity of a particular selection device on a heterogeneous group without considering the differences in validity the selection device might have for a homogeneous group of foreign students within the total study group. Consequently, systematic differences between the predictable and unpredictable groups introduce a type of prediction error that reduces the magnitude of the validity coefficient and therefore minimizes overall prediction accuracy. Researchers' failure to control the sources of study-subject heterogeneity, such as sex, college type, age, and country of origin, has resulted in low and misleading estimates of the predictive validity of selection devices.

Many researchers concerned with prediction accuracy have recognized the influence of study-subject heterogeneity on the magnitude of overall prediction accuracy and have recommended a number of methods to control its influence. In addition to including the intellective predictors in the regression model, many researchers have advocated subgroups analysis. Bartlett and O'Leary (1969) indicated that "when the nature of the heterogeneity can be identified, such as different sexes, race or socio-economic background, better prediction is likely by validating separately for each identifiable group" (p. 14). They went on to say that

> The combination of heterogeneous groups can act to reduce the accuracy of prediction because of the interactive effect of the heterogeneity on the correlation. Improvement of predictor utility should result from separate validation on all possible groups [rather] than validation on one long heterogeneous group. (p. 17)

Also, Krug (1966) advocated subgroup analysis. He wrote,

> In validating a selection technique it is always desirable to study as many separate groups as possible in preference to one large heterogeneous group. Holding N constant, a series of correlation coefficients, each based on an identifiable subsample, is always more informative than a single coefficient. (p. 34)

In prediction research, the foregoing method of improving prediction is called differential validity. This method postulates that, in addition to random error of prediction, a particular type of prediction error is caused by systematic differences between predictable and unpredictable groups. When this type of error is large, it usually reduces the selection device's predictive validity and therefore minimizes overall prediction accuracy. Since the sources of heterogeneity in the present study (sex, marital status, age, degree level, curriculum, and country of origin) were known, further analysis was undertaken to determine the extent to which a separate estimation of predictor validity would result in more accurate prediction.

Differential Validity Analysis

Based on the preceding argument, further analysis seemed essential to control for prediction error caused by study-subject heterogeneity. The primary analysis, along with the nature of the study-subject composition, presented clear evidence of the presence of a number of subgroups whose homogeneous character introduced a type of prediction error. This reduced the intellective predictors' validity coefficients when they were estimated for the total study subjects. Therefore, in an attempt to control for this type of prediction error, and to maximize overall prediction accuracy, differential-validity

procedures were performed on a number of homogeneous subgroups. The total study subjects were subgrouped according to their sex, marital status, age, college type, country of origin, and degree level. Then a separate estimation of intellective predictor validity was performed for all subgroups that had adequate numbers for observation ($N > 10$). Further, a stepwise multiple regression was performed on subgroups that had adequate sample sizes ($N > 30$). This analysis was undertaken to estimate the multiple contribution of the predictors to the prediction of a particular subgroup's GPA criteria and to determine which set of predictors was most appropriate for predicting a particular subgroup's GPA criteria.

Tables in Appendices A, B, and C show the predictive validity of the intellective predictors for the various subgroups. Also, tables in Appendix E present the regression statistics for the intellective predictors that contributed significantly to the prediction of the subgroups' GPA criterion measures.

In this context one must bear in mind that the magnitude of multiple correlation is highly influenced by the ratio of the combined predictors to the size of the sample. Pedhauzer (1982) stated that:

> The degree of the overestimation of R is affected, among things, by the ratio of the number of independent variables [predictors] to the size of the sample. Other things being equal, the larger this ratio the greater the overestimation of R. . . . What this means is that when the number of predictors is equal to the number of subjects minus one, a perfect correlation will be obtained even when in the population the predictors have zero correlation with the criterion. (p. 148)

To facilitate reading and comparing the predictors' differential validity, results of the college and country-of-origin subgroups analyses are summarized in Tables 11 and 12. Each table presents, for each of the intellective predictors, the range of the correlation detected with each criterion measure, as well as the median. Also, the tables show the number of correlations performed, the number of significant correlations, and the number of significant correlations that were higher than the corresponding validity detected for the total study subjects.

Based on the magnitude of the predictors' differential validity (tables in Appendices A, B, and C) and the regression statistics, the following findings emerged:

1. Overall, the differential-validity analysis led to an increase in the intellective predictors' overall prediction accuracy beyond the total-study-subject analysis. In particular, the separate estimations of predictor validity coefficients for the various subgroups of countries, colleges, and age categories in general exhibited an overall improvement in the magnitude of prediction accuracy. Further, the differential-validity analysis of the different subgroups of sex, marital status, and degree level showed a number of instances in which a particular predictor appeared to be more predictive of a particular group's GPA than that of other groups.

2. When the nonintellective predictors, sex, marital status, and degree level, were used as a basis for defining the subgroups, the differential-validity analysis did not improve the prediction accuracy

Table 11.--Summary table of the predictor differential validity for the college subgroups (correlation range, median, total number of correlations, number of significant correlations, and number of significant correlations more than correspondent correlations detected on the total study subjects).

	GPA 1-Term	# of Credits Completed	GPA 1-Year	# of Credits Completed	GPA 2-Year	# of Credits Completed	CGPA	# of Credits Completed
TOFEL	*-.32-.39[b] .18 †8(1)(1) .15[c]	-.42-.48[b] .25 8(2)(1) .28[c]	-.36-.29 .09 8(0) .006	-.35-.32[a] .28 8(2)(2) .21[c]	-.20-.47[b] .07 8(1)(1) .06	-.27-.55[b] .14 8(1)(1) .23[c]	-.18-.39[a] .10 8(1)(1) .06	-.38-.47[a] .07 8(1)(i) .12[a]
Grammar	-.14-.42[c] .28[b] 9(5)(2) .29[c]	-.04-.32 .18[a] 9(3)(1) .20[c]	-.17-.77[b] .20[a] 9(5)(4) .17[c]	-.10-.46[c] .27 9(4)(3) .23[c]	-.13-.71[c] .14 9(3)(3) .20[c]	-.13-.84[b] .15 9(4)(3) .20[c]	-.11-.48[b] .10 9(2)(1) .28[c]	-.01-.27 .21 9(1)(1) .14[c]
Vocabulary	-.03-.40[c] .22[b] 9(4)(3) .25[c]	.007-.41[c] .21[a] 9(4)(3) .22[c]	-.11-.78[b] .11 9(3)(2) .19[c]	-.12-.62[a] .26[b] 9(5)(4) .26[c]	-.17-.51[b] .32[b] 9(5)(5) .15[c]	-.14-.80[b] .25[b] 9(4)(4) .17[c]	-.03-.48[c] .12 9(3)(3) .25[c]	-.24-.32 .16 9(1)(1) .10[b]
Reading	-.05-.62[c] .27[b] 9(5)(4) .28[c]	-.07-.59[a] .29[b] 9(5)(3) .27[c]	.04-.66[c] .28 9(4)(4) .20[c]	-.01-.63 .37[c] 9(7)(4) .34[c]	-.12-.54[b] .40[a] 9(5)(5) .20[c]	-.02-.58 .35[a] 9(5)(4) .26[c]	-.15-.55[c] .33[b] 9(6)(6) .28[c]	-.06-.40[a] .30[b] 9(5)(4) .17[c]
Listening	-.01-.49[a] .22 9(4)(3) .25[c]	.10-.39 .21[a] 9(5)(3) .24[c]	-.16-.72[b] .15 9(3)(3) .14[c]	-.30-.50[c] .27 9(3)(2) .28[c]	-.04-.48[b] .24[a] 9(3)(3) .19[c]	-.14-.68[a] .30 9(3)(3) .21[c]	-.13-.34[c] .10 9(2)(2) .17[c]	-.30-.36 .16 9(1)(1) .11[c]
Writing	-.01-.46 .12 9(3)(2) .18[c]	-.03-.46 .17 9(4)(2) .22[c]	-.10-.57[a] .08 9(3)(3) .09[a]	-.02-.56[c] .26 9(4)(4) .26[c]	-.08-.47[c] .21 9(3)(3) .18[c]	-.11-.53 .24 9(3)(3) .20[c]	-.05-.38[c] .15 9(3)(2) .21[c]	-.20-.43 .17 9(2)(1) .13[c]
Average	.09-.52[a] .33[a] 9(4)(3) .32[c]	.15-.46 .26 9(4L(1) .30[c]	-.04-.78[c] .19[a] 9(4)(2) .21[c]	.10-.57[c] .38[a] 9(7)(4) .36[c]	.03-.65[c] .37[a] 9(5)(5) .25[c]	-.13-.72[b] .32[a] 9(6)(5) .26[c]	-.08-.46[c] .19 9(4)(4) .30[c]	-.33-.42[c] .22[a] 9(4)(4) .16[c]
IPAA	-.28-.29[a] .10 8(1)(1) .10[c]	-.26-.17 .08 8(0) .03	-.17-.45[a] .08 9(2)(2) .04	-.32-.27[a] .07 8(3)(3) .06	-.50[a]-.56[b] .24 8(2)(2) .12[a]	-.54[a]-.49[a] .01 8(1)(1) .04	-.17-.54[c] .18 8(4)(4) .18[c]	-.18-.34[b] .09 8(1)(1) .05
GPA 1-Term		.52[c]-.83[c] .64[c] 9(9)(3) .63[c]	.22[c]-.64[c] .44[c] 9(9)(6) .38[c]	.34[c]-.70[c] .55[c] 9(9)(6) .50[c]	.29-.57[c] .43[c] 9(9)(4) .40[c]	.05-.64[b] .35[c] 9(6)(5) .25[c]	.27-.56[c] .42 9(7)(3) .40[c]	-.08-.40[c] .22[b] 9(4)(4) .12[c]

Key: *Correlation range and median.
†Total number of correlations.
( ) Total number of significant correlations
( ) Total number of significant correlations higher than the total sample correlation
Total sample correlation

Table 12.--Summary table of the predictor differential validity for the country subgroups.

	GPA 1-Term	# of Credits Completed	GPA 1-Year	# of Credits Completed	GPA 2-Year	# of Credits Completed	CGPA	# of Credits Completed
TOEFL	*-.28-.32 .21 +5(0) .15[b]	.08-.45 .33 5(1)(1) .28[c]	-.52[a]-.58[a] -.12 5(1)(1) .006	.05-.54[a] .28[a] 5(3)(3) .21[c]	-.60[a]-.95[a] -.28 5(2)(2) .06	-.09-.58 .32 5(2)(2) .23[c]	-.40-.46 .08 5(0) .06	.09-.49[b] .36 5(1)(1) .12[a]
Grammar	-.10-.48[b] .33 13(4)(4) .29[c]	-.09-.52[b] .19 13(3)(2) .20[c]	-.09-.81[c] .14 13(2)(2) .17[c]	-.07-.62[c] .14 13(3)(3) .23[c]	-.06-.88[c] .20 13(4)(4) .20[c]	.06-.52[b] .25[a] 13(4)(4) .20	-.17-.78[c] .25[a] 13(5)(3) .28[c]	-.37-.34 .17 13(2)(2) .14[c]
Vocabulary	-.14-.53[b] .26 13(6)(6) .25[c]	-.17-.48[a] .06 13(5)(5) .22[c]	-.24-.67[c] .14 13(5)(5) .19[c]	.04-.48[c] .27 13(5)(5) .26[c]	-.41-.62[c] .21 13(4)(4) .15[c]	-.24-.56[b] .15 12(3)(3) .17[c]	-.16-.57[a] .22 13(3)(3) .25[c]	-.11-.37 .19 13(0) .10[b]
Reading	-.19-.57[c] .20 13(5)(4) .28[c]	-.32-.57[b] .21[a] 13(6)(5) .27[c]	-.20-.55[c] .11 13(2)(2) .20[c]	-.14-.78[b] .33 13(5)(4) .34[c]	-.19-.74[b] .24 13(2)(2) .20[c]	-.22-.55[a] .23 13(3)(3) .26[c]	-.30-.57[a] .23 13(5)(5) .28[c]	-.32-.42[c] .24 13(3)(3) .17[c]
Listening	-.14-.68[c] .29 14(5)(5) .25[c]	-.15-.53[c] .17 14(3)(3) .24[c]	.26[a]-.59[c] .09 14(2)(2) .14[c]	-.12-.72[b] .19 14(4)(4) .28[c]	-.25-.51[a] .18 14(5)(5) .15[c]	-.12-.50[b] .18 14(3)(3) .21[c]	-.16-.51[a] .14 14(4)(3) .17[c]	-.19-.37[a] .15 14(3)(3) .11[c]
Writing	-.03-.60[b] .20 14(2)(2) .18[c]	-.04-.62[c] .09 14(2)(2) .22[c]	-.36-.39[b] .17 14(2)(2) .09[c]	.01-.64[b] .21 14(5)(5) .26[c]	-.20-.68[a] .22 14(2)(2) .18[c]	-.17-.55[c] .15 14(4)(4) .20[c]	-.43-.48[a] .22 14(4)(3) .21[c]	-.28-.56[b] .28 14(6)(6) .15[c]
Average	-.10-.51[c] .35[a] 14(8)(8) .32[c]	-.07-.50[c] .13 14(5)(5) .30[c]	-.17-.75[b] .15 14(4)(4) .21[c]	.03-.68[c] .24 14(5)(5) .36[c]	-.18-.67[c] .27 14(6)(5) .25[c]	-.08-.49[b] .27 14(4)(3) .26[c]	-.02-.80[c] .19 14(5)(5) .30[c]	-.12-.46[c] .22 14(3)(3) .16[c]
IPAA	-.23[a]-.38[a] .14 11(2)(2) .10[c]	-.36[b]-.34[a] .04 11(1)(1) .03	-.13-.48[a] .11 11(3)(3) .04	-.24-.38[a] .22 11(2)(2) .06	-.45-.47 .20 11(1)(1) .12[a]	-.55[b]-.30 .05 11(0) -.04	-.13-.56[c] .25 11(4)(4) .18[c]	-.06-.33[a] .15 11(3)(3) .05
GPA 1-Term		.16-.90[c] .75[c] 14(13)(9) .83[c]	-.20-.72 .35 14(9)(6) .38[c]	.20-.84[c] .55[b] 14(12)(8) .50[c]	-.09-.54[c] .38[a] 14(7)(3) .40[c]	-.45-.67 .27 14(6)(5 .25[c]	.02-.81[c] .35[b] 14(7)(3) .40[c]	-.53-.49[b] .10 14(3)(3) .12[c]

Key: *Correlation range and median.
+Total number of correlations.
( ) Total number of significant correlations
( ) Total number of significant correlations higher than the total sample correlation
Total sample correlation

of the intellective predictors. For all subgroups, most of the intellective predictors (TOFEL, MSU-AETS, IPAA, pAA, and GPA 1-term) exhibited approximately the same pattern of correlation found in the total-subject correlation analysis. However, in the following instances a particular predictor showed differential validity.

a. For sex-subgroup analysis, females' IPAA and pAA exhibited a correlation with GPA 2-year and CGPA that was higher than the validity estimated for the male group and the total study subjects. For females, IPAA showed correlations of .36[b] with GPA 2-year and .35[c] with CGPA, compared to .06 and .13[a] for the male group and .12[a] and .18[c] for the total sample. Also, females' pAA exhibited correlations of .31[a], .43[b], .54[b], and .51[c] with the four GPA criteria, compared to .13, .12, .04, and .04 for the male group and .14[a], .16[a], .10, and .10 for the total sample (Appendix A, Tables 1 and 2).

b. Doctoral students' TOFEL scores exhibited correlations of .38[c] with GPA 1-term, .23[a] with GPA 2-year, and .23[a] with cumulative GPA, compared to .04, -.003, and -.02 for students in the master's program and .15[b], .06, and .06 for the total study subjects (Appendix A, Tables 5 and 6).

c. Doctoral students' GPA 1-term showed a correlation of .50[c] with CGPA, compared to .37[c] for students in the master's program and .40[c] for the total sample.

d. The pattern of the subgroups' regression statistic was essentially consistent with the total sample's regression statistic. The multiple correlation from the first set of predictors (MSU-AETS,

IPAA, and the intellective predictors) and the second set of predictors (MSU-AETS, IPAA, GPA 1-term, and the nonintellective predictors) were similar to those detected for the total study subjects. However, the findings presented in Appendix E showed a number of instances in which the second set of predictors exhibited multiple correlations that were higher for a particular group than another. According to the results of the sex-subgroup analysis, the second set of predictors exhibited multiple correlations of .45 with GPA 2-year and .40 with CGPA for females, compared to .37 and .32 for males. The same set of predictors showed multiple correlations of .38 with GPA 1-year, .40 with GPA 2-year, and .38 with CGPA for the married group, compared to .21, .30, and .28 for the single group. Further, the second set of predictors yielded multiple correlations of .43 with GPA 1-year, .48 with GPA 2-year, and .40 with CGPA for doctoral students, compared to .22, .27, and .31 for master's students. In most cases, GPA 1-term was the best predictor; in one instance, female IPAA emerged as the best predictor of GPA 2-year.

3. When the total study subjects were divided on the basis of their age at the time of admission, the differential-validity analysis showed an overall increase in the predictors' prediction accuracy (see Tables 7-9, Appendix A). A number of predictors emerged to show more predictability of the young group's GPA than they did for the older group and the total sample. Specifically, MSU-AETS showed correlations of $.33^{b}$ with GPA 2-year and $.45^{c}$ with CGPA for the young group, compared to $.13^{a}$ and $.14^{a}$, $.27^{b}$ and $.17^{a}$, and $.29^{a}$ and .05 for the older

groups. Also, GPA 1-term exhibited a correlation of .47[c] with CGPA of the young group compared to .41[c], .34[c], and .46[c] for the older groups and .40 for the total subjects. Further, the predictor's multiple contribution to the prediction of GPA 2-year was higher for the young group. The significant predictor showed a multiple correlation of .56 for the young group compared to .33, .38, and .47 for the older groups and the total subjects (see Tables 8-10, Appendix E). In general, the overall result of the age-subgroup analysis showed the young group to be more predictable than the older group. This result seems to be consistent with correlations of the age variable with the GPA criterion measures (see Table 8, p. 97).

4. College-subgroup analyses (differential validity) also resulted in more accurate estimations of the predictor validity coefficient than did the total-study-subject analyses. The separate estimations of the intellective predictor validity coefficients led to an observable increase in overall prediction accuracy. The findings presented in Tables 1-9, Appendix C, indicate that the intellective predictors differed with respect to their power in predicting the GPA of students in a particular college. Certain predictors showed more power than others in predicting a particular GPA of students in a specific college. Whereas the TOFEL score continued to exhibit the same pattern of correlation detected for the total sample, IPAA, MSU-AETS, and GPA 1-term tended to exhibit correlations with GPA that were higher for some colleges than others and for the total study subjects. Based on the differential validity summary (Table 11) and the results of the

available regression statistics for colleges that had an adequate number of students with complete information, the following general findings are cited:

a. The TOFEL score exhibited the same pattern of validity coefficients for all colleges as was found in the total-subject analysis. The various estimates of the TOFEL's predictive validity showed only a few instances in which it exhibited more power in predicting a particular GPA of students in a specific college than in other colleges or of the total study subjects.

b. Unlike the TOFEL score, the MSU-AETS showed several times a validity coefficient that was higher for a particular college than for other colleges or for the total study subjects. Of the 36 correlations performed between MSU-AETS and the four GPA criteria, 17 were significantly different from zero. Of the 17 significant correlations, 14 were higher than the correlation estimated for the total study subjects. The remaining correlations were almost always positive but were not statistically significant because of college size.

c. Although the IPAA correlation with total-study-subject GPAs did not exceed .18, the summary of the college differential-validity analysis presented in Table 11 showed a number of instances in which IPAA exhibited significant correlations with GPA that were higher than the correlation estimated for the total sample. In general, IPAA showed more power in predicting CGPA in colleges such as business, agriculture, and social science. As presented in Tables 1, 3, and 9,

Appendix C, IPAA exhibited correlations of .54[c], .45[c], and .33[b] with CGPA of the students in the aforementioned colleges, respectively.

d. GPA 1-term achieved in MSU graduate school was the best predictor of student CGPA in the various colleges. According to the differential-validity summary presented in Table 11, GPA 1-term showed 25 out of 27 correlations that were significantly different from zero. Of the 25 significant correlations, 13 were higher than the those resulting from the total-study-subject analysis. Moreover, the correlations of GPA 1-term with CGPA ranged from .27[c] to .56[c], with a median of .42[c]. This suggests that GPA 1-term yielded adequate uniform data that are appropriate for predicting foreign students' future academic success.

e. The regression statistic estimated for colleges with adequate observations showed an overall increase in prediction accuracy beyond the total-study-subject regression statistics. The multiple correlations from GPA 1-term, MSU-AETS, IPAA, and the nonintellective predictors ranged from .33 to .78. The significant predictor exhibited multiple correlations of .47 with GPA 1-year, .61 with GPA 2-year, and .72 with CGPA for engineering students. Also, they showed multiple correlations of .88, .75, and .78 against the three criteria, respectively, for students in the business college. Further, the same set of predictors had multiple correlations of .30, .38, and .36, and .33, .72, and .60 against the aforementioned criteria for students in natural science and agriculture, respectively. In most situations, GPA 1-

term and MSU-AETS were the best predictors, except in two situations in which sex emerged as the best predictor (Tables 11-14, Appendix E).

5. When the total study subjects were subgrouped on the basis of country of origin, the differential analysis led to more accurate estimation of the intellective predictor validity coefficient. As presented in Tables 1-14, Appendix B, a number of intellective predictors emerged to show more power in predicting a particular GPA of students from a particular country than from other countries. The findings also showed a number of instances in which a particular predictor exhibited a higher predictive validity coefficient of a particular GPA than its validity estimated for the combined study subjects. Based on the separate estimation of the predictor validity coefficient, the summary of the differential-validity analysis (Table 12), and regression statistics estimated for the countries with adequate numbers of observations with complete information on the predictors and criteria, the following findings are summarized (Tables 11-14, Appendix E).

a. The TOFEL score exhibited approximately the same pattern of correlation found in the total-study-subject analysis for all countries except China. According to the results of the differential-validity analysis presented in Table 2, Appendix B, the TOFEL score yielded correlations of .17, .17, .31[a], and .25[a] with the four GPA criteria of the Chinese students.

b. The MSU-AETS showed a correlation with the GPA criteria that differed markedly across the various countries. Of the 52 correlations computed between the MSU-AETS and the GPA criterion measures of

students from the various countries, 23 correlations were significantly different from zero. Of those significant correlations, 22 were higher than the MSU-AETS estimated for the total study subjects. In general, MSU-AETS seemed to be more appropriate for predicting the GPAs of students from Greece, Kuwait, Indonesia, Venezuela, Mexico, Jordan, Iran, and South Korea (Tables 14, 9, 10, 7, and 12, respectively, Appendix B).

c. IPAA of students from China, Brazil, and Japan exhibited adequate predictive validity of the GPA criterion measures. According to the differential-validity analysis summary (Table 12), IPAA showed more power in predicting CGPA. Of the 11 correlations computed between IPAA and CGPA of students from the various countries, four were significantly different from zero and higher than the validity estimated on the total study subjects.

d. GPA 1-term was the best predictor which showed a high consistency in predicting the CGPA of students from various countries. According to the differential-validity analysis presented in Tables 1 through 14, Appendix B, GPA 1-term yielded a high predictive validity of the CGPA of students from China, Mexico, Japan, India, Iran, Thailand, and South Korea. In contrast, the predictive validity of GPA 1-term for students from the remaining countries was negative or nonsignificant.

e. The regression statistic of the first and second set of predictors estimated for students from China, South Korea, and Japan showed an increase in the significant predictors' multiple correlation

beyond the multiple correlation estimated for the total sample. According to the regression statistics presented in Tables 15 through 17, Appendix E, the second set of predictors yielded multiple correlations of .70 with GPA 1-year, .64 with GPA 2-year, and .60 with CGPA for Chinese students. Also, the second set of predictors yielded multiple correlations of .34, .60, and .55 against the aforementioned GPA criteria for students from South Korea. Furthermore, the second set of predictors exhibited multiple correlations of .49 with GPA 1-year and .63 with CGPA for students from Japan.

Generally speaking, the differential-validity analysis led to an observable increase in the intellective-predictor validity coefficient. In particular, the subgroup analysis performed on age-category, college, and country subgroups showed several times the IPAA, MSU-AETS, and GPA 1-term to have a higher predictive validity than their corresponding validities for the combined heterogeneous groups. This finding suggested that foreign students from different countries, colleges, and age categories should not be grouped for the purpose of estimating the predictive validity of the preadmission criteria.

The finding of the subgroup differential analysis affirmed that the practice of combining heterogeneous groups of foreign students for prediction purposes is likely to limit the utility of the predictor validity coefficient. When a heterogeneous group is used for validating a particular selection device, the discrepancies between the predictable and unpredictable groups introduce a type of systematic

prediction error that acts to reduce the magnitude of the selection device's validity coefficient.

Separate estimations of the intellective-predictor validity coefficient and the descriptive statistics of the group data on both the predictors and the criteria showed several examples of discrepancies between the predictable and unpredictable groups affecting the magnitude of the predictor validity coefficient, which was estimated for the combined heterogeneous groups. According to the country-subgroup analysis, the MSU-AETS emerged to show equal validity for a number of countries whose means on the MSU-AETS and criteria did not differ significantly. Also, it showed equal validity for other countries whose means on the predictor MSU-AETS and criteria were significantly different. Further, it showed different validity for a number of countries whose means on the predictors and criteria differed significantly. The foregoing example of variations among country groups was also true for IPAA and GPA 1-term.

Although the differential-validity analysis succeeded in controlling the variation caused by the study subjects' heterogeneity and brought adequate increases in the intellective predictors' validity coefficients for a number of subgroups, the influence of the following factors on the predictor validity coefficient remained evident for a number of subgroups.

1. The restricted range of data on both the predictors and the criteria led a number of predictors to yield low predictive validity for a number of subgroups. The influence of this problem was clear

when the predictive validity of MSU-AETS was estimated for students from China. The restricted range of their scores on the MSU-AETS resulted in a low predictive validity when these scores were correlated with their GPA criteria.

2. The second factor that influenced the predictor validity coefficients when they were estimated for the subgroups was the lack of uniform grading practices among MSU faculty members. Different faculty members in different colleges assigned grades according to various standards. Consequently, a particular group of foreign students studying in a specific college may have achieved a GPA that does not reflect their actual academic achievement. Such variations act to reduce the quality of GPA as a valid and reliable indicator of graduate academic success.

3. A third factor was lack of comparability of foreign students from various countries with respect to the quality of their IPAA, GPA 1-term, and the courses they had to complete to gain a certain degree from a particular college. Although the indices of previous academic achievement have been found to be very effective in predicting graduate students' GPA, the index of previous academic achievement of foreign students from a number of countries has failed to predict their GPA achieved in MSU graduate schools. This may be because some foreign students had earned high grades at poor-quality schools and did poorly in their graduate work at MSU, whereas other students had earned only moderate grades at high-quality schools and did well in their graduate work at MSU. Using the same argument, the failure of GPA 1-term to

predict the CGPA of students from a number of countries may be attributed to the quality of courses that foreign students from a particular country completed during their first term at MSU. Particular groups of foreign students may have begun with fewer credits or less-demanding courses and achieved high grades, which does not reflect their actual academic potential as they advance toward the completion of their degree. Also, it may be ascribed to the variation among foreign students with respect to the college or department in which they are studying, the standards and requirements (term papers, in-class exams, etc.) against which their grades are assigned, and the quality of courses they must complete to earn their degree.

Because the influence of the foregoing factors was evident in the subgroup analyses, further analyses seemed necessary to extract the foreign students' heterogeneity with respect to (1) the quality of their IPAA, MSU-AETS, TOFEL, GPA 1-term, number of credits carried each term, and the types of courses required for a particular degree; and (2) the standards against which the foreign students' GPAs were assigned in the various departments and colleges. Accordingly, it was assumed that if the country rather than the individual student is used as the unit of analysis, the average performance of each country on each predictor and criterion would provide a more reliable and stable indicator of foreign students' overall preadmission attributes and their future academic potential in graduate school than would individual scores. Also, it would provide an index of preadmission data an criterion measures (GPA) that is not influenced by the diversity of

foreign students with respect to the quality of their IPAA, previous English instruction, GPA 1-term, and standards against which their grades in various colleges and departments were assigned.

Based on the preceding assumption, the average performance of students from various countries on the predictors (TOFEL, MSU English test score, IPAA, and GPA 1-term) and the criteria (GPA criterion measures) were computed. Then zero-order correlation and rank-order correlation were employed (1) to determine the degree to which the countries' average performance on the predictors would predict their average performance on the GPA criterion measure and (2) to determine the extent to which the order of the countries' means on the predictors would predict the order of their means on the GPA criterion measures. Based on the magnitude of the predictor rank-order correlation and zero-order correlation, the following findings are summarized (Tables 13 and 14):

1. As presented in Tables 13 and 14, the TOFEL exhibited approximately the same pattern of correlation as found in the total-study-subject analysis and the subgroup analysis.

2. The MSU-AETS exhibited rank-order correlations of .49 with GPA 1-term and .72[a] with CGPA. Also, it yielded zero-order correlations of .36 and .79[c] against the aforementioned criterion measures (Tables 13 and 14).

3. The foreign student index of previous academic achievement (IPAA) showed rank-order correlations of .41 and .54[c] with GPA 1-term

Table 13.--Rank order correlation between the country means on predictors and criteria (GPA and credits completed at different points in the graduate program).

	GPA 1-Term	# of Credits Completed 1-Term	GPA 1-Year	# of Credits Completed 1-Year	GPA 2-Year	# of Credits Completed 2-Year	CGPA
TOFEL	.50 9	.70[a] 9	-.26 9	.83[b] 9	.46 9	.80[b] 9	-.33 9
Grammar	.54[a] 6	.53[a] 15	.23 15	.47[a] 15	.38 15	.06 15	.61[b] 15
Vocabulary	.45[a] 15	.57[a] 15	.08 15	.62[b] 15	.08 15	.41 15	.44[a] 15
Reading	.48[a] 15	.67[b] 15	.28 15	.53[a] 15	.14 15	.14 15	.62[b] 15
Listening	.25 15	.48[a] 15	.30 15	.27 15	.14 15	-.13 15	.60[b] 15
Writing	.18 15	.32 15	.07 15	.30 15	.01 15	.28 15	.32 15
Average	.49[a] 15	.63[b] 15	.31 15	.53[a] 15	.30 15	.07 15	.72[a] 15
IPAA	.41 12	.51[b] 12	-.05 12	.44 12	.03 12	.13 12	.54[a] 12
GPA 1-Term		.80[c] 12	.51[b] 23	.81[c] 23	.75[c] 22	.47[a] 22	.56[b] 23

Table 14.--Zero-order correlation between the country means on predictors and criteria (GPA and credits completed at different points in the graduate program).

	GPA 1-Term	# of Credits Completed 1-Term	GPA 1-Year	# of Credits Completed 1-Year	GPA 2-Year	# of Credits Completed 2-Year	CGPA
TOFEL	.47 9	.47 9	-.06 9	.69[a] 9	.47 9	.74[b] 9	-.19 9
Grammar	.37 15	.49[a] 15	.10 15	.42 15	.22 15	.11 15	.74[c] 15
Vocabulary	.37 15	.57[a] 15	.07 15	.53[a] 15	.03 15	.37 15	.67[b] 15
Reading	.27 15	.53[a] 15	.03 15	.36 15	-.03 15	.16 15	.75[c] 15
Listening	.30 15	.52[a] 15	.28 15	.32 15	.08 15	-.06 15	.72[c] 15
Writing	.26 15	.50[a] 15	-.06 15	.45[a] 15	-.02 15	.20 15	.63[b] 15
Average	.36 15	.58 15	.10 15	.48[a] 15	.08 15	.18 15	.79[c] 15
IPAA	.41 12	.54[a] 12	.03 12	.38 12	.08 12	.30 12	.43 12
GPA 1-Term		.90[c] 23	.68[c] 23	.83[c] 23	.77[c] 22	.56[b] 22	.57[b] 23

and CGPA, respectively. Also, it showed zero-order correlations of .41 and .43 with the aforementioned criterion measures.

4. GPA 1-term emerged in both analyses as the best predictor that showed a consistently high correlation with the various criterion measures. As shown in Tables 13 and 14, in both analyses GPA 1-term exhibited correlations of .56[b] and .57[b] with CGPA.

Although some of the correlations did not reach significance because of the small observation size, the direction and magnitude of the correlations reflected a positive sign. Overall, the pattern of the rank-order correlations suggested that, on the average, countries that ranked high with respect to the order of their means on predictors (MSU-AETS, IPAA, and GPA 1-term) among the other countries usually tended to maintain a high standing with respect to the order of their GPA means. Also, the results of the zero-order correlation implied that the higher the country's mean on the predictors, the more likely students from that country were to maintain a high average performance with respect to GPA 1-term and CGPA.

Means Comparison Analysis

In prediction research, the heterogeneity of the study subjects is known, among other things, as the major factor that influences prediction accuracy. When heterogeneous groups are combined for predictive purposes, the results of the predictor validity are likely to be of limited value. The greater the variability of the group with respect to the validity a particular selection device may have for the various groups, and the sampling distribution (mean, standard

deviation) of their scores on the predictors and the criteria, the higher the prediction error and the lower the prediction accuracy.

In general, when heterogeneous groups are combined for validating a particular selection device, several types of relationships may emerge and act to reduce prediction accuracy. For example, a particular selection device such as the TOFEL may yield equal validity for a number of subgroups whose means on both the predictors and the criteria differ significantly. Also, it may exhibit equal validity for other groups while their means on the predictors and the criteria do not differ significantly. Furthermore, it may yield equal validity for other groups for which only the means on either the predictor or the criteria differ significantly. Under the aforementioned conditions of mean differences, the TOFEL may also yield different validity, opposite validity, or no validity for a particular group within the total study subjects.

As one or more of the foregoing relationships occurs in a prediction study, the combination of the groups will almost always produce low validity and therefore less-accurate prediction. In the present study, the preliminary analysis of the combined groups produced several examples in which a number of predictors yielded very low validity coefficients. Such low coefficients were attributed to the differences in validity that the predictors had for the different groups. The low coefficients were also attributed to the discrepancies among the various groups with respect to the sampling distribution of their scores (mean and standard deviation) on both the predictors and the criteria.

Because the findings of the differential validity analyses provided several examples in which the preadmission data differed with respect to their prediction of various groups' GPAs, it is worthwhile to compare the various groups with respect to their average performance on the predictors (TOFEL and MSU English test score) and the criteria (GPAs and academic credits accumulated at different points in the graduate program). The findings of such a comparison, along with the findings of the differential validity analysis, would provide valuable insight into how the findings of the present study can be interpreted and used properly.

Tables 1 through 6, Appendix D, present a summary of the ANOVA and t-test results. Also, Tables 1 through 15, Appendix F, show the findings of post-hoc comparison analysis (Tukey procedure) for GPA 1-term, academic credits completed by the end of the first term, and CGPA for the various groups that differed significantly. Based on the findings presented in the aforementioned tables, the following observations are made:

1. The results of the t-test analysis indicated that males and females performed at the same level on all of the predictors and criteria except the listening test and CGPA. The t-test values suggested that females tended to achieve higher scores on the English listening test and a higher CGPA than the male group (Tables 1 and 2, Appendix D).

2. Single graduate students had significantly higher means than married students with respect to their performance on the TOFEL

test, grammar, listening, writing, and the MSU-AETS. They also had significantly higher means with respect to the number of credits accumulated at the end of the first term and the first year. On the other hand, both groups performed similarly on vocabulary, reading, and GPAs they accumulated at different points in their graduate programs (Tables 1 and 2, Appendix D).

3. Students in the doctoral program differed significantly from those in the master's program with respect to their mean scores on English reading, writing, and the MSU-AETS. They also differed significantly with respect to mean GPA achieved at different points in their graduate programs. The t-values revealed that doctoral students tended to accumulate higher English scores and higher GPAs than did students in the master's program (Tables 1 and 2, Appendix D).

4. The foreign students who achieved a score of 80 or above on the MSU English test (average and subtests) tended to accumulate higher GPAs than those who achieved a score of 80 or below on the same tests. For example, students who scored higher than 80 on the MSU-AETS accumulated GPAs of 2.59, 3.36, 3.41, and 3.36. In contrast, students who scored below 80 on the MSU-AETS accumulated GPAs of 1.45, 3.00, 3.22, and 2.93. The overall pattern of the t-test results and the distribution of GPAs suggested that students who started their academic program with scores below 80 on the MSU-AETS tended by the end of their program to accumulate lower GPAs than did students who achieved scores higher than 80 on the same test (Tables 3 and 4, Appendix D).

5. Foreign graduate students whose academic records indicated that their academic progress was normal tended to start their academic programs with significantly higher scores on the TOFEL and MSU English test (average and subtests) than those whose records indicated their academic progress was not normal. Also, normal students tended on the average to accumulate significantly higher GPAs and more credits than nonnormal students (Tables 1 and 2, Appendix D).

6. When the foreign graduate students were grouped into different age categories (20-24, 25-29, 30-34, and 35 and above), they differed significantly with respect to performance on the TOFEL and MSU English test. Young graduate students (20-29) tended to score higher on the TOFEL and the MSU English test than did older graduate students (age > 30). Also, they differed with respect to their mean GPA and the number of credits they had accumulated at different periods in the graduate program. The ANOVA results indicated that students differed with respect to GPA 1-term ($F = 9.99$, $df = 3,920$, $p < .001$), academic credits completed by the end of the first term ($F = 9.59$, $df = 3,920$, $p < .001$), and CGPA ($F = 2.69$, $df = 3,922$, $p < .05$). Overall, the findings of the post-hoc comparison analysis (Tukey procedure) revealed that the young group tended to accumulate a significantly higher GPA and to carry significantly more credits than the older students.

7. When the foreign students were grouped on the basis of college they were attending, the comparison analysis indicated they differed significantly with respect to their means on the TOFEL and the MSU English test (average and subtests). Also, students in the various

colleges differed with respect to their means on GPA and credits accumulated at different points in the graduate program. In general, the results of the ANOVA and the post-hoc comparison analyses revealed that foreign graduate students attending colleges such as arts and letters, natural science, engineering, and education tended to accumulate significantly higher mean GPAs, particularly GPA 1-term, than students studying communications, business, and agriculture. Further, the results implied that students in business tended to carry a significantly heavier academic load than students in the other colleges (Tables 4, 5, and 6, Appendix F).

8. When students from single countries (China, Canada, etc.) and grouped countries (South America, Middle East, Far East, English-speaking countries, Europe, and countries in which English is a second language) were compared, the ANOVA results indicated that students from the single countries and the grouped countries differed significantly with respect to their means on the predictors and the criteria. Overall, the findings of the ANOVA and the post-hoc comparison analyses performed on students from the single countries and the grouped countries were highly similar (Tables 7-12, Appendix F). The findings of the post-hoc comparison analysis suggested that students from English-speaking countries, Europe, and countries in which English is a second language tended to accumulate significantly higher GPAs and to complete more credits by the end of the first term than those from South America, the Far East, and the Middle East (Tables 7, 8, 10, and 11, Appendix F). When students from the various countries and groups of

countries were compared with respect to CGPA, the post-hoc comparison analysis indicated that students from English-speaking countries, Europe, and the Far East tended to achieve significantly higher CGPAs than students from the Middle East, South America, and countries in which English is considered a second language. This finding suggested that students from the Far East, particularly Chinese and Japanese students, had managed to improve their achievement as they advanced in their graduate programs. Although their first-term performance was significantly lower than that of students from English-speaking countries, Europe, and countries in which English is a second language, their CGPA was significantly higher from that of students from South America, the Middle East, and countries in which English is a second language (see Tables 9 and 12, Appendix F).

9. The final comparison analysis was performed on GPA and academic credit load means of the following groups, which differed with respect to their English-language status when they applied to MSU graduate school.

a. Students who scored higher than 550 on the TOFEL test and were allowed to start their academic programs.

b. Students who scored below 550 on the TOFEL test and had to take the MSU English test and then started their academic programs.

c. Students who just took the MSU English test and started their academic programs.

d. Students who took the MSU English test and, because of their low scores, studied for a number of terms at the English Language

Center; after meeting the university standard (MSU-AETS score of 80 or above), they started their academic programs.

e. Students with no English records (from English-speaking countries, some European countries, and countries in which English is considered a second language).

f. Students with no English records (transferred from another school).

g. Students with no English records (from the Middle East, South America, and some countries in Africa and the Far East).

The ANOVA results revealed that the aforementioned groups differed with respect to their means on all the GPA measures and academic credits accumulated at different points in the graduate program. Specifically, the F-values indicated they differed with respect to GPA 1-term ($F = 36$, $df = 6,964$, $p < .001$), credits completed by the end of the first term ($F = 58.73$, $df = 6,958$, $p < .001$), and CGPA ($F = 6.80$, $df = 6,1099$, $p < .001$). In general, the results of the post-hoc comparison analysis of the group means on the aforementioned criteria suggested the following (see Tables 13-15, Appendix F):

1. When the various groups were compared with respect to their means on GPA 1-term, groups A, C, E, F, G, and B, in that order, accumulated higher GPAs by the end of the first term than did group D. Whereas group D accumulated a GPA of only 2.10, the remaining groups accumulated GPAs that ranged from 3.13 to 3.38 (see Table 13, Appendix F).

2. Groups E, A, F, C, G, and B, in that order, completed more academic credits by the end of the first term than did group D. Whereas students from group D completed, on the average, only 3.57 credits by the end of the first term, the remaining groups completed from 6.81 to 8.59 credits (see Table 2, Appendix F).

3. When the various groups were compared with respect to their mean CGPA, the post-hoc comparison analysis indicated that groups E, B, A, and G accumulated higher CGPAs than group D. Overall, the pattern of the comparison analysis indicated that foreign students who came to MSU with low English ability and studied at the English Language Center tended to perform at a lower level than the remaining groups (see Table 15, Appendix F).

General Discussion

Prediction of individuals' behavior has been a subject of great interest to researchers in the fields of education and psychology. Of great importance of educators, particularly those who deal with the problem of selection and placement of students in a particular program for advanced learning, is prediction of academic achievement. Because of the uncertainty inherent in making selection decisions, decision makers need precise data for judging students' probability of academic success in a particular program. Consequently, concerned researchers have conducted a vast amount of prediction research to identify student attributes that bear a strong relationship to future academic potential. The findings of these studies have contributed greatly to the accumulation of scientific knowledge about the prediction of academic

achievement. Decision makers have found this knowledge very helpful in making accurate judgments about particular students' potential success in a specific program.

As the number of foreign students has increased in most American universities, admission decision makers have again been placed in a position of needing precise criteria on which to base admission decisions. Accordingly, several researchers have attempted to use the logic of prediction theory to determine the attributes that best predict foreign students' future academic potential. Although the logic of prediction theory is applicable to the prediction of foreign students' academic achievement, the overall outcome of such prediction is less accurate than that for the American student. The findings of the present study, as well as those of previous research, revealed that foreign students' academic potential can be predicted from preadmission data required by American universities. However, because of foreign students' diversity with regard to culture, English proficiency, and previous educational experience; the lack of a uniform scale that can be used to measure their actual academic aptitude; and the difficulty of locating a large number of foreign students with complete information on the predictors and criteria, predictions of their academic success are less consistent and less accurate than for American students. These problems, along with the criterion difficulty, and restriction of the range of data on both predictor and criterion measures, have contributed largely to the reduction of prediction accuracy

and have prevented researchers from reaching consistent conclusions regarding the effectiveness of current preadmission criteria.

Contrary to the findings of previous research, the findings of the present study indicated that the TOFEL score failed to exhibit consistent predictive validity of foreign students' academic achievement, as measured by GPA, academic credit load, and indices of the major academic advisor's rating of the student's academic competence. According to the findings of the total-study-subject analysis, the TOFEL yielded a positive significant correlation only with GPA 1-term and the number of credits accumulated at different points in the graduate program. However, the magnitude of the positive correlation between the TOFEL and credit load tended to decrease as we moved along the scale to the final cumulative credits.

When the predictors' validity coefficients were estimated for the various subgroups, the TOFEL continued to exhibit approximately the same pattern of correlation found on the total sample except for students from China, students in the doctoral program, and students in the engineering college. According to the findings presented in Table 7, the TOFEL score tended to exhibit different patterns of correlations from those found on the total sample and the other subgroup comparisons. Precisely, the TOFEL yielded correlations of .38[c], .11, .23[a], and .23[a] against the four GPA criterion measures for students in the doctoral program. Also, it showed correlations of .17, .17, .31[a], and .25[a] and .39[b], .10, .47[b], and .13 against the four GPA criteria for

students from China and students in the engineering college, respectively.

In general, the failure of the TOFEL score to predict GPA 1-year, GPA 2-year, and CGPA may be attributed to the restriction of range of data on these GPA measures. In most analyses, the TOFEL score tended to exhibit a positive correlation with first-term GPA and academic load, and a low or negative correlation with the remaining GPA measures. This is because the first-term GPA and credit load tended to vary more than did GPA 1-year, GPA 2-year, and CGPA.

This finding may also be attributed to the fact that English proficiency, as measured by the TOFEL, does not correlate with student GPA after the student achieves a score above threshold value. In other words, English proficiency, as measured by the TOFEL, tended to predict the student's GPA at a low level of proficiency, and once the student's English proficiency exceeded a particular threshold value, the TOFEL failed to associate with the student's GPA. Hence, once a student reaches a level of English proficiency where language is no longer a barrier to academic achievement, additional improvement on the TOFEL has only a negligible influence on improving overall academic performance, as measured by GPA.

The MSU English test score exhibited a different pattern of correlation with the various criterion measures. According to the total-study-subject analysis, the MSU English test score (average and subtests) tended to yield significant correlations with all of the GPA and academic-credit criteria. Also, it tended to show a positive

correlation with advisor's rating, but because of the size of the sample most of the correlations were not significant. Further, for a number of subgroups, the MSU English test score exhibited correlations with criterion measures that were higher than those found in the total-study-subject analysis. However, when students were subgrouped into those who took the test and passed and those who took the test and studied at the English Language Center, the patterns of correlations were totally different. The English scores of the former group tended to show a very weak association with the various criterion measures (Table 12, Appendix A). In contrast, scores of the latter group (Table 13, Appendix A) and of the combined groups (Table 7) tended to exhibit positive, significant correlations with almost all of the criteria. This finding reaffirmed the aforementioned fact concerning English proficiency--that English proficiency, as measured by various tests, tends to predict student academic success up to a particular threshold value. Once the student's score exceeds this value, the influence of English proficiency on improving academic achievement (GPA) will be marginal.

Table 15 presents the means and standard deviations of the foregoing groups on both the predictor (MSU-AETS) and the criteria (GPA 1-term, number of credits completed by the end of the first term, and CGPA). Based on these findings and the correlations presented in Table 7, it can be concluded that the failure of the first group's (those who passed the test the first time) MSU-AETS to predict their academic achievement may be attributed to a greater restriction of range and the

low level of variability of the data on both the predictors and criteria. Also, it may be attributed to the fact that the English proficiency of students in this group reached a level at which the English language was not a major barrier to their academic achievement.

Table 15.--Means and standard deviations of selected groups on the MSU-AETS, GPA 1-term, number of credits completed first term, and CGPA.

	MSU-AETS		GPA 1-Term		# Credits 1-Term		CGPA		Pattern of Correlation
	X	SD	X	SD	X	SD	X	SD	
1. Passed	88	4.39	3.36	.51	7.87	3.40	3.41	.31	Very few positive correlations
2. Studied at ELC	83	6.59	2.11	1.56	3.57	4.41	3.24	.35	Most r's were significant & positive
3. Combined (1&2)	84	6.40	2.87	1.35	6.76	4.00	3.38	.56	Most r's were significant & positive

Overall, English proficiency as measured by the TOFEL and MSU English tests tended (up to a certain threshold value) to predict defined criteria. Once the student's score exceeded that value, additional improvements in the scores on both tests tended to show no association with GPA. Such lack of association may be attributed either to the restriction of range or the fact that English skills do not intervene with academic achievement after a student becomes fluent

in English. If this is true, the variations in students' academic achievement as measured by GPA and academic credit load may be ascribed to other factors, such as academic background, motivation, persistence, major field, and study habits.

In addition to English proficiency, the present study attempted to examine the benefits to be gained from using the index of previous academic achievement (IPAA) as an indicator of foreign students' success in graduate school. Because of the diversity of ways in which foreign students' grades were reported, it was difficult to use their actual grades to predict academic achievement. For the purpose of prediction, the grades were so diverse that no available equating model was appropriate to use them as predictors of graduate students' academic success. Therefore, foreign students' grades were converted to a scale similar to MSU's grading scale. The converted scores were then used as a predictor of graduate academic success. Although the converted scores may not be exactly equal to the actual scores, the correlation between the actual score (reported on a scale from 1-100, n = 127) and the correspondent converted-grade IPAA was .95[c]. This correlation suggested that the transformation procedure was highly consistent and accurate.

When IPAA was correlated with the criteria of academic success, it yielded correlations of .10[c] with GPA 1-term, .12[a] with GPA 2-year, and .18[c] with CGPA. In contrast, the correlations of IPAA with the remaining criteria were either low, negative, or nonsignificant. However, when predictor validity was estimated separately for the various

subgroups, IPAA emerged to exhibit different validity for the different groups. Specifically, the IPAA of students from China, Kuwait, Brazil, and Japan showed more power in predicting GPA, particularly CGPA, than did the IPAA of students from other countries. Also, the IPAA exhibited more power in predicting the GPA of students in education, social science, business, and agriculture than in other colleges. Moreover, the IPAA yielded a higher correlation with GPAs of young students, females, married students, and those in the master's program than with GPAs of older students, males, single students, and those in the Ph.D. program.

The lack of consistency in the IPAA's predictive validity may be attributed to the fact that foreign students differed with respect to the quality of their home grading system. For example, a particular group of foreign students might come to the United States with high grades achieved at poor-quality schools and do poorly in MSU graduate school. Another group might come with moderate grades from high-quality schools and do well in MSU graduate school. These variations represent one possible explanation of the inconsistency in the IPAA's predictive validity. Further, variations in the grading standards in various colleges and departments at MSU may have contributed to the inconsistency in the IPAA's predictive validity.

Despite the problems involved in using foreign students' academic achievement as a predictor of their academic success in MSU graduate school, the overall pattern of the findings suggested that the

higher the students' IPAA, the more likely they will be to maintain better academic status.

The present study has also attempted to examine the effectiveness of GPA 1-term as a predictor of foreign students' academic success in graduate school. The findings of the present study were highly consistent with those reported by Putnam (1953) and Cieboter (1969). According to the total-subject analysis, GPA 1-term exhibited correlations with the various criterion measures that were higher than the correlations of English test scores and IPAA (see Table 7). Also, GPA 1-term showed high correlations with CGPA in most subgroups analyses except when the total sample was subgrouped on the basis of country of origin. GPA 1-term failed to predict the CGPA of students from countries in the Middle East, South America, and the Far East (except Japan and China). In general, the failure of GPA 1-term to predict the CGPA was due in part to those students' low level of English proficiency. Foreign students from the aforementioned regions encounter more academic adjustment problems with the American educational system than do students from Europe, English-speaking countries, or countries in which English is a second language. Therefore, their GPA 1-term may always be higher or lower than their actual academic potential. Particular groups of foreign students may start with just a few credits or less-demanding courses and achieve a high GPA, which does not reflect their academic potential as they advance to more demanding courses. In contrast, other students may begin with very demanding courses and achieve lower grades than their actual academic potential. However,

the findings of the present study, as well as those of Putnam and Cieboter, revealed that GPA 1-term possesses a very promising sign as a good indicator of foreign students' future academic achievement. Accordingly, if each college or department required its students to start with a uniform number of courses the first term that would expose them to various academic experiences (term paper, essay exam, objective test, etc.), GPA 1-term would provide good uniform information that could be used in combination with other preadmission data to make accurate judgments about foreign students' probability of academic success in a particular graduate program.

In an attempt to improve prediction accuracy, the present study also examined the effectiveness of a number of nonintellective predictors in predicting foreign students' academic success. Although these predictors did not exhibit adequate linear correlations with the defined criterion measure, their inclusion in the study was found to be very effective. Specifically, the nonintellective predictors (particularly age, country of origin, and college type) were found to be very effective when they were used to moderate the predictive validity of the intellective predictors. By subgrouping the total study subjects on the basis of the nonintellective predictors, prediction accuracy was increased and the intellective predictors emerged to show different predictive validity for the various groups. In general, the use of the nonintellective predictors contributed highly to control of prediction error caused by study-subject heterogeneity and led to more accurate estimation of the intellective predictors' validity coefficients.

Accordingly, foreign students from different colleges, countries, and age categories should not be combined for the purpose of validating a particular selection device. Better prediction is more likely to result from a separate estimation of predictor validity for each identifiable homogeneous subgroup.

As a result of the problem inherent in using GPA as a criterion of graduate students' academic success, the present study attempted to use the academic advisors' ratings of students' academic competence, as complementary criteria to the GPA. Because of the low questionnaire return, and lack of complete data on the predictors and criteria, the number of doctoral students with complete information on both the predictors and the criterion (advisor rating) was not encouraging. However, using the available data, the findings revealed that advisor ratings seem to possess an encouraging sign as a criterion of foreign students' academic success.

In conclusion, predicting foreign graduate students' academic success in American schools is a discouraging process. This is because a well-designed prediction study requires the examination of a large number of foreign students who have complete information on the preadmission criteria and the criterion measures. The development of such a study requires the time and cooperation of all officials concerned with the question of foreign students' academic achievement. Although the present study attempted to examine the academic records of a large number of foreign students, the final data needed were not complete. Because of time limitations, various administrative regulations, and

other limitations imposed by the nature of the study, it was difficult to gather complete information on all of the study variables. However, compared to previous research, the present study managed to control for a number of variables that had caused inconsistencies in former research findings.

Based on findings discussed earlier, it is clear that estimating the benefits to be gained from using a particular selection device for judging foreign students' academic success in American graduate schools requires a large sample for whom complete data are available on all the predictors and criteria. Such a sample should be large enough to permit full control of all the variables that directly or indirectly affect the magnitude of the main predictors' validity coefficients. When the foregoing condition is met, better estimates of predictor validity coefficients will result from validating separately for each identifiable group rather than for the total heterogeneous group. Furthermore, correct interpretation of what the data on the TOFEL, MSU-AETS, IPAA, and standardized tests mean in terms of academic standards in MSU graduate school is likely to result from examining the distribution of data on the aforementioned predictors as they correspond to student GPA distribution.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The primary purpose of this study was to estimate the predictive validity of the common preadmission criteria used by admission decision makers to screen foreign students into the various graduate programs at MSU. In particular, the writer attempted to evaluate the effectiveness of foreign students' IPAA English test scores (MSU English test score and TOFEL scores), and demographic and biographical data in predicting foreign students' graduate academic success, as measured by various types of GPA and academic credits completed at different points in the graduate program. Further, the predictive validities of the aforementioned criteria were estimated as they related to the major academic advisors' ratings of doctoral students' academic competence. Moreover, the investigator attempted to examine the value of first-term GPA as a potential predictor of foreign students' long-run academic success.

Because of the nature of prediction research and the heterogeneity of the study population, the researcher attempted to locate a large sample from which stable findings could be drawn. Accordingly, the study subjects were pooled from the foreign students who were enrolled in MSU graduate schools between fall term 1978 and spring term

1982. The total study subjects comprised 1,103 students who had completed 12 credits or more. After the necessary data were collected and coded, they were analyzed in terms of the study hypotheses and research questions.

During the first phase of data analysis, zero-order correlation was employed to estimate the intercorrelation of the study predictors and criterion measures for the total study subjects and to determine the intellective and nonintellective predictors' validity as they related to the defined criterion measures. Then, the differential validities of the intellective predictors were estimated for all of the identifiable subgroups. In that analysis, the nonintellective predictors were used as a basis for subgrouping the total study subjects into homogeneous subgroups. Then zero-order correlation was employed to estimate the intellective predictors' validity coefficients as they related to criterion measures of the various subgroups. Further correlation analysis was performed on the countries' means on the predictors and criteria. In that analysis, zero-order and rank-order correlation were used to determine the extent to which the country's mean (magnitude or order) on the predictor could predict the magnitude or the order of its mean on the criterion measure (GPA).

During the second phase of data analysis, the stepwise multiple-regression technique was undertaken to estimate the multiple contribution of the various variables in predicting the the total study subject and the subgroup GPA criterion measures (CGPA). This technique

was also employed to specify those predictors that accounted for as much of the criterion variance as did the total set of predictors.

During the final stage of data analysis, t-tests and one-way ANOVAs were used to compare the various subgroups of foreign students with respect to their average performance on the predictor and criterion measures. When the ANOVA yielded a significant F-test, post-hoc comparison analyses (Tuckey) were used to locate the means that differed significantly from each other.

In view of the findings cited throughout the study and the discussion of those findings, the following conclusions were drawn.

Conclusions

1. The TOFEL score failed to consistently predict foreign students' academic success, as measured by the various criterion measures. Although the TOFEL tended to yield significant predictive validity for first-term GPA and academic credit load, the magnitude of its validity with respect to the remaining GPA measures and the indices of the academic advisors' ratings were low, nonsignificant, or negative. Such failure was attributed, in large part, to the low level of variability of the data on both the predictors and the criteria.

2. The overall correlational analysis revealed that MSU-AETS was a good predictor of foreign students' graduate academic success, as measured by GPA and academic credits achieved at different points in the graduate program. However, when the indices of the advisors'

ratings were used as the criterion measures, the MSU-AETS tended to yield a positive correlation, but because of the size of the observation, most of the correlations were not significant.

3. The failure of the English test scores, particularly the TOFEL, to yield a predictive validity that was statistically and practically significant was attributed, to a great degree, to the restriction of range of the data on both the predictors and criteria, and to the heterogeneity of the study subjects. The evidence from the differential validity analysis suggested that when the range of the data on both the English test scores and the criterion measures was adequate, the TOFEL and the MSU-AETS tended to yield a predictive validity that was statistically and practically significant. Also, an examination of the distribution of English scores corresponding to the distribution of GPAs revealed that students who started their academic work with high English scores were more likely to accumulate higher GPAs and to earn more credits than those who started their academic program with low English scores.

4. MSU English subtests (grammar, listening, and reading) were the best predictors of foreign students' graduate success, as measured by GPA 1-term. But when CGPA was used as the criterion measure, listening and writing subtest scores were the best predictors. In contrast, when academic credit load completed at various points of the graduate program was used as the criterion measure, reading and listening subtest scores were the best predictors.

5. The index of previous academic achievement (IPAA) appeared to predict foreign students' graduate success, as measured by GPA 1-term, GPA 2-term, and CGPA. But when GPA 1-year, credit load, and indices of advisors' ratings were used as the criteria of graduate academic success, the power of IPAA as a predictor was very weak.

6. GPA 1-term was the best single predictor that consistently predicted foreign students' graduate success, as measured by the various criterion measures.

7. The nonintellective predictors, such as sex, marital status, age, degree level, country of origin, and type of curriculum, failed to yield consistent predictive validity of the defined criterion measures. However, the direction of the significant correlation between students' age and degree level and the GPA criteria suggested that students who were young or in the doctoral program tended to achieve higher GPAs than those who were older or in the master's program.

When the aforementioned predictors were used as moderators, they proved to be effective in enhancing the overall prediction accuracy of the intellective predictors. The differential validity analysis of the various groups provided several instances in which a certain intellective predictor yielded a higher correlation with the criterion measures of a particular group than with those of the total study subjects or the other subgroups.

8. Using the stepwise multiple-regression technique led to an increase in overall prediction accuracy. The multiple contribution

that resulted from combining the intellective and nonintellective predictors led to an observable increase in overall prediction accuracy.

9. The overall result of the total-sample and subgroup stepwise multiple-regression analyses indicated that GPA 1-term, MSU-AETS, and college type were the best predictors of the GPA criterion measures. However, in a number of instances, IPAA, in addition to GPA 1-term, MSU-AETS, and college type, was one of the best predictors of the GPA criterion measures. This was particularly true for female, Korean, Chinese, and Japanese students, and for those in the business college.

10. Males and females did not differ with respect to their performance on the predictors or the criteria, except for the English listening subtest and CGPA. Females tended to accumulate a significantly higher mean on both variables than did males.

11. Single graduate students tended to achieve significantly higher means with respect to their performance on the predictors and criteria than did married students.

12. Overall, students in the doctoral program had higher means than those in the master's program with respect to their performance on the English test and the GPA criterion measures.

13. Foreign students who achieved scores of 80 or above on the MSU-AETS tended to accumulate significantly higher GPAs and credit loads than those who achieved scores of 80 or below on the same test.

14. Foreign graduate students whose academic records indicated their academic progress was normal tended to accumulate significantly

higher means on the predictor and criterion measures than did those whose academic records indicated their academic progress was not normal.

15. Young graduate students had significantly higher means with respect to the data on the predictor and criterion measures than did older graduate students.

16. Foreign graduate students from different parts of the world differed significantly with respect to their average performance on the criterion measures. Overall, students from English-speaking countries, Europe, and the Far East (particularly China and Japan), in that order, tended to accumulate significantly higher GPAs and to complete more credits than students from the Middle East and South America.

17. Foreign graduate students who came to MSU with adequate English scores (TOFEL > 550 or MSU-AETS > 80) and students for whom the English scores were waived (particularly students from English-speaking countries) tended to accumulate significantly higher GPAs and to complete more credits than those students who came with low English proficiency and studied at the English Language Center.

Overall, the study findings and the conclusions drawn from those findings provide interesting and useful information that admission decision makers at MSU may use to improve the foreign student admission program. The findings regarding the validity of the IPAA and English scores (particularly MSU-AETS and GPA 1-term) revealed a number of implications for personnel who deal with the admission of foreign students. Furthermore, the study findings revealed a number of

implications for those who are concerned with maximizing the accuracy with which foreign students' academic success in American graduate schools is predicted.

Recommendations

In view of the study findings and the conclusions drawn from those findings, several recommendations were made possible. These recommendations are considered under the following headings: (1) suggested two-stage selection model and (2) recommendations for further research.

Suggested Two-Stage Selection Model

The lack of uniform data on which decision makers can base their judgments of foreign students' admissibility into a particular program has made the decision maker's task very difficult. However, the findings of the present study revealed a number of implications that may aid decision makers in making accurate judgments regarding the probability of foreign students' academic success in particular programs. Based on these implications, the researcher attempted to modify the current selection models used by various graduate schools into the following two-stage selection model.

First-stage selection. At this stage, the judgment of a foreign student's admissibility (probability of academic success in a particular program) must be based on criteria such as IPAA (converted previous academic grade), English scores (MSU-AETS and the TOFEL), age,

degree level, and nationality. To make an accurate judgment, the decision maker may use the following criteria:

1. If the foreign student's IPAA is adequate (> 2.0) and his English scores meet the university standard (MSU-AETS > 80 or TOFEL > 550), he should be given a conditional admission and allowed to start his academic program, according to the conditions explained in Criterion 4.

2. If the student's IPAA is adequate (> 2.0) and his MSU-AETS score is between 60 and 79, he should be given a conditional admission and referred to the English Language Center for an extensive English program. When he achieves a score of > 80 on the MSU-AETS, he then should be permitted to start his academic program, according to the conditions explained in Criterion 4.

3. If the student fails to achieve a score of > 80 on the MSU-AETS, he should be interviewed by the admission committee of his college or department, and one of two actions should be taken on the basis of their recommendations: (1) he should be allowed to start his academic program, or (2) he should be dropped from the university. This suggestion is applicable only to those students who have good previous academic achievement and whose records confirm their serious work while studying at the English Language Center. Some students who have good previous academic records and good academic potential may fail to achieve a score of 80 on the MSU-AETS because of their unfamiliarity with objective-test-taking strategies (Aseeri, 1980).

4. After a student meets the standards with respect to his IPAA and English test scores, he should be allowed to start his academic program. Since some foreign students may start with less demanding courses or carry fewer credits to meet the requirements of conditional admission, it is recommended that all foreign students in a particular college or department start with the same courses. Each college or department should specify two courses in the master's program and four courses for doctoral students. The choice of courses must take into account the various academic experiences (taking objective and essay tests, writing papers, etc.) the student will encounter as he progresses through the program. The student's GPA in such courses will provide decision makers with highly uniform data that can be used to make accurate judgments about the probability of the student's academic success in a particular program.

Second-stage selection. After the student completes the predefined courses and before he enrolls for further courses, the admission decision committee must evaluate the quality of his performance. If the student managed to accumulate a GPA of > 3.0 in all required courses, he should be given regular admission. But if the student's GPA is unsatisfactory, he must be dropped from the school. Further continuation may lead to serious financial and psychological losses.

The university may continue to use the aforementioned model for four years. By the end of the fourth year and after a large number of foreign students have been screened according to the aforementioned procedures, a comprehensive evaluation of the entire program should be

undertaken. To facilitate the work that may be needed to conduct such an evaluation, the following recommendations are presented.

Recommendations for Further Research

To conduct an objective evaluation of the utility of the foregoing model, the following procedures may be used:

1. Design a chart similar to the one used to collect data in the present study. After a student meets the university requirements for conditional admission, the chart may be placed in his file at the Office of Foreign Students and Scholars. The needed information can be entered gradually, so that by the end of the fourth year the information needed for evaluation will be available.

2. The evaluation should be concerned with the following predictors:

   a. Converted previous academic achievement (IPAA). Data concerning this predictor should be maintained for as many countries as possible.

   b. MSU English test scores (average and subtests). To obtain complete information, all foreign students from non-English-speaking countries should be required to take the MSU English test.

   c. First-term GPA of students at the master's level.

   d. CGPA of the first two terms for students at the doctoral level.

   e. GRE scores of students seeking admission to the Ph.D. program. The various graduate schools should require all applicants to submit their GRE scores. Having such information for

large numbers of students from various countries and colleges would enable researchers to examine their validity as related to criteria of academic success. Further, the availability of GRE scores would allow researchers to examine the distribution of these scores as they correspond to students' GPA in various graduate schools. Such an examination would provide valuable information about how to interpret these scores and how to use them when judging foreign students' academic potential in a particular program.

3. The criteria of academic success must include:

a. GPAs and the academic credit load completed by the end of the first term, the first year, and the end of the master's program.

b. GPAs and academic credit load completed by the end of the second term, the second year, and the end of the Ph.D. program.

c. The academic advisor's rating of the doctoral student's academic competence. The rating scale in Appendix H may be used to collect the data regarding this criterion measure. If such a scale could be completed by the major academic advisor and another member of the doctoral committee, the average of their ratings would provide a more accurate measure of academic success in the doctoral program than would the GPA at different points in the doctoral program.

4. When estimating the predictive validity of the preadmission data, it must be computed for the total sample and for all possible identifiable subgroups (mainly college, country, and age categories).

Such procedures would provide valuable information on how the various predictors could be used to estimate the probability of a specific group of foreign students succeeding in a particular program.

5. If possible, professional personnel should conduct a standardized interview with foreign students who terminate their programs before they earn their degrees. Such an interview should focus on factors associated with academic success, such as motivation, adjustment to the American culture and educational system, clarity of academic attitudes, academic self-concept, and so on.

6. In addition to examining predictor validity, the evaluation should be concerned with examining the distribution of the data on the predictor in relation to data distribution on the criterion measures. Such an examination would provide insight into how the data could be interpreted and used to select foreign students for various graduate programs.

7. Finally, the evaluation should be concerned with estimating the reliability of the MSU-English subtests. Knowledge of the reliability would provide valuable information about the benefit to be gained from using the the various subtests as criteria for judging foreign students' readiness to start their academic programs.

APPENDICES

APPENDIX A

CORRELATIONS BETWEEN PREDICTORS AND CRITERIA FOR THE VARIOUS DEMOGRAPHIC SUBGROUPS

Table 1.--Correlation between predictors and criterion for male group.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status	ROAC-A	ROAC-F
TOFEL	.22[c] 188	.30[c] 188	.03 186	.27[c] 186	.04 136	.24[b] 136	.10 191	.16 191	.25 32	.006 191	.13 24	-.03 23
Grammar	.30[c] 372	.32[c] 372	.16[c] 371	.24[c] 371	.20[c] 265	.19[c] 265	.29[c] 394	.12[c] 394	.34[c] 245	.22[c] 395	.26[c] 48	.15 47
Vocabulary	.25[c] 372	.28[c] 372	.13[b] 371	.23[c] 371	.15[c] 265	.11[a] 265	.26[c] 394	.07 394	.36[c] 245	.19[c] 395	.18 48	.02 47
Reading	.30[c] 318	.36[c] 318	.18[c] 317	.36[c] 317	.21[c] 221	.27[c] 221	.30[c] 336	.19[c] 336	.27[c] 213	.19[c] 338	.29[a] 41	.19 41
Listening	.26[c] 373	.31[c] 373	.14[b] 372	.29[c] 372	.20[c] 266	.21[c] 266	.20[c] 394	.11[b] 394	.07 246	.20[c] 395	.21 48	.24[a] 47
Writing	.20[c] 376	.27[c] 376	.01 375	.26[c] 375	.15[b] 269	.21[c] 269	.18[c] 399	.13[c] 399	.27[c] 248	.14[b] 400	-.06 49	-.12 48
Average	.35[c] 372	.39[c] 372	.17[c] 371	.37[c] 371	.25[c] 265	.25[c] 265	.31[c] 394	.15[c] 394	.30[c] 245	.24[c] 394	.24[a] 48	.17 47
Interview	.27[b] 107	.25[b] 107	.08 107	.21[a] 107	.20[a] 82	.12 82	.27[b] 113	.07 113	-.05 47	-.01 114	.32 8	.36 7
IPAA	.08 237	.07 237	.04 237	.09 237	.06 172	-.07 172	.13[a] 251	.02 251	... 	.07 247	-.17 31	-.25 31
PAA	.13 88	.11 88	.12 88	.09 88	.04 64	-.07 64	.04 92	-.03 92	.94[c] 92	-.13 91	-.08 13	-.23 13
GPA 1-term	1.00	.71[c] 690	.41[c] 687	.52[c] 687	.40[c] 476	.25[c] 476	.41[c] 690	.12[b] 690	.08 237	.05 685	.34[c] 92	.27[b] 90

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 2.--Correlation between predictors and criterion for female group.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status	ROAC-A	ROAC-F
TOFEL	.06	.27[b]	-.02	.11	.12	.19	.02	.08	-.19	.11	.30	.05
	79	79	79	79	47	47	81	81	14	80	10	10
Grammar	.23[b]	-.01	.19[a]	.19[a]	.19[a]	.29[b]	.21[c]	.25[c]	.31[c]	.22[c]	.03	.05
	141	141	138	138	80	80	151	151	95	152	5	5
Vocabulary	.26[c]	.13	.31	.35[c]	.14	.41[c]	.25[c]	.25[c]	.29[c]	.20[c]	.53	.52
	140	140	137	137	80	80	150	150	95	151	5	5
Reading	.23[b]	.12	.26[b]	.25[b]	.17	.23[a]	.17[a]	.08	.09	.19[a]	.51	.45
	120	120	118	118	33	73	127	127	83	128	4	4
Listening	.21[b]	.12	.14[a]	.27[c]	.17	.28[b]	.05	.14[a]	-.05	.23[c]	.19	.65
	142	142	139	139	81	81	152	152	95	153	5	5
Writing	.12	.12	.22[b]	.27[c]	.27[b]	.18[a]	.27[c]	.16[a]	.32[c]	.20[b]	.43	-.34
	141	141	138	138	80	80	151	151	95	152	5	5
Average	.26[c]	.13	.29[c]	.33[c]	.26[b]	.35[c]	.23[b]	.23[b]	.22[a]	.28	.42	.51
	143	143	140	140	82	82	152	153	95	134	5	5
Interview	.26[a]	.20	.39[a]	.25[a]	.39[a]	.15	.16	-.05	-.12	.07	...	...
	50	50	50	50	23	23	56	56	25	57		
IPAA	.17[a]	-.08	.03	-.09	.36[b]	.17	.35[c]	.23[a]	1.00	.11	.96	.96
	90	90	90	89	52	52	95	95			4	4
PAA	.31[a]	.26	.43[b]	.21	.54[b]	.37[a]	.51[c]	.34[a]	.94[c]	-.05	...	...
	34	34	34	34	25	25	35	35	35	35		
GPA 1-term	1.00	.43[c]	.32[c]	.43[c]	.41[c]	.25[c]	.39[c]	.14[b]	.17[a]	.10[a]	.09	.17
		274	274	271	159	159	274	274	90	273	18	18

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 3.--Correlation between predictors and criterion for single group.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status	ROAC-A	ROAC-F
TOFEL	.13[a] 209	.24[c] 209	-.02 208	.18[b] 208	.04 142	.22 142	.06 214	.18 214	.06 36	.01 213	-.11 28	-.03 27
Grammar	.37[c] 347	.29[c] 347	.20[c] 345	.28[c] 345	.23[c] 234	.20[c] 234	.33[c] 364	.09 364	.26[c] 217	.18[c] 367	.31[a] 31	.24 30
Vocabulary	.28[c] 346	.27[c] 346	.18[c] 344	.27[c] 344	.13[a] 234	.17[c] 363	.24[c] 363	.05 363	.24[c] 217	.15[c] 366	.14 31	-.003 30
Reading	.32[c] 288	.34[c] 288	.18[c] 287	.33[c] 287	.20[b] 193	.23[c] 193	.29[c] 301	.12[a] 301	.11 182	.15[b] 305	.46[b] 27	.35[a] 27
Listening	.27[c] 349	.25[c] 349	.17[c] 347	.27[c] 347	.14[a] 236	.19[c] 236	.16[c] 365	.04 365	-.01 218	.14 368	.25 31	.20 30
Writing	.19[c] 351	.22[c] 351	.11[a] 349	.23[c] 349	.17[c] 238	.19[c] 238	.19[c] 369	.09[a] 369	.30[c] 220	.12[b] 372	-.12 32	-.17 31
Average	.37[c] 349	.35[c] 349	.22[c] 347	.37[c] 347	.23[c] 236	.25[c] 236	.31[c] 366	.10[a] 366	.20[c] 217	.20[c] 369	.30[a] 31	.20 30
Interview	.29[c] 104	.20[a] 104	.30[c] 104	.26[b] 104	.22[a] 72	.11 72	.15 112	-.02 112	-.27[a] 45	.03 113	.34 7	.28 6
IPAA	.09 213	-.005 213	.01 212	.03 212	.11 149	-.04 149	.14[a] 223	.03 223	...	.04 221	-.26 19	-.33 19
PAA	.13 88	.18[a] 88	.11 88	.08 88	.09 67	-.09 67	.15 90	.15 90	.94 90	-.005 89	-.006 9	-.21 9
GPA 1-term	1.00	.64[c] 700	.36[c] 696	.48[c] 696	.40[c] 461	.23[c] 461	.41[c] 700	.13[c] 700	.09 213	.08 696	.36[c] 75	.30[c] 73

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 4.--Correlation between predictors and criterion for married group.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status	ROAC-A	ROAC-F
TOFEL	.25[a] 58	.36[b] 58	.10 57	.28[a] 57	.21 41	.35[a] 41	.10 58	.02 58	.48 10	.09 58	.83[a] 6	.83[a] 6
Grammar	.13[a] 166	.04 166	.11 165	.10 164	.12 111	.20[a] 111	.20[b] 181	.23[c] 181	.48[c] 123	.26[c] 180	.12 22	-.11 22
Vocabulary	.20[b] 166	.12 166	.20[b] 165	.26[c] 164	.19[a] 111	.16[a] 111	.27[c] 181	.20[b] 181	.50[c] 123	.25[c] 180	.27 22	.06 22
Reading	.21[b] 150	.15[a] 150	.23[b] 149	.35[c] 148	.21[a] 101	.33[c] 101	.26[c] 162	.27[c] 162	.40[c] 114	.22[b] 161	-.03 18	-.19 18
Listening	.20[b] 166	.22[b] 166	.09 165	.30[c] 164	.33[c] 111	.26[b] 111	.19[b] 181	.20[b] 181	.18[a] 123	.26[c] 180	.10 22	.29 22
Writing	.15[a] 166	.20[b] 166	.05 165	.33[c] 164	.22[b] 111	.21[b] 111	.22[c] 181	.22[c] 181	.30[c] 123	.20[b] 180	.12 22	.04 22
Average	.23[c] 166	.20[b] 166	.17[a] 165	.34[c] 164	.33[c] 111	.29[c] 111	.27[c] 181	.26[c] 181	.43[c] 123	.30[c] 180	.11 22	.03 22
Interview	.17 53	.25[a] 53	.04 53	.12 52	.35[a] 33	.21 33	.31[b] 59	.10 59	.33[a] 27	-.01 58	.42 4	.42 4
IPAA	.11 114	.15 114	.09 114	.14 114	.14 75	-.04 75	.24[b] 123	.10 123	1.00	.14 121	-.06 16	-.08 16
PAA	.23 34	.12 34	.29[a] 34	.20 34	.19 22	.24 22	.04 37	-.18 37	.96[c] 37	-.26 37	-.38 5	-.26 5
GPA 1-term	1.00	.59[c] 264	.41[c] 263	.54[c] 262	.45[c] 174	.28[c] 174	.39[c] 264	.08 264	.11 114	.03 262	.21 35	.20 35

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 5.--Correlation between predictors and criterion for Master's group.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
TOFEL	.04 190	.23[c] 190	-.04 190	.16[a] 190	-.003 120	.27[c] 120	-.02 194	.15[a] 194	.04 34	.05 193
Grammar	.28[c] 393	.18[c] 393	.14[b] 395	.22[c] 395	.21[c] 259	.20[c] 259	.30[c] 429	.16[c] 429	.39[c] 268	.24[c] 430
Vocabulary	.26[c] 397	.22[c] 397	.20[c] 394	.29[c] 394	.15[b] 259	.21[c] 259	.28[c] 428	.13[b] 428	.39[c] 268	.20[c] 429
Reading	.31[c] 344	.27[c] 344	.18[c] 342	.36[c] 342	.19[b] 227	.32[c] 227	.31[c] 369	.22[c] 369	.29[c] 237	.21[c] 371
Listening	.28[c] 399	.25[c] 399	.14[b] 396	.30[c] 396	.22[c] 260	.26[c] 260	.21[c] 429	.16[c] 429	.06 269	.24[c] 430
Writing	.22[c] 401	.25[c] 401	.13[b] 398	.31[c] 398	.20[c] 262	.24[c] 262	.24[c] 433	.17[c] 433	.37[c] 270	.18[c] 434
Average	.34[c] 399	.30[c] 399	.20[c] 398	.38[c] 398	.26[c] 260	.30[c] 260	.32[c] 430	.21[c] 430	.33[c] 430	.27[c] 431
Interview	.32[c] 123	.28[c] 123	.26[c] 123	.30[c] 123	.22[a] 78	.19[a] 78	.22[b] 134	.05 134	-.06 56	.05 135
IPAA	.09 253	.02 253	.03 252	.07 252	.10 169	-.02 169	.20[c] 272	.06 272	...	.07 268
PAA	.14 87	.14 87	.09 87	.11 87	.01 64	.06 64	.07 92	-.05 92	.93 92	-.22 91
GPA 1-term	1.00	.62[c] 718	.32[c] 714	.55[c] 714	.34[c] 439	.36[c] 439	.37[c] 718	.10[b] 718	.09 253	.07 712

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 6.--Correlation between predictors and criterion for Ph.D. group.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status	ROAC-A	ROAC-F
TOFEL	.38[c]	.35[c]	.11	.25[a]	.23[a]	.12	.23[a]	.05	.47	-.007	.12	.04
	78	78	76	76	63	63	79	79	12	79	33	32
Grammar	.30[c]	.31[c]	.29[c]	.28[c]	.17	.22[a]	.06	.05	.13	.07	.25[a]	.13
	115	115	114	114	86	86	116	116	72	117	52	51
Vocabulary	.21[b]	.22[b]	.16[a]	.15	.12	.06	-.03	-.07	.17	.07	.20	.04
	115	115	114	114	86	86	116	116	72	117	52	51
Reading	.14	.25[b]	.28[b]	.31[c]	.22[a]	.12	.02	-.07	-.004	.03	.30[a]	.19
	94	94	93	93	67	67	94	94	59	95	44	44
Listening	.12	.21[b]	.16[a]	.19	.14	.03	-.06	-.14	.07	.01	.21	.23[a]
	116	116	115	115	87	87	117	117	72	118	52	51
Writing	-.008	.03	-.06	.08	.09	.14	-.07	-.01	-.03	.01	-.05	-.12
	116	116	115	115	87	87	117	117	73	118	53	52
Average	.22[b]	.30[c]	.23[b]	.29[c]	.20[a]	.18[a]	-.008	-.08	.12	.08	.25[a]	.17
	116	116	115	115	87	87	117	117	72	118	52	51
Interview	-.004	-.003	.08	-.03	.34[a]	-.05	.16	-.19	-.10	-.17	.14	.14
	34	34	34	34	27	27	35	35	16	36	11	23
IPAA	.15	.09	.08	.03	.18	-.13	.08	-.007	1.00	.10	-.14	-.17
	74	74	74	74	55	55	74	74		74	35	35
PAA	.19	.18	.27	.10	.30	-.14	.22	.16	.96	.13	-.10	-.23
	35	35	35	35	25	25	35	35	35	35	14	14
GPA 1-term	1.00	.69[c]	.53[c]	.43[c]	.50[c]	.13[a]	.50[c]	.21[c]	.15	.09	.32[c]	.27[b]
		247	245	245	196	196	247	247	74	247	108	108

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 7.--Correlation between predictors and criterion for students between 20 and 24 years old.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status	ROAC-A	ROAC-F
TOFEL	.08 83	.23[a] 83	-.07 83	.24[a] 83	-.12 56	.38 56	-.002 87	.30[b] 87	-.13 15	.15 86	-.26 11	.12 10
Grammar	.22[a] 106	.21[a] 106	.10 105	.21[a] 105	.18 68	.02 68	.46[c] 138	.42[c] 138	.51[c] 78	.46[c] 140	-.32 8	.26 7
Vocabulary	.03 106	.20[a] 106	.24[b] 105	.34[c] 105	.22[a] 68	.23[a] 68	.43[c] 138	.40[c] 138	.53[c] 78	.39[c] 140	.24 8	.37 7
Reading	.37[c] 85	.35[c] 85	.16 85	.33[c] 85	.30[b] 56	-.07 56	.52[c] 110	.34[c] 110	.44[c] 65	.36[c] 113	.28 6	-.21 6
Listening	.11 106	.07 106	.03 105	.13 105	.25[a] 68	.04 68	.27[c] 137	.30[c] 137	.27[b] 78	.43[c] 139	-.22 8	.83[b] 7
Writing	.08 107	.19[a] 107	.09 106	.26[b] 106	.09 69	.12 69	.37[c] 140	.35[c] 140	.52[c] 79	.40[c] 142	.56 8	.38 7
Average	.21[a] 106	.24[b] 106	.17[a] 105	.33[c] 105	.33[b] 68	.05 68	.45[c] 138	.39[c] 138	.48[c] 78	.47[c] 140	.17 8	.38 7
Interview	.03 43	.14 43	.22 43	.12 43	.36[a] 28	-.20 28	.40[c] 55	-.09 55	-.18 20	.04 56	-.06 4	-.14 3
IPAA	.09 60	.13 60	.06 60	.009 60	-.01 40	-.11 40	.38[c] 79	.44[c] 79	...	.37[c] 78	...	...
PAA	.07 22	-.24 22	.02 22	.02 22	-.18 15	-.11 15	.25 27	.24 27	.92[c] 27	-.05 27	...	...
GPA 1-term	1.00	.56[c] 221	.46[c] 220	.40[c] 220	.40[c] 148	.13[a] 148	.47[c] 221	.13[a] 221	-.09 60	-.01 219	.02 19	-.14 19

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 8.--Correlation between predictors and criterion for students between 25 and 29 years old.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status	ROAC-A	ROAC-F
TOFEL	.23[b] 122	.29[c] 122	.03 120	.14 120	.14 84	.11 84	.12 122	.02 122	.09 21	-.04 122	-.18 14	-.46[a] 14
Grammar	.26[c] 217	.01 217	.10 214	.16 214	.08 147	.21[b] 147	.13[a] 217	.08 217	.15[a] 146	.08 218	-.14 20	-.28 20
Vocabulary	.17[b] 217	.06 217	.08 214	.20[c] 214	.09 147	.09 147	.12[a] 217	.03 217	.20 146	.07 218	-.17 20	-.25 20
Reading	.21[b] 187	.13[a] 187	.15[a] 184	.25[c] 184	.07 126	.17[a] 126	.07 187	.11 187	.10 127	.16[a] 188	-.37 18	-.38 18
Listening	.13[a] 219	.10 219	-.04 216	.18 216	.07 149	.16 149	.05 219	.01 219	-.05 147	.06 220	.10 20	.33 20
Writing	.18[b] 217	.12[a] 217	.08 214	.20[c] 214	.18[a] 147	.22[b] 147	.10 217	.02 217	.30[c] 146	-.006 218	-.05 20	-.10 20
Average	.25[c] 219	.13[a] 219	.10 216	.27[c] 216	.13[a] 149	.21[b] 149	.14[a] 219	.07 219	.13 146	.13[a] 220	-.26 20	-.22 20
Interview	.18 68	.27[a] 68	-.001 68	.15 68	.15 45	.30[a] 45	.04 68	.09 68	.07 35	.07 69	.94[a] 4	.95[a] 4
IPAA	.18[a] 149	.006 149	.06 148	.05 148	.11 102	-.02 102	.16[a] 149	.003 149	...	-.07 148	-.006 16	.05 16
PAA	.21[a] 67	.21[a] 67	.12 67	.16 67	.08 50	.03 50	.18 67	.18 67	.95 67	-.005 66	-.08 10	-.17 10
GPA 1-term	1.00	.50[c] 419	.31[c] 415	.45[c] 415	.40[c] 282	.26[c] 282	.41[c] 419	.14[c] 419	.18[a] 149	.08[a] 477	.22 41	.28[a] 41

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 9.--Correlation between predictors and criterion for students between 30 and 34 years old.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status	ROAC-A	ROAC-F
TOFEL	.31[a] 50	.37 50	.001 50	.35[b] 50	.12 36	.37[a] 36	-.003 51	.12 51	.25 8	-.004 51	.76[a] 7	.37 7
Grammar	.33[c] 134	.34[c] 134	.21[b] 134	.40[c] 134	.23[a] 92	.25[b] 92	.16[a] 134	.19[a] 134	.29[b] 79	-.07 133	.74[c] 17	.69[c] 17
Vocabulary	.32[c] 133	.32[c] 133	.08 133	.32[c] 133	.11 92	.16 92	.04 133	.03 133	.43[c] 79	-.05 132	.65[b] 17	.48[a] 17
Reading	.27[b] 113	.34[c] 113	.25[b] 113	.46[c] 113	.31[b] 76	.38[c] 76	.15[a] 113	.19[a] 113	.30 70	.09 112	.66[b] 14	.62[b] 14
Listening	.32[c] 134	.40[c] 134	.25[c] 134	.49[c] 134	.23[a] 92	.29[b] 92	.17[a] 134	.19[a] 134	.09 79	.06 133	.45[a] 17	.53[a] 17
Writing	.16[a] 136	.30[c] 136	-.02 136	.29[c] 136	.15 94	.15 94	.07 136	.16[a] 136	.18 80	-.03 135	-.03 17	-.05 17
Average	.36[c] 134	.44[c] 134	.19[a] 134	.51[c] 134	.27[b] 92	.31[c] 92	.17[a] 134	.19[a] 134	.30[b] 79	.001 133	.69[c] 17	.68[c] 17
Interview	.36[a] 34	.25 34	.06 34	.23 34	.34 23	-.15 23	.28[a] 34	-.01 34	.17 11	.07 34	...	...
IPAA	.07 80	.13 80	.08 80	.19[a] 80	.12 56	-.09 56	.14 80	-.04 80	1.00	.07 79	-.09 10	-.15 10
PAA	-.004 23	.20 23	.42[a] 23	-.02 23	.13 17	-.38 17	.05 25	-.67[b] 23	.95[c] 23	-.28 23	-.14 31	-.25 31
GPA 1-term	1.00	.74[c] 221	.33[c] 220	.57[c] 220	.36[c] 142	.23[b] 142	.34[c] 221	.10 221	.07 80	.10 220	.28 31	.18 31

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 10.--Correlation between predictors and criterion for students age 35 and above.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Years	# of Credits	CGPA	# of Credits	IPAA	Academic Status
TOFEL	-.27 13	-.04 13	-.08 13	-.03 13	-.06 7	.06 7	.02 13	.21 13	...	-.15 13
Grammar	.07 56	.23[a] 56	.12 56	.01 56	.22 38	.24 38	-.05 56	-.19 56	.41[b] 37	.03 56
Vocabulary	.36[b] 56	.47[c] 56	.39[c] 56	.20 56	.17 38	.30[a] 38	.008 56	-.19 56	.15 37	-.004 56
Reading	.27[a] 53	.40[c] 53	.19 53	.30[a] 53	.21 36	.56[c] 36	.002 53	.12 53	.008 34	-.08 53
Listening	.32[b] 56	.39[c] 56	.35[b] 56	.23[a] 56	.26 38	.33[a] 38	.15 56	-.03 56	-.24 37	.15 56
Writing	.32[b] 57	.41[c] 57	.32[b] 57	.36[b] 57	.34[a] 39	.39[a] 39	.09 57	-.07 57	.14 38	.04 57
Average	.33[b] 56	.45[c] 56	.34[b] 56	.27[a] 56	.29[a] 38	.45[b] 38	.05 56	-.07 56	.13 37	.04 56
Interview	.68[b] 12	.66[b] 12	.76[b] 12	.61[a] 12	.55 9	.83[b] 9	.07 12	.44 12	-.37 6	.08 12
IPAA	.08 38	-.08 38	-.05 38	-.10 38	.17 26	-.14 26	.02 38	-.09 38	...	-.06 37
PAA	-.30 10	.31 10	.04 10	-.30 10	-.02 7	-.02 7	-.19 10	-.27 10	.97[c] 10	-.33 10
GPA 1-term	1.00	.81[c] 104	.51[c] 104	.54[c] 104	.45[c] 63	.42[c] 63	.46[c] 104	.12 104	-.08 38	.003 103

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 11.--Correlation between the predictors (English subtests, average, and TOFEL) and the criterion for the students who passed the English test and started their academic programs.

	TOFEL	Grammar	Vocabulary	Reading	Listening	Writing	Average	Interview	IPAA	PAA	Academic Status	GPA 1-Term	# of Credits Completed	GPA 1-Year	# of Credits Completed	GPA 2-Year	# of Credits Completed	CGPA	# of Credits Completed
Grammar	1.00		.28[c]	.42[c]	.23[a]	.31[c]	.44[c]	.09	.18	.13	.10	.07	.12	.07	.02	.04	-.08	.04	.03
			168	130	94	95	93	144	60	22	169	158	158	157	157	93	93	167	167
Vocabulary		1.00		.42[c]	.34[c]	.27[c]	.60	.18	.18	.39[a]	-.002	-.08	.07	.03	.07	.23[a]	.11	.02	.009
				129	168	169	168	141	60	22	168	157	157	156	156	93	93	166	166
Reading			1.00		.34[c]	.37[c]	.71[c]	.30[c]	.10	.54[a]	.05	.03	.05	.11	.16[a]	.26[a]	.13	.08	.05
					129	130	130	105	43	15	130	121	121	120	120	70	70	128	128
Listening				1.00		.17[a]	.63[c]	.31[c]	.01	-.04	.15	.005	.04	-.04	.08	-.03	-.005	.002	-.06
						168	169	140	61	22	170	160	160	159	159	95	95	168	168
Writing					1.00		.66[c]	.32[c]	.008	.11	.13[a]	-.03	.11	.03	.19[b]	.22[a]	.20[a]	.04	.13[a]
							169	142	63	23	174	162	162	161	161	97	97	172	172
Average						1.00		.33[c]	.09	.33	.12	-.01	.07	.04	.09	.21[a]	.008	.05	-.02
								141	60	22	17	160	160	159	159	95	95	169	169
Interview							1.00	-.15	-.24	-.03	.14[a]	.10	.12	.07	.22[a]	-.03	.15[a]	-.02	
								56	24	146	135	135	135	135	86	86	144	144	

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 12.--Correlation between the predictors (English subtests and the average) for students who studied at the English Language Center at Michigan State University.

	Grammar	Vocabulary	Reading	Listening	Writing	Average	Interview	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status	PAA	ROAA Compared to American	ROAA Compared to Foreign	TRC-A	TRC-F
Grammar	1.00	.68[c]	.61[c]	.41[c]	.56[c]	.80[c]	.40[a]	.26[c]	.12[c]	.16[c]	.21[c]	.17[b]	.24[c]	.29[c]	.18[c]	.37[c]	.26	.12	.35[a]	.15	.04	.17
		382	339	382	382	382	25	355	355	352	352	252	252	378	378	280	378	102	36	36	36	36
Vocabulary		1.00	.63[c]	.37[c]	.58[c]	.80[c]	.38[a]	.23[c]	.15[b]	.19[c]	.24[c]	.08	.16[b]	.26[c]	.13[b]	.38[c]	.25	.14	.25	.05	-.02	.09
			339	382	382	382	25	355	355	352	352	252	252	378	378	280	378	102	36	36	36	36
Reading			1.00	.44[c]	.57[c]	.83[c]	.52[a]	.23[c]	.18[c]	.19[c]	.30[c]	.11[a]	.27[c]	.28[c]	.23[c]	.25[c]	.22[c]	.02	.33[a]	.20	.11	.15
				339	339	339	19	317	317	317	317	224	224	355	335	253	336	92	32	32	32	32
Listening				1.00	.37[c]	.71[c]	.46[b]	.22[c]	.18[c]	.15[b]	.27[c]	.18[c]	.24[c]	.17[c]	.16[c]	.06	.21[c]	.06	.31[a]	.38[b]	.22	.30
					382	382	25	355	355	352	352	252	252	378	378	28	378	102	36	36	36	36
Writing					1.00	.74[c]	.54[b]	.13[b]	.08[a]	.07	.18[c]	.08	.15[b]	.23[c]	.15[c]	.33[c]	.17[c]	.23[b]	-.04	-.07	.007	-.007
						382	25	355	355	352	352	252	252	378	378	280	378	102	36	36	36	36
Average						1.00	.53[b]	.29[c]	.21[c]	.21[c]	.35[c]	.19[c]	.30[c]	.30[c]	.22[c]	.32[c]	.30[c]	.13	.36[a]	.26	.12	.22
							25	355	355	352	352	252	252	378	378	280	378	102	36	36	36	36
Interview							1.00	.39[a]	.32	.45[a]	.53[b]	.02	.51[a]	.14	.23	.13	-.17	.18	...	...	...	...
								22	22	22	22	19	19	25	25	16	25	10				

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

APPENDIX B

CORRELATIONS BETWEEN PREDICTORS AND CRITERIA FOR STUDENTS FROM DIFFERENT COUNTRIES

Table 1.--Correlation between predictors and criterion for students from Brazil.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.13 25	.17 25	.22 25	.36[a] 25	.01 15	.27 15	.12 26	.20 26	.27 20	.39[a] 27
Vocabulary	.47[b] 25	.35[a] 25	.33[a] 25	.42[a] 25	.36 15	.30 15	.26 26	.27 26	.23 20	.11 27
Reading	.08 21	.20 21	-.02 21	.01 21	-.19 14	.19 14	-.15 22	.23 22	.12 17	.25 23
Listening	.42[a] 25	.33[a] 25	.07 25	.28 25	.15 15	.21 15	-.12 26	-.09 26	.09 20	.38[a] 27
Writing	.27 25	.04 25	.20 25	.44[a] 25	.22 15	.47[a] 15	.20 26	.49[b] 26	.17 20	.19 27
Average	.36[a] 25	.26 25	.18 25	.34 25	.11 15	.30 15	.01 26	.21 26	.21 20	.34[a] 27
IPAA	.35 19	.21 19	.36 19	.38[a] 19	.46 11	.07 11	.37[a] 20	.33 20	...	...
GPA 1-term	1.00	.75[c] 36	.27[a] 36	.51[c] 36	.47[a] 23	.27 23	.24 36	.37[a] 36	.35 19	.16 36

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 2.--Correlation between predictors and criterion for students from the Republic of China.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status	ROAC-A	ROAC-F
TOFEL	.17 56	.08 56	.17 56	.28[a] 56	.31[a] 41	.29[a] 41	.25[a] 58	.19 58	.19 14	.27[a] 58	-.45 6	-.61 6
Grammar	-.10 84	.02 84	-.02 84	.11 84	-.08 60	.25[a] 60	.14 89	.28[a] 89	-.14 84	.28[b] 89	-.25 12	-.38 12
Vocabulary	-.14 84	-.01 84	-.07 84	.04 84	-.07 60	-.08 60	-.001 89	-.03 89	-.21 84	.04 89	.10 12	-.17 12
Reading	.07 75	.21[a] 75	-.13 75	.25[a] 75	-.14 52	.22 52	-.02 80	.09 80	-.27[b] 75	.06 80	-.65[b] 10	-.74[b] 10
Listening	-.10 84	.07 84	-.26[b] 84	.08 84	-.25[a] 60	.15 60	-.16 89	.08 89	-.09 84	.24[b] 84	-.56 12	-.20 12
Writing	-.03 84	-.04 84	.09 84	.01 84	.10 60	.16 60	.16 89	-.01 89	.001 84	.007 89	-.09 12	-.09 12
Average	-.06 84	.10 84	-.17 84	.18[a] 84	-.18 60	.23[a] 60	-.02 89	.09 89	-.24 84	.20[a] 89	-.68[b] 12	-.64[a] 12
Interview	-.20 26	.06 26	-.16 26	.18 62	-.03 17	.16 17	-.05 28	.17 28	-.08 28	.18 28	...	...
IPAA	.14 82	.04 82	.31[b] 82	.09 82	.24[a] 58	.16 58	.23[a] 86	.20[a] 86	...	...	.43 10	...
PAA	.05 75	.009 75	.18 75	-.02 75	.10 52	.02 52	.09 79	.02 79	...	...	.17 9	...
GPA 1-term	1.00	.61[c] 146	.60[c] 146	.35[c] 146	.52[c] 105	.14 105	.51[c] 146	.12 146	.14 82	-.01 146	.45[a] 18	.58[b] 18

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 3.--Correlation between predictors and criterion for students from Greece.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits
Grammar	.35 12	.28 12	.81[c] 12	.42 12	.88[c] 10	.15 10	.78[c] 12	-.08 12
Vocabulary	-.01 12	-.06 12	.58[a] 12	.29 12	.62[a] 10	.15 10	.57[a] 12	.06 12
Reading	.17 11	.05 11	.78[b] 11	.41 11	.74[b] 9	-.03 9	.84[c] 11	-.21 11
Listening	-.07 12	-.15 12	.28 12	.72[b] 12	.15 10	.38 10	.36 12	.21 12
Writing	.46 12	.32 12	.36 12	.62[a] 12	.30 10	.05 10	.39 12	.29 12
Average	.17 12	.06 12	.75[b] 12	.65[a] 12	.67[a] 10	.18 10	.80[c] 12	-.02 12
GPA 1-term	1.00	.88[c] 13	.38 13	.33 13	.40 11	-.45 11	.38 13	-.53 13

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 4.--Correlation between predictors and criterion for students from Kuwait.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA
Grammar	.38 18	.36 18	.14 18	-.07 18	.39 14	.06 14	.43[a] 27	.11 27	.36[a] 23
Vocabulary	.44[a] 18	.48[a] 18	.09 18	.15 18	.21 14	.25 14	.49[b] 27	.17 27	.38[a] 23
Reading	.28 17	.43[a] 17	-.20 17	.39 17	-.15 13	.29 13	.30 24	.38[a] 24	.30 21
Listening	.21 18	.32 18	.31 18	-.07 18	.46[a] 14	-.12 14	.33[a] 27	.08 27	.26 23
Writing	.28 18	.32 18	-.14 18	.26 18	.06 14	.40 14	.31 27	.29 27	.26 27
Average	.40[a] 18	.45[a] 18	.009 18	.20 18	.16 14	.24 14	.39[a] 27	.23 27	.34[a] 23
IPAA	.14 15	.29 15	-.07 15	.30 15	-.06 12	.002 12	.48[b] 23	.17 23	...
GPA 1-term	1.00	.75[c] 25	.16 25	.38[a] 25	.29 19	.04 19	.28 25	-.15 25	.14 15

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 5.--Correlation between predictors and criterion for students from India.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	Academic Status
Grammar	.33 16	.22 16	.38 15	.27 15	-.06 9	.34 9	.30 16	.19 16	.46[a] 17
Vocabulary	-.13 16	-.17 16	-.22 15	.04 15	-.41 9	.64[a] 9	-.03 16	.06 16	-.22 17
Reading	-.19 15	-.09 15	-.08 14	-.14 14	-.06 8	.04 8	-.30 15	-.32 15	-.28 16
Listening	-.02 16	.21 16	-.14 15	.19 15	-.19 9	.27 9	.02 16	-.19 16	.03 17
Writing	.33 16	-.06 16	.06 15	-.04 15	-.02 9	.36 9	.23 16	.14 16	-.11 17
Average	.10 17	.08 17	.007 16	.06 16	-.17 10	.35 10	.05 17	-.03 17	-.01 18
GPA 1-term	1.00	.25[a] 53	.72[c] 56	.20 52	.54[c] 36	-.09 36	.81[c] 53	.27[a] 53	1.00
TOFEL	.22 28	.33 28	-.12 27	.44[b] 27	-.28 18	.47[a] 18	.08 29	.49[b] 29	.13 29

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 6.--Correlation between predictors and criterion for students from Indonesia.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.33 18	.28 18	-.21 18	.05 18	.76[b] 10	.31 10	-.17 18	-.37 18	.09 14	-.27 18
Vocabulary	.14 18	.36 18	.13 18	.40[a] 18	-.06 10	.55[a] 10	.15 18	.31 18	.09 14	.06 18
Reading	.55[a] 16	.55[a] 16	.40 16	.55[a] 16	.57 9	.28 9	.43[a] 16	.34 16	.15 13	.30 16
Listening	.13 18	.17 18	.18 18	-.12 18	.08 10	.002 10	.18 18	.21 18	-.08 14	.13 18
Writing	.54[b] 18	.56[b] 18	.30 18	.64[b] 18	.68[a] 10	.15 10	.46[a] 18	.16 18	.26 14	.07 18
Average	.41[a] 18	.42[a] 18	.29 18	.28 18	.56[a] 10	.35 10	.34 18	.27 18	.26 14	.15 18
IPAA	-.09 14	-.07 14	.48[a] 14	.27 14	.47 8	.30 8	.39 14	.14 14	...	...
GPA 1-term	1.00	.90[c] 22	.17 22	.55[b] 22	.16 12	-.16 12	.28 22	.11 22	-.09 14	-.15 22

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 7.--Correlation between predictors and criterion for students from Iran.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	Academic Status
Grammar	.34[a]	-.09	.53[c]	.26	-.06	.40[a]	.05	.25	.16
	37	37	35	35	25	25	39	39	39
Vocabulary	.35[a]	.06	.67[c]	.40[b]	.33[a]	.56[b]	.18	.23	.24
	37	37	35	35	25	25	39	39	39
Reading	.57[c]	-.07	.55[c]	.47[b]	.38	.53[a]	.17	.26	.36[a]
	25	25	24	24	17	17	25	25	25
Listening	.68[c]	.15	.59[c]	.55[c]	.22	.41[a]	.01	.05	.01
	38	38	36	36	26	26	40	40	40
Writing	.21	.11	.39[b]	.41[b]	.22	.59[c]	.05	.20	.16
	37	37	35	35	25	25	40	40	40
Average	.51[c]	.06	.36[c]	.49[c]	.20	.49[b]	.09	.15	.19
	38	38	36	36	26	26	40	40	40
Interview	.57[b]	.39[a]	.78[c]	.41[a]	.11	.60[a]	-.14	-.03	-.03
	18	18	18	18	14	14	20	20	20
GPA 1-term	1.00	.23[a]	.52[c]	.63[c]	.39[b]	.28[a]	.35[b]	.09	1.00
		67	65	65	51	51	67	67	
TOFEL	.22	.16	-.52[a]	.12	-.49	-.09	-.40	.09	-.33
	12	12	12	12	10	10	13	13	13

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 8.--Correlation between predictors and criterion for students from Iraq.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.20 13	.09 13	.14 13	.26 13	-.08 11	.22 11	.60[b] 15	.57 15	-.29 14	.90 15
Vocabulary	.36 13	-.32 13	-.27 13	-.14 13	.06 11	-.20 11	-.15 15	.04 15	-.35 14	.42 15
Reading	.25 11	.26 11	.30 11	.45 11	-.13 9	.37 9	.56[a] 12	.37 12	-.005 12	.47 12
Listening	.06 13	.16 13	.48[a] 13	.03 13	.51[a] 11	.05 11	.01 15	.27 15	.23 14	.68[b] 13
Writing	.17 14	.08 14	.38 14	.13 14	.29 12	-.17 12	.34 16	.43[a] 16	.17 15	.73[c] 16
Average	-.10 13	-.07 13	.18 13	.04 13	.23 11	-.07 11	.16 15	.37 15	-.08 14	.77 15
IPAA	-.11 14	.03 14	.11 14	-.24 14	-.45 12	-.26 12	-.04 15	-.002 15	...	...
PAA	.16 12	.33 12	.25 12	.14 12	-.21 10	.41 10	.14 12	.25 12	...	...
GPA 1-term	1.00	.85[c] 15	.46[a] 15	.84[c] 15	.42 13	.63[b] 13	.28 15	.06 15	-.11 14	...

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 9.--Correlation between predictors and criterion for students from Mexico.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.37[a]	.48[b]	-.09	.62[c]	.07	.52[b]	.29	.22	.36	.27
	26	26	26	26	25	25	29	29	15	29
Vocabulary	.41[a]	.46[b]	.14	.39[a]	.25	.16	.30	.19	.05	.03
	26	26	26	26	24	24	29	29	15	29
Reading	.49[b]	.54[b]	.17	.48	.20	.29	.37[a]	.36[a]	.25	.19
	25	25	25	25	23	23	28	28	14	28
Listening	.48[b]	.55[c]	-.007	.69[c]	.38[a]	.50[a]	.51[b]	.32[a]	.32	-.02
	28	26	26	26	24	24	29	29	15	29
Writing	.05	.16	.01	.51	.23	.41[a]	.17	.33[a]	.06	.10
	26	26	26	26	24	24	29	29	15	29
Average	.38[a]	.43[a]	.07	.53[b]	.38[a]	.35[a]	.49[b]	.29	.24	.06
	26	26	26	26	24	24	29	29	15	29
IPAA	.05	-.13	.11	.22	.31	-.05	.39	-.004	...	...
	15	15	15	15	13	13	15	15		
PAA	.35	.49	-.26	...	-.14	-.69[a]	-.14	-.07	...	...
	8	8	8		7	7	8	8		
GPA 1-term	1.00	.88[c]	.41[c]	.56[c]	.17	.35[a]	.36[b]	.08	.05	.04
		52	52	52	26	26	52	52	15	52

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 10.--Correlation between predictors and criterion for students from Jordan.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.48[b]	.52[b]	.19	-.03	.24	.06	.35[a]	.15	.01	.19
	23	23	23	23	17	17	25	25	25	24
Vocabulary	.53[b]	.47[a]	.46[a]	.25	.47[a]	-.04	.27	-.11	.16	.03
	23	23	23	23	17	17	25	25	25	24
Reading	.53[a]	.57[b]	.38	-.09	.16	-.04	.09	-.15	.21	-.06
	17	17	17	17	13	13	19	19	19	18
Listening	.29	.18	.30	.08	.24	-.09	.34[a]	-.02	.16	.08
	23	23	23	23	17	17	25	25	25	24
Writing	.60[b]	.62[c]	.35[a]	.33	.35	-.13	.45[a]	.08	.13	.27
	23	23	23	23	17	17	25	25	25	24
Average	.49[b]	.45[a]	.38[a]	.03	.35	-.08	.33[a]	-.06	.17	.10
	23	23	23	23	17	17	25	25	25	24
IPAA	-.07	.12	.17	.10	.20	-.55[b]	-.02	-.10	...	...
	23	23	23	23	17	17	25	25		
PAA	.04	-.04	.30	.17	.28	-.45	.08	-.03	...	...
	20	20	20	20	14	14	21	21		
GPA 1-term	1.00	.87[c]	.02	.22	-.09	-.42[a]	.02	-.02	-.07	...
		27	27	27	20	20	27	27	23	

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 11.--Correlation between predictors and criterion for students from Japan.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.24 30	.13 30	-.03 30	.008 30	.35 12	.23 12	.05 32	.09 32	.33[a] 29	.15 31
Vocabulary	.27 30	.06 30	.23 30	.22 30	-.23 12	.09 12	.09 32	.23 32	.46[b] 29	.18 31
Reading	.07 25	.11 25	-.02 25	.11 25	.35 11	-.22 11	.42[a] 26	.15 26	.51[b] 25	.13 26
Listening	-.14 30	-.10 30	.005 30	.06 30	.24 12	.06 12	.01 32	.21 32	.16 29	.11 31
Writing	.09 31	.01 31	.25 31	.06 31	.30 13	.14 13	.30[a] 33	.40[a] 33	.14 30	.25 32
Average	.17 30	.05 30	.07 30	.15 30	.51[a] 12	.24 12	.18 32	.30[a] 32	.55[c] 29	.27 31
IPAA	.38[a] 29	.24 29	.41[a] 29	.27 29	.39 13	-.05 13	.56[c] 30	.32[a] 30	...	...
GPA 1-term	1.00	.67[c] 39	.43[b] 39	.59[b] 39	.28 17	.40 17	.45[b] 39	.29[a] 39	.38[a] 29	.26 37

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 12.--Correlation between predictors and criterion for students from South Korea.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.32[b] 56	.24[a] 56	.21 56	.38[b] 56	.29[a] 42	.25[a] 42	.22[a] 62	.16 60	-.31 52	-.04 59
Vocabulary	.39[c] 56	.29[a] 56	.51[c] 56	.48[c] 56	.46[c] 42	.36[b] 42	.34[b] 60	.28[a] 60	-.02 52	.04 59
Reading	.23[a] 50	.35[b] 50	.31[a] 50	.50[c] 50	.48[c] 37	.49[c] 37	.21 53	.42[c] 52	-.17 45	.15 52
Listening	.43[c] 57	.53[c] 57	-.003 57	.56[c] 57	.46[c] 43	.42[b] 43	.25[a] 61	.29[a] 61	-.12 53	-.02 60
Writing	.03 56	.01 56	.10 56	.17 56	.49[c] 42	.16 42	.23[a] 60	.28[a] 60	.16 52	.009 59
Average	.46[c] 56	.50[c] 56	.26[a] 56	.68[c] 56	.65[c] 42	.36[c] 42	.34[b] 60	.45[c] 60	-.07 52	.08 59
IPAA	-.23[a] 51	-.36[b] 51	.11 51	-.24[a] 51	.08 40	-.34[a] 40	.22 53	-.01 53	...	...
GPA 1-term	1.00	.70[c] 76	.33[c] 76	.62[c] 76	.39[b] 55	.50[c] 55	.43[c] 76	.06 76	-.23[a] 51	-.002 75
TOFEL	-.28 14	.45[a] 14	-.24 14	.54[a] 14	-.60[a] 11	.32 11	-.38 14	.40 14	...	...

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 13.--Correlation between predictors and criterion for students from Thailand.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.05 38	.04 38	.09 38	.12 38	.07 19	.14 19	.27[a] 38	.13 38	.03 36	-.12 38
Vocabulary	.005 38	-.02 38	-.24 38	.04 38	-.35 19	-.24 19	-.16 38	-.04 38	.05 36	-.03 38
Reading	.06 29	-.004 29	.01 29	.02 29	.28 15	.23 15	-.09 29	-.14 29	.08 28	-.23 29
Listening	.29[a] 38	.24 38	.13 38	.01 38	.47[a] 19	.14 19	.09 38	-.14 38	.08 36	-.13 38
Writing	.20 38	.04 38	-.36[a] 38	.04 38	-.20 19	.04 19	-.43[b] 38	-.28[a] 33	.40 38	-.45 38
Average	.17 38	.08 38	-.004 38	.08 38	.31 19	.18 19	.009 38	-.12 38	.15 36	-.16 38
IPAA	.31[a] 36	.34[a] 36	-.06 36	.30[a] 36	.002 19	-.06 19	-.13 36	-.06 36	...	...
GPA 1-term	1.00	.83[c] 43	.29[a] 43	.61[c] 43	.38[a] 22	.43[a] 22	.35[b] 43	.22 43	.31[a] 36	-.10 43
TOFEL	.32 10	.39 10	.58[a] 10	.05 10	.92[a] 5	.58 5	.46 10	.36 10	.01 8	.08 10

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 14.--Correlation between predictors and criterion for students from Venezuela.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.32 23	-.01 23	.01 23	.05 22	.16 12	.43 12	.04 23	.34 23	.52[a] 11	.17 23
Vocabulary	.26 23	-.01 23	.05 23	.31 22	.21 12	.14 12	.37[a] 23	.37[a] 23	.16 11	.37[a] 23
Reading	.15 22	.27 22	.23 22	.27 21	.29 11	.55[a] 11	.26 22	.26 22	-.68 10	.37[a] 22
Listening	.46[a] 23	.11 23	.003 23	.38[a] 22	.16 12	.41 12	.10 23	.37[a] 23	.13 11	.30 23
Writing	.19 24	.16 24	.11 24	.14 23	.10 13	.01 13	.16 24	.56[b] 24	.18 12	.17 24
Average	.34[a] 23	.17 23	.12 23	.30 22	.19 12	.41 12	.21 23	.46[a] 23	-.13 11	.28 23
IPAA	.42 12	-.15 12	-.13 12	-.24 11	-.34 7	-.50 7	.25 12	.15 12	...	...
GPA 1-term	1.00	.16 31	-.20 31	.55[c] 30	-.01 18	.46[a] 18	.27 31	.49[b] 31	.42 12	.24 31

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

APPENDIX C

CORRELATIONS BETWEEN PREDICTORS AND CRITERIA FOR STUDENTS FROM DIFFERENT COLLEGES

Table 1.--Correlation between the predictors and criterion for students in agriculture and natural resources.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status	ROAC-A	ROAC-F
Grammar	.42[c]	.18[a]	.07	.36[c]	.44[c]	.24[a]	.32[c]	.22[a]	.30[b]	.04	.16	.04
	101	101	100	100	70	70	102	102	60	102	14	14
Vocabulary	.22[b]	.21[a]	.09	.41[c]	.32[b]	.27[a]	.12	.10	.36[b]	-.03	.13	-.12
	101	101	100	100	70	70	102	102	60	102	14	14
Reading	.25[b]	.23[a]	.30[b]	.38[c]	.44[c]	.26[a]	.33[c]	.19[a]	.44[c]	-.02	.25	.07
	87	87	86	86	59	59	88	88	54	88	13	13
Listening	.31[c]	.21[a]	.11	.41[c]	.36[c]	.13	.29[b]	.04	.35[b]	.03	-.16	-.20
	101	101	100	100	70	70	102	102	60	102	14	14
Writing	.18[a]	.26[b]	.17[a]	.38[c]	.31[b]	.34[b]	.09	.17	.33[b]	-.007	.16	-.38
	101	101	100	100	70	70	102	102	60	102	14	14
Average	.40[c]	.33[c]	.23[a]	.57[c]	.54[c]	.36[c]	.35[c]	.22[a]	.47[c]	.01	.05	-.18
	101	101	100	100	70	70	102	102	60	102	14	14
Interview	.35	.03	-.02	.18	.008	-.001	-.04	.02	.69[a]	-.01	...	...
	22	22	22	22	14	14	23	23	8	23		
TOFEL	.39[b]	.48[b]	.10	.32[a]	.47[b]	.55[b]	.13	.07	.16	-.11	.69	.17
	34	34	34	34	26	26	35	35	7	35	6	6
IPAA	.29[a]	.11	.08	.33[b]	.42[b]	.07	.33[b]	.34[b]	1.00	-.06	-.81[b]	-.68[b]
	60	60	59	59	39	39	60	60		59	9	9
PAA	.78[c]	.81[c]	.61[c]	.55[a]	.55[a]	.50	.38	.03	.98	-.37	...	...
	15	51	15	15	10	10	15	15	15	15		
GPA 1-term	1.00	.60[c]	.22[c]	.57[c]	.43[c]	.39[c]	.36[c]	.22[b]	.29[a]	.10	.26	.29
		166	165	165	120	120	166	166	60	165	30	30

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 2.--Correlation between the predictors and criterion for students in arts and letters.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	-.14 35	-.07 35	-.11 35	-.10 35	.14 25	-.06 24	.02 39	.21 39	-.13 21	.26 39
Vocabulary	.06 35	.08 35	.20 35	-.12 35	.51[b] 24	.01 24	-.003 39	.16 39	.06 21	.34[a] 39
Reading	.34[a] 27	.38[a] 27	.28 27	.36[a] 27	.54[b] 18	.28 18	.55[c] 30	.36[a] 30	-.12 19	.40[a] 30
Listening	.26 35	.29[a] 35	.24 35	.27 35	.48[b] 24	.10 24	.13 39	.28 39	-.37[a] 21	.48[c] 39
Writing	.09 35	.17 35	.22 35	.26 35	.21 24	.03 24	.15 39	.13 39	.20 21	.32[a] 39
Average	.16 35	.17 35	.28 35	.18 35	.65[c] 24	.04 24	.19 39	.22 39	-.20 21	.47[c] 39
Interview	.21 17	-.12 17	.18 17	.16 17	.35 11	.07 11	.07 18	.006 18	-.59 5	...
TOFEL	-.32 24	-.42[a] 24	-.07 23	-.35 23	-.20 12	-.22 12	.07 25	-.38 25	...	.02 25
IPAA	.04 19	.09 19	.29 19	.01 19	.32 13	.49[a] 13	.08 21	.30 21	1.00	.30 21
GPA 1-term	1.00	.64[c] 77	.61[c] 76	.46[c] 76	.57[c] 49	.18 49	.52[c] 77	-.008 77	.04 19	.27[b] 77

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 3.--Correlation between the predictors and criterion for students in business.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.38[a]	.13	.67[c]	.33[a]	.71[c]	.33[a]	.10	.27	.21	.11
	31	31	30	30	25	25	33	33	25	33
Vocabulary	.39[a]	.38[a]	.59[c]	.54[c]	.41[b]	.34[a]	.23	.29	.19	-.004
	31	31	31	31	25	25	33	33	25	33
Reading	.39[a]	.52[c]	.66[c]	.59[c]	.44[a]	.42[a]	.33[a]	.40[a]	.27	.15
	30	30	30	30	25	24	32	32	24	32
Listening	.13	.32[a]	.42[b]	.21	.02	.21	-.04	.16	-.03	.14
	32	32	32	32	26	26	34	34	26	34
Writing	.12	.10	-.05	.12	.09	.12	.07	.29	-.19	.16
	31	31	31	31	25	25	33	33	25	33
Average	.33[a]	.33[a]	.62[c]	.38[a]	.40[a]	.30[a]	.17	.32[a]	.15	.15
	31	31	31	31	25	25	33	33	25	33
TOFEL	-.07	.04	.10	.19	.11	.24	.39[a]	.23	-.96	.19
	42	42	42	42	32	32	43	43	4	43
IPAA	.08	.08	.45[a]	.38[a]	.56[b]	.18	.54[c]	.13	1.00	-.11
	24	24	24	24	21	21	26	26		26
GPA 1-term	1.00	.52[c]	.57[c]	.55[c]	.38[c]	.37[c]	.42[c]	.31[b]	.08	-.03
		89	89	89	69	69	89	89	24	89

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 4.--Correlation between the predictors and criterion for students in communication.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.10 36	.24 36	-.17 36	.27 36	.09 20	-.13 20	-.11 37	-.01 37	-.07 22	-.23 35
Vocabulary	.12 36	.007 36	.11 36	.19 36	.12 20	.10 20	.05 37	-.007 37	-.16 22	.11 35
Reading	.18 30	.30[a] 30	.10 30	.53[c] 30	.53[a] 17	.36 17	.03 31	-.06 31	-.15 19	-.10 30
Listening	.22 36	.20 36	.15 36	.50[c] 36	.06 20	.36 20	.10 37	.13 37	-.55 22	.12 35
Writing	-.10 37	.06 37	.04 37	.26 37	.21 21	.11 21	.08 38	-.10 38	-.07 23	.05 36
Average	.18 36	.26 36	.06 36	.54[c] 36	.23 20	.28 20	.04 37	.05 37	-.43[a] 22	.02 35
TOFEL	.28 21	.29 21	.20 21	.28 21	.05 15	.39 15	.07 21	.07 21	.25 4	...
IPAA	-.28 22	-.13 22	-.17 22	-.32 22	-.50[a] 12	-.54[a] 12	-.17 23	-.18 23	1.00	.08
GPA 1-term	1.00	.79[c] 62	.43[c] 62	.70[c] 62	.45[b] 33	.64[c] 33	.50[c] 62	.40[c] 62	-.28 22	.12 60

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 5.--Correlation between the predictors and criterion for students in education.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.25[b]	.08	.20[a]	.10	.36[b]	.15	.48[b]	.13	.52[c]	.47[c]
	84	84	82	82	48	48	95	95	71	94
Vocabulary	.40[c]	.25[a]	.23[a]	.26[b]	.37[b]	.25[a]	.48[c]	.15	.51[c]	.40[c]
	83	83	81	81	48	48	94	94	71	93
Reading	.27[b]	.14	.12	.32[b]	.11	.40[b]	.34[c]	.30[b]	.37[c]	.45[c]
	70	70	69	69	44	44	79	79	61	78
Listening	.32[c]	.21[a]	.20[a]	.22[a]	.24[a]	.36[b]	.34[c]	.14	.22[a]	.46[c]
	84	84	82	82	48	48	94	94	71	93
Writing	.30[b]	.25[b]	.08	.33[c]	.24[a]	.29[a]	.38[c]	.22[a]	.51[c]	.36[c]
	85	85	83	83	49	49	96	96	71	95
Average	.40[c]	.25[b]	.19[a]	.34[c]	.31[a]	.38[b]	.46[c]	.22[a]	.49[c]	.49[c]
	84	84	82	82	48	48	95	95	71	94
Interview	.32	.40[a]	.15	.49[b]	.01	.48[a]	.44[a]	.57[c]	-.25	.38
	24	24	24	24	13	13	26	26	14	26
TOFEL	.35	.38[a]	.29	.30	.35	-.27	.32	.47[a]	.57	.16
	21	21	21	21	13	13	21	21	6	21
IPAA	.20	.17	.02	.14	.16	.04	.28[b]	.01	1.00	.31[b]
	62	62	62	62	40	40	71	71		70
IPAA	-.19	-.15	.39	-.03	.38	-.36	.16	-.22	.92[c]	-.12
	17	17	17	17	15	15	18	18	18	17
GPA 1-term	1.00	.57[c]	.29[c]	.46[c]	.29[b]	.21[a]	.27[c]	-.08	.20	-.006
		163	160	160	79	79	163	163	62	162

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 6.--Correlation between the predictors and criterion for students in engineering.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.31[b]	.21[a]	.28[b]	.18	.13	.01	.39[c]	.21[a]	.12	.07
	67	67	67	67	37	37	72	72	44	72
Vocabulary	.35[b]	.41[c]	.09	.31[b]	-.06	-.02	.33[b]	.23[a]	.22	.13
	67	67	67	67	37	37	72	72	44	72
Reading	.43[c]	.29[a]	.30[b]	.37[c]	.40[a]	.35[a]	.33[b]	.32[b]	.06	.07
	60	60	60	60	31	31	63	63	39	63
Listening	.21[a]	.29[b]	-.09	.32[b]	.44[b]	.38[b]	.15	.36[c]	.01	.11
	67	67	67	67	37	37	72	72	44	72
Writing	.29[b]	.37[c]	.25[a]	.42[c]	.47[c]	.41[b]	.24[a]	.39[c]	.04	.23[a]
	68	68	68	68	38	38	73	73	45	73
Average	.41[c]	.44[c]	.18	.45[c]	.37[a]	.32[a]	.39[c]	.42[c]	.09	.19[a]
	67	67	67	67	37	37	72	72	44	72
Interview	.27	.39[a]	-.06	.44[a]	.29	.19	.22	.28	-.41	.03
	24	24	24	24	17	17	27	27	11	27
TOFEL	.17	.17	-.04	-.01	-.06	.13	-.11	.13	-.58	.07
	42	42	42	42	25	25	43	43	9	43
IPAA	.23	.08	-.007	.27[a]	-.22	.009	.05	.18	1.00	.18
	44	44	44	44	25	25	46	46		46
PAA	.17	.16	-.33	.27	-.14	.27	-.05	.24	.92[c]	.09
	24	24	24	24	14	14	26	26	26	26
GPA 1-term	1.00	.64[c]	.44[c]	.63[c]	.54[c]	.35[c]	.56[c]	.30[c]	.23	.32[c]
		133	133	133	78	78	133	133	44	133

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 7.--Correlation between the predictors and criterion for students in human ecology.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.33 12	.32 12	.77[b] 12	.41 12	.43 10	.72[b] 10	.04 14	.20 14	.15 7	.23 14
Vocabulary	.38 12	.37 12	.78[b] 12	.62[a] 12	.43 10	.80[b] 10	.01 14	.32 14	.74[a] 7	.20 14
Reading	.62[a] 11	.57[a] 11	.61[a] 11	.63[a] 11	.31 9	.58[a] 9	.08 11	.23 11	-.62 5	...
Listening	.49 12	.39 12	.72[b] 12	.48 12	.29 10	.68[a] 10	-.08 14	.28 14	-.55 7	.22 14
Writing	.46 12	.54[a] 12	.57[a] 12	.56[a] 12	.40 10	.53 10	.24 14	.43 14	-.09 7	.28 14
Average	.52[a] 12	.46 12	.78[c] 12	.57[a] 12	.42 10	.72[b] 10	.04 14	.39 14	-.58 7	.29 14
GPA 1-term	1.00	.83[c] 21	.64[c] 21	.63[c] 21	.47[a] 14	.43 14	.40[a] 21	.35 21	-.43 6	...

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 8.--Correlation between the predictors and criterion for students in natural science.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status	ROAC-A	ROAC-F
Grammar	.28[b]	.26[b]	.22[a]	.19[a]	.14	.09	.09	.01	-.001	.06	-.31	.42[a]
	82	82	82	82	65	65	83	83	52	84	23	22
Vocabulary	.12	.10	.04	.14	.22[a]	-.14	-.02	-.24[a]	.19	-.17	.20	-.24
	82	82	82	82	65	65	83	83	52	84	23	22
Reading	.11	.26[a]	.04	.27	.10	-.02	-.15	.31[b]	-.03	-.07	.06	-.02
	69	69	69	69	53	53	70	70	44	71	19	19
Listening	-.001	.10	-.12	-.002	-.004	-.14	-.13	-.30	-.06	-.03	.17	.24
	82	82	82	82	65	65	83	83	52	84	23	22
Writing	.01	-.006	-.10	-.02	.15	-.11	-.05	-.20[a]	.13	-.28[b]	.16	.08
	82	82	82	82	65	65	83	83	52	84	23	22
Average	.09	.19[a]	-.03	.10	.15	-.13	-.08	-.33	.02	-.13	.00	-.03
	83	83	83	83	66	66	84	84	52	85	23	22
Interview	.18	.13	.13	-.16	.28	-.29	.12	-.28	.04	-.28	-.11	.11
	31	31	31	31	25	25	32	32	17	33	5	4
TOFEL	.20	.31[a]	.09	.30[a]	.09	.15	.23	.05	.54	-.02	-.25	-.08
	47	47	47	47	40	40	47	47	7	47	12	11
IPAA	.12	-.13	.07	-.03	.01	-.07	.01	-.12	1.00	-.21	-.52[a]	-.44
	52	52	52	52	40	40	53	53		53	12	12
PAA	-.02	-.20	.16	-.12	.08	-.16	.15	-.03	.95[c]	.02	-.63	-.66
	35	35	35	35	28	28	35	35	35	35	7	7
GPA 1-term	1.00	.56[c]	.51[c]	.34[c]	.40[a]	.05	.46[c]	.15[a]	.12	-.009	-.07	-.04
		142	142	142	115	115	142	142	52	142	33	32

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

Table 9.--Correlation between the predictors and criterion for students in social science.

	GPA 1-Term	# of Credits	GPA 1-Year	# of Credits	GPA 2-Year	# of Credits	CGPA	# of Credits	IPAA	Academic Status
Grammar	.06 43	.18 43	-.05 43	.31[a] 43	-.13 32	.84[b] 32	.24 45	.22 45	.35[a] 27	.20 47
Vocabulary	-.03 43	.07 43	-.11 43	.23 43	-.17 32	.28 32	.43[c] 45	.18 45	.31 27	.38[b] 47
Reading	-.05 32	-.07 32	.16 32	-.01 32	-.12 25	.23 25	.45[b] 34	.23 34	.43[a] 20	.30[a] 36
Listening	.14 44	.19 44	-.16 44	.30 44	.03 33	.30[a] 33	.01 46	.20 46	-.19 27	.10 48
Writing	-.01 43	-.03 43	-.02 43	.15 43	-.08 32	.24 32	.32[a] 45	.02 45	.45[b] 27	.23 47
Average	.14 44	.15 44	-.04 44	.32[a] 44	-.03 33	.46[b] 33	.36[b] 46	.19 46	.26 27	.30[a] 48
Interview	-.25 12	-.46 12	-.23 12	-.18 12	.12 7	-.42 7	-.28 12	-.32 12	.05 7	.39 13
TOFEL	.007 17	.36 17	-.36 17	.29 17	-.03 13	.06 13	-.18 18	-.04 18	.49 5	-.07 18
IPAA	-.20 26	-.26 26	.34[a] 26	-.26 26	.32 19	-.27 19	.45[c] 27	.06 27	1.00	.10 27
GPA 1-term	1.00	.72[c] 71	.33[c] 71	.50[c] 71	.39[c] 54	.20 54	.42[c] 71	.01 71	-.20 26	.01 71

[a]Significant at .05. [b]Significant at .01. [c]Significant at .001.

APPENDIX D

RESULTS OF THE PREDICTOR AND CRITERION MEAN COMPARISON ANALYSIS

Table 1.--Summary table that indicates where the subgroups differed significantly with respect to their means on predictors and criteria.

		TOFEL	Grammar	Vocabulary	Reading	Listening	Writing	MSU-AETS	GPA 1-Term	# of Credits Completed 1st Term	GPA 1-Year	# of Credits Completed 1st Year	GPA 2-Year	# of Credits Completed 2 Years	CGPA
Sex	T-test	ns	ns	ns	ns	a,F	ns	ns	ns	ns	ns	ns	ns	ns	a,F
Marital status	T-test	a,S	A,S	ns	ns	a,S	a,S	a,S	ns	a,S	ns	a,S	ns	ns	ns
Degree level	T-test	ns	ns	ns	a, Ph.D.	ns	a, Ph.D.	a, Ph.D.	a, Ph.D.	ns	a, Ph.D.	a, M.A.	a, Ph.D.	a, M.A.	a, Ph.D.
Academic status	T-test	ns	a,N	a,N	a,N	a,N	a,N	a,N	a,N	ns	a,N	a,N	ns	a,N	a,N
Age	Anova	a,Y	a,Y	a,Y	a,Y	a,Y	ns	a,Y	a,Y	a,Y	a,Y	a,Y	ns	ns	a,Y
Curriculum	Anova	a	a	a	a	a	a	a	a	a	a	a	a	a	ns
Country of Origin	Anova	a	a	a	a	a	a	a	a	a	a	a	a	a	a

Key: a = Group mean differed significantly ($p < .05$).

ns = Group means did not differ significantly.

F = Female.

S = Single.

Y = Young group.

N = Students with normal academic progress.

Table 2.--Results of the mean comparison analysis of male versus female, single versus married, doctoral versus master's students, and students with normal academic progress versus students whose academic progress is not normal.

Variables	Groups	GPA 1-Term				No. of Credits Completed the First Term				CGPA			
		Mean	n	T-Value	Sig. Level	Mean	n	T-Value	Sig. Level	Mean	n	T-Value	Sig. Level
Sex	Male	2.86	690	- .64	..	4.17	690	-1.12	..	3.36	789	-1.98	a
	Female	2.96	274			6.49	274			3.43	310		
Marital Status	Single	2.92	700	1.70	..	6.51	700	3.12	b	3.38	810	.08	..
	Married	2.75	264			5.60	264			3.38	289		
Degree Level	Ph.D.	3.12	247	3.31	c	6.10	247	- .71	..	3.48	259	3.43	c
	Master's	2.79	718			6.31	718			3.35	839		
Academic Status	Not normal	2.43	44	-2.27	a	5.80	44	- .71	..	2.98	168	-10.69	c
	Normal	2.90	915			6.30	915			3.46	925		

[a]Significant at .05.

[b]Significant at .01.

[c]Significant at .001.

Table 3.--Means, standard deviations, and F-values of GPA 1-term, number of credits completed first term, GPA 1-year, and CGPA for students who achieved scores of <80 or >80, 80-85, and >85 on the MSU-AETS and writing subtests.

		GPA 1-Term				# of Credits Completed 1st Term				GPA 1-Year				CGPA			
	Score	n	$\bar{X}$	SD	F-Value	n	$\bar{X}$	SD	F-Value	n	$\bar{X}$	SD	F-Value	n	$\bar{X}$	SD	F-Value
Average	<80	59	1.45	1.75	28.00[c]	59	2.49	5.14	21.00[c]	59	3.00	.98	18.00[c]	73	2.93	1.10	31.00[c]
	>80	456	2.59	1.53		456	5.00	3.84		456	3.36	.54		474	3.36	.49	
Writing	<80	324	2.36	1.61	3.00	324	4.36	3.87	7.34[b]	324	3.29	.60	3.00	353	3.24	.71	11.34[b]
	>80	193	2.62	1.56		193	5.36	4.30		192	3.38	.63		197	3.42	.38	
Average	<80	59	1.45	1.75	22.54[c]	59	2.49	5.14	20.00[c]	59	3.00	.98	9.34[c]	73	2.93	1.10	17.48[c]
	80-85	197	2.25	1.65		197	4.15	4.09		197	3.36	.61		207	3.31	.53	
	>85	259	2.04	1.38		259	5.73	5.73		258	3.36	.48		267	3.41	.46	
Writing	<80	324	2.36	1.61	4.35[a]	324	4.36	3.87	9.65[c]	324	3.29	.60	1.50	353	3.24	.71	5.66[c]
	80-85	154	2.48	1.62		154	4.86	4.36		153	3.38	.68		158	3.43	.35	
	>85	39	3.16	1.16		39	7.33	3.62		39	3.38	.43		39	3.42	.50	

[a] F-value significant at $p < .05$.

[b] F-value significant at $p < .01$.

[c] F-value significant at $p < .001$.

Table 4.--Comparison of GPA and credit-load means of students who achieved a score of <80 and those who achieved a score of >80 on the MSU English test (average and subtests).

	MSU English Test Score	GPA 1-Term		# of Credits Completed 1-Term		GPA 1-Year		# of Credits Completed 1-Year		GPA 2-Year		# of Credits Completed 2-Year		CGPA	
		$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Grammar	<80	1.57	1.75[c]	3.07	5.66[c]	3.13	1.05[b]	16.00	9.88[c]	3.28	.38[b]	37	13[b]	3.05	.95[c]
	>80	2.64	1.52	5.09	3.57	3.36	.47	21.00	7.20	3.41	.32	42	12	3.36	.50
Vocabulary	<80	1.73	1.75[c]	3.26	5.37[c]	3.01	1.07[c]	17.00	10.92[c]	3.31	.33	37	13[b]	2.98	1.13[c]
	>80	2.54	1.56	4.91	3.86	3.36	.52	21.00	7.42	3.40	.34	4	12	3.35	.50
Reading	<80	1.52	1.77[c]	2.58	4.95[c]	3.06	.97[c]	14.66	7.88[c]	3.27	.38[a]	34	14[c]	2.95	1.11[c]
	>80	2.52	1.55	4.87	3.89	3.34	.56	20.82	7.73	3.40	.32	41	12	3.35	.48
Listening	<80	1.93	1.76[c]	3.78	5.00[b]	3.21	.87	17.74	10.35[c]	3.31	.38	38	14	3.11	.94[c]
	>80	2.56	1.54	4.95	3.86	3.34	.55	20.87	7.28	3.40	.33	41	12	3.35	.53
Writing	<80	2.36	1.61	4.36	3.87[b]	3.29	.60	19.47	7.99[c]	3.35	.34[a]	39	12a	3.24	.72[c]
	>80	2.62	1.56	5.36	4.33	3.38	.63	21.87	7.59	3.43	.34	42	12	3.43	.39
Average	<80	1.45	1.75[c]	2.49	6.14[c]	3.00	.98[c]	14.85	10.39[c]	3.22	.40[c]	35	14[b]	2.93	1.10[c]
	>80	2.59	1.53	5.05	3.84	3.36	.54	21.03	7.27	3.41	.32	42	12	3.36	.49

[a]Means differ significantly at $p < .05$.
[b]Means differ significantly at $p < .01$.
[c]Means differ significantly at $p < .001$.

Table 5.--Comparison of GPA and credit-load means of students who achieved scores of <80, 80-85, and >85 on the MSU English test (average and subtests).

	MSU English Test Score	GPA 1-Term		# of Credits Completed 1-Term		GPA 1-Year		# of Credits Completed 1-Year		GPA 2-Year		CGPA	
		$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
	<80	1.57	1.72	3.07	5.66	3.13	1.05	16	9.88	3.29	.38	3.05	.95
Grammar	80-85	2.26	1.65c	4.29	3.62c	3.33	.39b	20	7.04c	3.33	.37c	3.31	.55c
	>85	2.81	1.42	5.42	3.51	3.38	.50	22	7.20	3.45	.30	3.40	.48
	<80	1.73	1.75	3.26	5.37	3.00	1.07	17	11.00	3.31	.33	2.98	1.13
Vocabulary	80-85	1.84	1.69c	3.00c	3.20	3.19	.62c	17	7.00c	3.32	.34	3.23	.57c
	>85	2.67	1.50	5.25	3.87	3.39	.50	21	7.29	3.41	.34	3.37	.48
	<80	1.60	1.77	2.58	4.95	3.06	.97	14	7.88	3.28	.39	2.95	1.11
Reading	80-85	2.02	1.68c	3.61	3.36c	3.29	.43b	18	7.00c	3.31	.31a	3.30	.38c
	>85	2.67	1.49	3.22	3.96	3.36	.60	21	8.00	3.42	.32	3.37	.31
	<80	1.93	1.76	3.78	5.00	3.21	.87	18	10.35	3.31	.38	3.11	.94
Listening	80-85	2.12	1.72c	3.66	4.32c	3.27	.76	18	7.00	3.34	.36a	3.23	.69c
	>85	2.74	1.44	5.45	3.55	3.37	.44	21	7.00	3.44	.31	3.23	.44
	<80	2.36	1.51	4.36	3.87	3.29	.60	19	8.00	3.35	.34	3.24	.71
Writing	80-85	2.48	1.63a	4.86	4.36c	3.39	.68	21	7.00c	3.42	.34a	3.43	.35b
	>85	3.16	1.16	7.33	3.62	3.38	.43	25	6.00	3.52	.35	3.42	.50
	<80	1.45	1.75	2.49	5.14	3.00	.98	15	10.00	3.22	.41	2.93	1.10
Average	80-85	2.27	1.66c	4.15	9.09c	3.36	.61c	19	7.59c	3.34	.33c	3.31	.53c
	>85	2.84	1.38	5.73	3.48	3.37	.48	23	6.68	3.46	.31	3.41	.46

[a]Means differ significantly at $p < .05$.
[b]Means differ significantly at $p < .01$.
[c]Means differ significantly at $p < .001$.

Table 6.--Means on predictors and criteria for students from countries in which English is a second language, the Far East, Europe, South America, the Middle East, and English-speaking countries.

	TOFEL	Grammar	Vocabulary	Reading	Listening	Writing	Average	IPAA	GPA 1-Term	# of Credits Completed 1-Term	GPA 1-Year	# of Credits Completed 1-Year	GPA 2-Year	# of Credits Completed 2-Year	CGPA
Countries in which English is a second language	592	90.0	94	92	87	85	89	..	3.20	8.00	3.39	26.33	3.48	50.0	3.37
Far East	571	88.5	91	88	85	78	85	2.71	2.78	5.52	3.38	21.58	3.43	43.0	3.39
Europe	669	88.0	90	91	89	83	88	..	3.24	7.50	3.54	24.28	3.58	42.0	3.49
South America	557	82.0	88	89	86	79	84	2.36	2.62	5.80	3.42	22.21	3.35	45.0	3.36
Middle East	528	78.0	80	81	85	75	81	1.97	2.52	4.77	3.32	19.56	3.40	40.0	3.24
English-speaking countries	..	..	..	..	..	..	..	..	3.50	8.50	3.59	26.33	3.64	45.0	3.63

APPENDIX E

STEPWISE MULTIPLE REGRESSION STATISTICS

FOR THE VARIOUS SUBGROUPS

Table 1.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for males.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=230)	MSU-AETS	.32	.10	.30	9.38					
	Age	.35	.12	-.13	-4.70					
GPA 1-Year (N=230)	MSU-AETS	.17	.04	.17	2.02	GPA 1-Term	.34	.11	.31	.11
	*									
GPA 2-Year (N=167)	MSU-AETS	.25	.06	.25	1.43	GPA 1-Term	.34	.11	.29	.54
						MSU-AETS	.37	.14	.15	.88
CGPA (N=230)	MSU-AETS	.15	.02	.15	1.26	GPA 1-Term	.32	.10	.32	.86

*No significant predictor. $p \leq .05$

Table 2.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for females.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=90)	*									
GPA 1-Year (N=90)	*					*				
GPA 2-Year (N=52)	IPAA	.36	.13	.36	.22	IPAA	.36	.13	.35	.21
						GPA 1-Term	.45	.21	.28	.57
CGPA (N=90)	IPAA	.27	.07	.27	.20	GPA 1-Term	.33	.11	.29	.80
						IPAA	.40	.16	.22	.16

*No significant predictor. $p \leq .05$

Table 3.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for single students.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=206)	MSU-AETS	.36	.13	.35	.12					
	Degree level	.39	.15	-.17	-69					
	Age	.41	.17	-.13	- 4					
GPA 1-Year (N=206)	*					GPA 1-Term	.21	.04	.21	.86
GPA 2-Year (N=144)	MSU-AETS	.19	.03	.20	1.33	GPA 1-Term	.30	.09	.30	.60
	Degree level	.25	.06	-.17	-12					
CGPA (N=206)	Degree level	.14	.01	-.14	-15	GPA 1-Term	.28	.08	.28	.75
	MSU-AETS	.20	.05	.14	1.30					

*No significant predictor. $p \leq .05$

Table 4.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for married students.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=114)	*									
GPA 1-Year (N=114)	*					GPA 1-Term	.38	.14	.38	.14
GPA 2-Year (N=75)	MSU-AETS	.24	.06	.24	1.31	GPA 1-Term	.40	.16	.40	.69
CGPA (N=114)	*					GPA 1-Term	.38	.14	.38	.10

*No significant predictor. $p \leq .05$

Table 5.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for students in the doctoral program.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N-75)	MSU-AETS	.28	.07	.28	.10					
GPA 1-Year (N=71)	MSU-AETS	.25	.06	.25	3.80	GPA 1-Term	.43	.17	.43	.18
GPA 2-Year (N=54)	*					GPA 1-Term	.48	.23	.48	.95
CGPA (N=71)	*					GPA 1-Term	.33	.11	.40	.84
						MSU-AETS	.40	.16	-.24	1.85

*No significant predictor. $p \leq .05$

Table 6.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for students in the master's program.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=249)	MSU-AETS	.28	.08	.28	9.39					
GPA 1-Year (N=249)	*					GPA 1-Term	.22	.05	.22	.90
GPA 2-Year (N=165)	MSU-AETS	.23	.05	.23	1.34	GPA 1-Term	.27	.07	.21	.41
						MSU-AETS	.31	.09	.16	.95
CGPA (N=249)	MSU-AETS	.14	.02	.14	1.37					

*No significant predictor. $p \leq .05$

Table 7.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for students age 20 to 24.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=58)	*									
GPA 1-Year (N=58)	*					GPA 1-Term	.43	.18	.43	.19
GPA 2-Year (N=39)	MSU-AETS	.47	.22	.52	5.30	MSU-AETS	.47	.22	.52	5.27
	Degree level	.55	.31	-.30	-30	Degree level	.56	.31	-.29	-29
CGPA (N=58)	MSU-AETS	.27	.07	.27	4.55	GPA 1-Term	.41	.17	.41	.15

*No significant predictor. $p \leq .05$

Table 8.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for students age 25 to 29.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=146)	MSU-AETS	.23	.05	.20	7.40					
	IPAA	.29	.08	.17	.47					
GPA 1-Year (N=146)	*					GPA 1-Term	.17	.03	.17	.62
GPA 2-Year (N=100)	*					GPA 1-Term	.33	.11	.33	.65
CGPA (N=146)	IPAA	.19	.03	.19	.10	GPA 1-Term	.39	.15	.37	.76

*No significant predictor. $p \leq .05$

Table 9.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for students age 30-34.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=79)	MSU-AETS	.30	.09	.30	8.70					
GPA 1-Year (N=79)	Degree level	.23	.05	.23	33	GPA 1-Term	.24	.05	.24	.87
						Degree level	.34	.11	.23	33
GPA 2-Year (N=55)	MSU-AETS	.38	.14	.38	1.66	MSU-AETS	.38	.14	.38	1.66
CGPA (N=79)	*					GPA 1-Term	.31	.09	.31	.44

*No significant predictor. $p \leq .05$

Table 10.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for students majoring in natural science.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=50)	Sex	.33	.11	-.33	-94					
GPA 1-Year (N=50)	Sex	.29	.08	-.29	-32	GPA 1-Term	.30	.09	.30	.12
GPA 2-Year (N=39)	Degree level	.38	.14	-.38	-29	Degree level	.38	.14	-.38	-29
CGPA (N=50)	*					GPA 1-Term	.36	.13	.32	.11

*No significant predictor. $p \leq .05$

Table 11.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for students majoring in agriculture.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=60)	MSU-AETS	.39	.15	.39	.16					
GPA 1-Year (N=60)	Sex	.33	.11	.33	60	Sex	.33	.11	.33	60
GPA 2-Year (N=39)	MSU-AETS	.67	.45	.50	3.32	MSU-AETS	.67	.45	.50	3.32
	Aag	.72	.52	-.31	-2.57	Aag	.72	.52	-.31	-2.57
CGPA (N=60)	MSU-AETS	.56	.32	.55	4.28	MSU-AETS	.56	.32	.55	4.28
	Sex	.60	.36	.21	17	Sex	.60	.36	.21	17

$p \leq .05$

Table 12.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for students majoring in engineering.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=42)	MSU-AETS	.40	.16	.43	.20	*				
	Sex	.52	.27	-.34	-188					
GPA 1-Year (N=42)	Sex	.47	.22	-.47	-80	Sex	.47	.22	-.47	-80
GPA 2-Year (N=24)	*					GPA 1-Term	.61	.37	.61	.14
CGPA (N=42)	Sex	.39	.15	-.46	-76	GPA 1-Term	.63	.40	.64	.20
	MSU-AETS	.52	.27	.38	5.31	Age	.68	.47	.30	3.34
						Sex	.72	.53	-.24	-44

*No significant predictor. $p \leq .05$

Table 13.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for students majoring in business.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=23)										
GPA 1-Year (N=23)	MSU-AETS	.70	.49	.67	10	MSU-AETS	.70	.49	.52	8
	Marital stat.	.79	.63	.38	60	Marital stat.	.79	.63	.38	61
						GPA 1-Term	.88	.77	.40	.22
GPA 2-Year (N=20)	Marital stat.	.62	.38	.58	35	Marital stat.	.62	.38	.58	35
	MSU-AETS	.75	.56	.42	2.36	MSU-AETS	.75	.56	.42	2.36
CGPA (N=23)	IPAA	.64	.41	.64	.33	IPAA	.64	.41	.60	.31
						GPA 1-Term	.78	.62	.45	.11

$p \leq .05$

Table 14.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for students from China.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=80)	Marital stat.	.18	.03	-.23	-68					
	IPAA	.28	.08	.22	.69					
GPA 1-Year (N=80)	IPAA	.37	.13	.47	.46	GPA 1-Term	.59	.34	.50	.16
	Sex	.49	.24	-.34	-29	IPAA	.65	.42	.36	.35
						Sex	.70	.49	-.27	-23
GPA 2-Year (N=57)	Degree level	.33	.10	-.27	21	GPA 1-Term	.54	.29	.49	.11
						IPAA	.59	.35	.34	.27
						Sex	.64	.41	-.25	-17
CGPA (N=80)	IPAA	.34	.11	.46	.38	GPA 1-Term	.51	.26	.44	.11
	Sex	.42	.17	-.26	-18	IPAA	.57	.33	.32	.27
	Marital stat.	.46	.22	-.21	-16	Sex	.60	.36	-.19	-14

$p \leq .05$

Table 15.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for students from South Korea.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=50)	MSU-AETS	.42	.18	.39	17					
	Degree level	.48	.23	-.32	-132					
	IPAA	.56	.31	-.29	-1.64					
GPA 1-Year (N=50)	MSU-AETS	.26	.31	-.29	-1.64	IPAA	.34	.11	.34	.15
	Sex	.38	.14	-.27	-51					
GPA 2-Year (N=39)	MSU-AETS	.60	.36	.60	4.81	MSU-AETS	.60	.36	.60	4.81
CGPA (N=50)	MSU-AETS	.30	.09	.30	2.93	GPA 1-Term	.48	.23	.54	.12
						IPAA	.55	.30	.26	.32

$p \leq .05$

Table 16.--Stepwise multiple regression statistics of the predictors that contributed significantly to the prediction of GPA for students from Japan.

Criterion	(A) First Set of Predictors					(B) Second Set of Predictors				
	Predictor	MR	R^2	B	b	Predictor	MR	R^2	B	b
GPA 1-Term (N=28)	IPAA	.39	.15	.37	1.69					
GPA 1-Year (N=28)	IPAA	.42	.17	.42	1.13	GPA 1-Term	.49	.24	.49	.29
GPA 2-Year (N=20)	*					*				
CGPA (N=28)	IPAA	.54	.30	.54	1.59	IPAA	.54	.30	.41	1.19
						GPA 1-Term	.63	.40	.34	.22

*No significant predictor. $p \leq .05$

APPENDIX F

ANOVA AND POST HOC COMPARISON ANALYSIS (TUKEY) FOR THE VARIOUS GROUPS

Table 1.--ANOVA and post-hoc comparison analysis (Tukey) of GPA 1-term means for students in different age categories.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Between groups	3	526883.8436	175627.9479	9.995	.0000
Within groups	920	16165234.7657	17570.9074		
Total	923	16692118.6093			

Mean	Group	G R P 0 0 4	G R P 0 0 3	G R P 0 0 2	G R P 0 0 1
249.4776	GRP004				
258.2308	GRP003				
296.0167	GRP002	*	*		
318.7742	GRP001	*	*		

Age Categories

1. 20-24
2. 25-29
3. 30-34
4. 35 and above

Table 2.--ANOVA and post-hoc comparison analysis (Tukey) of the means of credits completed the first term by students in different age categories.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Between groups	3	452.0576	150.6859	9.594	.0000
Within groups	920	14449.8731	15.7064		
Total	923	14901.9307			

Mean	Group	G R P 0 0 3	G R P 0 0 4	G R P 0 0 2	G R P 0 0 1
5.3484	GRP003				
5.4328	GRP004				
6.4391	GRP002			*	
7.2442	GRP001			*	*

Age Categories

1. 20-24
2. 25-29
3. 30-34
4. 35 and above

Table 3.--ANOVA and post-hoc comparison analysis (Tukey) of CGPA means for students in different age categories.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Between groups	3	11235.7141	3745.2380	2.693	.0450
Within groups	922	1282093.1542	1390.5566		
Total	925	1293328.8683			

Mean	Group	G R P 0 0 4	G R P 0 0 3	G R P 0 0 2	G R P 0 0 1
332.6269	GRP004				
344.2793	GRP003				
346.0358	GRP002	*			
346.4725	GRP001	*			

Age Categories

1. 20-24
2. 25-29
3. 30-34
4. 35 and above

Table 4.--ANOVA and post-hoc comparison analysis (Tukey) of GPA 1-term means for students in different colleges.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Between groups	10	864090.8698	86409.0870	4.878	.0000
Within groups	941	16669028.0042	17714.1637		
Total	951	17533118.8739			

Mean	Group	GRP009	GRP006	GRP001	GRP011	GRP004	GRP007	GRP003	GRP005	GRP002	GRP010	GRP008
229.3065	GRP009											
248.7222	GRP006											
250.7108	GRP001											
271.2394	GRP011											
276.5238	GRP004											
284.2209	GRP007											
310.8271	GRP003	*							*	*	*	
315.3028	GRP005	*						*				
318.2584	GRP002	*						*				
323.5195	GRP010	*						*				
324.2000	GRP008											

College

1. Agr. & Nat. Resources
2. Business
3. Engineering
4. Human Ecology
5. Natural Science
6. Vet. Med. & Human Med.
7. Education
8. Unclassified
9. Communications
10. Arts & Letters
11. Social Science

Table 5.--ANOVA and post-hoc comparison analysis (Tukey) of the means of credits completed the first term by students in different colleges.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Btween groups	10	687.6771	68.7677	4.410	.0000
Within groups	941	14672.5540	15.5925		
Total	951	15360.2311			

Mean	Group	GRP006	GRP009	GRP011	GRP001	GRP005	GRP007	GRP004	GRP008	GRP010	GRP003	GRP002
4.1667	GRP006											*
5.4516	GRP009											*
5.5211	GRP011											*
5.6205	GRP001											*
5.9718	GRP005											*
6.1902	GRP007											*
6.2381	GRP004											*
6.4000	GRP008											*
6.8182	GRP010											*
g.8421	GRP003											
8.3258	GRP002	*	*	*	*	*	*					

College

1. Agr. & Nat. Resources
2. Business
3. Engineering
4. Human Ecology
5. Natural Science
6. Vet. Med. & Human Med.
7. Education
8. Unclassified
9. Communications
10. Arts & Letters
11. Social Science

Table 6.--ANOVA of the means on CGPA of students in different colleges.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Between groups	10	52121.6285	5212.1628	1.661	.0852
Within groups	1073	336734.3964	3138.5223		
Total	1083	3419756.0249			

Table 7.--ANOVA and post-hoc comparison analysis (Tukey) of GPA 1-term means for students from different regions of the world.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Between groups	5	864610.7640	172922.1528	9.858	.0000
Within groups	956	16770335.0364	17542.1915		
Total	961	17634945.8004			

Mean	Group	G R P 0 0 3	G R P 0 0 1	G R P 0 0 2	G R P 0 0 5	G R P 0 0 6	G R P 0 0 4
252.9187	GRP003						
262.7113	GRP001						
278.8743	GRP002						
320.4302	GRP005	*	*	*			
324.0339	GRP006	*	*				
350.6806	GRP004	*	*	*			

Region

1. South America
2. Far East
3. Middle East
4. English-speaking country
5. Country in which English is a second language
6. Europe

Table 8.--ANOVA and post-hoc comparison analysis (Tukey) of the means of credits completed the first term by students from different regions of the world.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Between groups	5	1651.6613	330.3323	22.860	.0000
Within groups	956	13814.6807	14.4505		
Total	961	15466.3420			

Mean	Group	G R P 0 0 3	G R P 0 0 2	G R P 0 0 1	G R P 0 0 6	G R P 0 0 5	G R P 0 0 4
4.7750	GRP003						
5.5229	GRP002						
5.7958	GRP001						
7.4915	GRP006	*	*	*			
8.1117	GRP005	*	*	*			
8.5417	GRP004	*	*	*			

Region

1. South America
2. Far East
3. Middle East
4. English-speaking country
5. Country in which English is a second language
6. Europe

Table 9.--ANOVA and post-hoc comparison analysis (Tukey) of means of CGPA for students from different regions of the world.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Between groups	5	100349.4611	20069.8922	6.575	.0000
Within groups	1091	3330262.8178	3052.4865		
Total	1096	3430612.2789			

Mean	Group	GRP003	GRP001	GRP005	GRP002	GRP006	GRP004
324.2541	GRP003						
336.2895	GRP001						
337.2565	GRP005						
338.6092	GRP002	*					
349.0756	GRP006	*					
363.2658	GRP004	*	*	*	*		

Region

1. South America
2. Far East
3. Middle East
4. English-speaking country
5. Country in which English is a second language
6. Europe

Table 10.--ANOVA and post-hoc comparison analysis (Tukey) of GPA 1-term means for students from different countries.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Between groups	22	2105018.2249	95682.6466	5.678	.0000
Within groups	862	14526562.5841	16852.1608		
Total	384	16631580.8090			

Mean	Group	GRP011	GRP009	GRP023	GRP021	GRP022	GRP013	GRP006	GRP014	GRP015	GRP001	GRP017	GRP012	GRP016	GRP020	GRP010	GRP018	GRP019	GRP007	GRP003	GRP004	GRP008	GRP005	GRP002
165.0000	GRP011																							
172.5000	GRP009																							
172.5000	GRP023																							
215.0698	GRP021																							
234.4194	GRP022																							
235.0741	GRP013																							
240.9231	GRP006																							
246.8816	GRP014																							
249.7600	GRP015																							
269.5278	GRP001																							
271.5962	GRP017																							
278.4872	GRP012																							
301.9167	GRP016																							
302.1739	GRP020																							
304.6119	GRP010	*	*	*																				
312.1509	GRP018	*	*	*	*																			
315.2083	GRP019		*																					
323.0000	GRP007		*																					
326.6644	GRP003	*	*	*	*															*				
328.6471	GRP004		*																					
334.5660	GRP008	*	*	*	*															*				
351.2941	GRP005	*	*	*	*																			
354.6087	GRP002	*	*	*	*	*	*													*				

Table 11.--ANOVA and post-hoc comparison analysis (Tukey) of the means of credits completed the first term by students from different countries.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Between groups	22	2542.3684	115.5622	8.530	.0000
Within groups	862	11678.2078	13.5478		
Total	884	14220.5763			

Mean	Group	GRP011	GRP009	GRP023	GRP015	GRP013	GRP021	GRP006	GRP014	GRP001	GRP012	GRP022	GRP010	GRP003	GRP017	GRP019	GRP016	GRP008	GRP018	GRP004	GRP005	GRP020	GRP002	GRP007
2.8000	GRP011													*	*	*	*	*	*	*	*	*	*	*
3.2727	GRP009													*	*	*	*	*	*	*	*	*	*	*
3.3889	GRP023													*	*	*	*	*	*	*	*	*	*	*
3.4400	GRP015													*	*	*	*	*	*	*	*	*	*	*
3.6667	GRP013													*	*	*	*	*	*	*	*	*	*	*
4.0465	GRP021													*	*	*	*	*	*	*	*	*	*	*
4.4615	GRP006													*	*	*	*	*	*	*	*	*	*	*
4.6053	GRP014													*	*	*	*	*	*	*	*	*	*	*
4.7222	GRP001													*	*	*	*	*	*	*	*	*	*	*
5.4103	GRP012													*	*	*	*	*	*	*	*	*	*	*
5.4839	GRP022													*	*	*	*	*	*	*	*	*	*	*
6.4925	GRP010													*	*	*	*	*	*	*	*	*	*	*
6.5068	GRP003	*	*		*	*	*		*															
6.7115	GRP017	*	*		*																			
7.2500	GRP019	*	*		*																			
7.3333	GRP016	*	*		*																			
7.6415	GRP008	*	*	*	*	*	*		*	*														
8.2264	GRP018	*	*	*	*	*	*		*	*	*													
8.2941	GRP004	*	*	*	*	*	*		*															
8.5294	GRP005	*	*	*	*	*	*		*															
8.6087	GRP020	*	*	*	*	*	*		*	*														
8.6957	GRP002	*	*	*	*	*	*	*	*	*	*	*												
8.7778	GRP007	*	*	*	*	*	*		*	*														

Table 12.--ANOVA and post-hoc comparison analysis (Tukey) of CGPA means of students from different countries.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Between groups	22	197949.5137	8997.7052	2.778	.0000
Within groups	936	3031450.2924	3238.7289		
Total	958	3229399.8060			

Mean	Group	GRP015	GRP011	GRP009	GRP013	GRP012	GRP001	GRP018	GRP022	GRP014	GRP007	GRP023	GRP010	GRP019	GRP008	GRP017	GRP012	GRP004	GRP003	GRP020	GRP016	GRP006	GRP002	GRP005
295.1175	GRP015																							
312.3529	GRP011																							
318.8635	GRP009																							
319.7667	GRP013																							
320.2791	GRP012																							
324.2500	GRP001																							
328.8727	GRP018																							
331.8387	GRP022																							
333.6707	GRP014																							
335.7895	GRP007																							
337.2105	GRP023																							
339.5000	GRP010	*																						
339.6538	GRP019																							
339.8983	GRP008	*																						
341.3333	GRP017	*																						
341.7727	GRP012																							
345.3889	GRP004																							
346.1026	GRP003	*																						
346.9167	GRP020																							
351.9167	GRP016	*																						
353.5000	GRP006																							
365.8824	GRP002	*																					*	
367.3889	GRP005	*																						

Table 13.--ANOVA and post-hoc comparison analysis (Tukey) of GPA 1-term means for students who started their academic programs with different English status.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Between groups	6	3299979.1711	549996.5285	36.529	.0000
Within groups	958	14423961.5709	15056.3273		
Total	964	17723940.7420			

Mean	Group	G R P 0 0 4	G R P 0 0 2	G R P 0 0 7	G R P 0 0 6	G R P 0 0 5	G R P 0 0 3	G R P 0 0 1
210.5345	GRP004							
313.3301	GRP002	*						
329.3411	GRP007	*						
333.3333	GRP006	*						
336.3545	GRP005	*						
336.8873	GRP003	*						
338.4259	GRP001	*						

English Status

1. TOFEL >550 and passed
2. TOFEL <550 and passed after after taking MSU test
3. MSU-AETS >80 and passsed
4. MSU-AETS <80 and studied at the English Language Center
5. No English record (English-speaking countries, Europe, and countries in which English is second language)
6. No English record (transfer)
7. No English record (from Middle East, South America, Africa, and the Far East)

Table 14.--ANOVA and post-hoc comparison analysis (Tukey) of the means of credits completed the first term by students who started their academic programs with different English status.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Between groups	6	4175.0844	695.8474	58.735	.0000
Within groups	958	11349.5851	11.8472		
Total	964	15524.6694			

Mean	Group	GRP004	GRP002	GRP007	GRP003	GRP006	GRP001	GRP005
3.5747	GRP004							
6.8155	GRP002	*						
7.2326	GRP007	*						
7.7887	GRP003	*						
7.8095	GRP006	*						
8.2593	GRP001	*	*					
8.5909	GRP005	*	*	*				

English Status

1. TOFEL >550 and passed
2. TOFEL <550 and passed after after taking MSU test
3. MSU-AETS >80 and passsed
4. MSU-AETS <80 and studied at the English Language Center
5. No English record (English-speaking countries, Europe, and countries in which English is second language)
6. No English record (transfer)
7. No English record (from Middle East, South America, Africa, and the Far East)

Table 15.--ANOVA and post-hoc comparison analysis (Tukey) of CGPA means for students who started their academic programs with different English status.

Source	df	Sum of Squares	Mean Squares	F-Ratio	F Prob.
Between groups	6	123568.1894	20594.6982	6.805	.0000
Within groups	1093	3307662.1597	3026.2234		
Total	1099	3431230.3491			

Mean	Group	GRP004	GRP007	GRP003	GRP001	GRP002	GRP006	GRP005
324.8086	GRP004							
340.4793	GRP007	*						
341.8861	GRP003							
345.8848	GRP001	*						
346.4190	GRP002	*						
347.6744	GRP006							
355.1000	GRP005	*						

English Status

1. TOFEL >550 and passed
2. TOFEL <550 and passed after after taking MSU test
3. MSU-AETS >80 and passsed
4. MSU-AETS <80 and studied at the English Language Center
5. No English record (English-speaking countries, Europe, and countries in which English is second language)
6. No English record (transfer)
7. No English record (from Middle East, South America, Africa, and the Far East)

APPENDIX G

DESCRIPTION OF THE STUDY SUBJECTS ACCORDING TO THE AVAILABILITY OF DATA, CURRICULUM, AND COUNTRY

Table 1.--Distribution of study subjects according to the availability of English proficiency test scores.

Group	Variable	# of Subjects		Group	Variable	# of Subjects
1	TOFEL >550	165		5	No English record/European & English-speaking countries	120
2	TOFEL <550 & MSU-AETS >80	105	560			
3	MSU-AETS >80	80		6	No English record (transfer)	43
4	MSU-AETS <80 & studied at the MSU English Language Center	375		7	No English record from countries in which English is a second language, & Far East & Middle East	217

Table 2.--Distribution of study subjects according to sex, marital status, age, degree level, and the availability of GPA, CGPA, IPAA, pAA, and ROAC.

Variable	Category	# of Students	Variable	# of Students
Sex	Male	794	GPA 1-term	965
	Female	311	GPA 1-year	962
Marital Status	Single	815	GPA 2-year	635
	Married	290	CGPA	1,100
Age	20-24	218	IPAA	342
	25-29	421	pAA	127
	30-34	222	ROAC	110
	35-59	106		
	Missing	139		
Degree Level	Ph.D.	260		
	Master's	844		

IPAA: Index of previous academic achievement
pAA: Actual previous grades reported on a scale of 1-100.
ROAC: Rating of overall academic competence

Table 3.--Distribution of the total study subjects according to curriculum (college) and country of origin.

College	# of Subjects	Country	# of Subjects	Country	# of Subjects
Agr. & Nat. Resources	173	Argentina	10	Iran	76
Business	94	Australia	10	Iraq	17
Engineering	143	Brazil	41	Japan	44
Human Ecology	23	Botswana	8	Jordan	30
Natural Science	150	Canada	51	Kenya	8
Veterinary Medicine	10	Chile	8	South Korea	82
Education	178	China	156	Kuwait	362
Communications	68	Colombia	7	Malaysia	24
Arts & Letters	85	England	18	Mexico	57
Human Medicine	9	France	18	Netherlands	60
Social Science	77	West Germany	11	Nigeria	55
Unclassified	79	Greece	14	Philippines	26
Missing	17	Hong Kong	19	South Africa	24
		India	60	Spain	8
		Indonesia	22	Sudan	9
		Thailand	44	Venezuela	31
				Egypt	21

Table 4.--Distribution of study subjects for whom previous grades were available.

		Number of Subjects
COUNTRY		
South America	Brazil	20
	Mexico	15
	Venezuela	12
Near East & Far East	China	86
	Indonesia	14
	Japan	30
	South Korea	53
	Thailand	36
Middle East	Iraq	15
	Jordan	25
	Kuwait	23
	Egypt	13
COLLEGE		
Agriculture and Natural Resources		60
Business		26
Engineering		46
Human Ecology		7
Natural Science		53
Veterinary Medicine		4
Education		71
Communication		23
Arts and Letters		21
Human Medicine		3

Table 5.--Detailed description of how the common grading systems were rescaled for the purpose of converting the foreign students' actual previous grades to a uniform scale.

(4) 9-10 (3) 8 (2) 7 (1) 6 (0) <6	(4) Excellent (3) Above average (2) Average (1) Below average (0) Insufficient	(4) 18-20 (3) 16-17 (2) 14-15 (1) 10-13 (0) <10	(4) 90-100 (3) 80-89 (2) 70-79 (1) 60-69 (0) <60	(4) E-Excellent (100) (3) MB-Very Good (90) (2) B-Good (80) (1) R-Average (70)	(4) MB (9-10) (3) B (7.6-8.9) (2) S (6-7.5) (1) NA (Failure)	(4) 10 (With honor) 9 (Excellent) (3) 8 (Very good) (2) 7 (Good) (1) 6 (Fair) (0) 5 (Failure)
(4) Best (3) Good (2) Fair (1) Poor (0) Very poor	(4) Excellent (3) Good (2) Fair (1) Poor (0) Failure	(4) 8-10 Excellent (3) 7 Very good (2) 6 Good (1) 5-1/2 (0)<5-1/2	(4) 90-100 (Excellent) (3) 75-89.99 (Good) (2) 60-74.99 (Fair) (1) 40-49.99 (Poor) (0)<40 (Failure)	(4) Excellent (3) Good (2) Fair (1) Pass (0) Failure	(4) 86-100 Excellent 80-85 Very good (3) 70-79 Good (2) 65-69 Fair (1) 60-64 Satisfactory (0)<60 Failure	
(4) Excellent (3) Good (2) Fair (1) Weak (0) Failure	(4) Excellent (3) Good (2) Fair (1) Minimum (0) Failure	(4) 90-100 Excellent (3) 75-89 Good (2) 60-74 Fair (1) 33-59 Poor (0)<33 Failure	(4) 80-100 (3) 70-79 (2) 60-69 (1) 50-59 (0)<50	(4) Excellent (4.0) (3) Good (3.0) (2) Satisfactory (2.0) (1) Passed (1.0) (0) Failure (<1.0)	(4) Excellent (80-100) (3) Good (70-79) (2) Fair (60-69) (0) Failure (<60)	
(4) Superior (3) Middle (2) Inferior (0) Failure	(4) Excellent (90-100) (3) Very good (80-89) (2) Good (70-79) (1) Pass (60-69) (0) Failure (<60)	(4) Excellent (90-100) (3) Very good (80-89) (2) Good (65-79) (1) Pass (50-64) (0) Failure (40-49)	(4) Distinguished (3) Very good (2) Good (1) Pass	(4) 10 Perfect 9 Excellent (3) 8 Very good (2) 7 Good (1) 6 Sufficient (0) <6 Failure	(4) 10 Excellent 9 Very good (3) 8 Good (2) 7 Better than fair (1) 6 Fair (0) <6 Inadequate	
(4) 10 Perfect 9 Excellent (3) 8 Very good (2) 7 Good (1) 6 Sufficient 5.5 Pass 5 Less sufficient (0) 4.5 Not sufficient 4 Fail	(4) 10 Excellent 9 Very good (3) 8 Good (2) 7 Better than fair (1) 6 Fair 5 Inadequate 4 More inadequate (0) 3 Most inadequate 2 Bad 1 Poor	(4) A Excellent (4.00) (3) B+ Very good (3.50) B Good (3.00) (2) C+ Above ave. (2.50) C Average (2.00) (1) D+ Below ave. (1.50) D Poor (1.00) (0) F Failure (<1.00)	A+ 4.3 (4) A 4.0 90-100 A- 3.7 B+ 3.3 (3) B 3.0 80-89 B- 2.7 C+ 2.3 (2) C 2.0 70-79 C- 1.7 D+ 1.3 (1) D 1.0 60-69 D- .07	(4) A+ (95-100) A (90-94) (3) B+ (85-89) B (80-84) (2) C+ (75-79) C (70-74) (1) D+ (65-69) D (60-64) (0) (<60)	(4) A (95-100) 4.50 A- (90-94) 4.00 (3) B (85-89) 3.50 B- (80-84) 3.00 (2) C (75-79) 2.50 C- (70-74) 2.00 (1) D (65-70) 1.50 D- (60-64) 1.00 (0) F (<60) Failure	

APPENDIX H

CHART FOR THE DATA COLLECTION, RATING SCALE, AND DOCUMENTS RELATED TO THE RESEARCH

MICHIGAN STATE UNIVERSITY

COLLEGE OF EDUCATION · DEPARTMENT OF COUNSELING,
EDUCATIONAL PSYCHOLOGY AND SPECIAL EDUCATION

EAST LANSING · MICHIGAN · 48824

May 3, 1983

Professor Benson
Office of Foreign Students
109 International Center
Michigan State University
East Lansing, Michigan 48824

Dear Professor Benson:

One of my doctoral advisees, Mr. Ali Aseeri (02-99372) is undertaking research on the prediction of foreign graduate students academic achievement at Michigan State University. To conduct his study he will need information on the names of these students, their ages, their field of specialization, country of origin and their martial status. Further he will need information on their previous academic achievement, their GPA achieved at M.S.U. and their English test score achieved by the end of their English program. In addition, Mr. Aseeri will distribute a rating scale to the foreign doctoral student academic advisors. The scale asks the advisors to rate the doctoral student's academic competence. Data on this scale will be used as criterion data for examining the predictive validity of the preadmission criteria. We will be grateful for your help in providing as much of this information as may be available. Mr. Aseeri will be in touch with you to follow up on this letter.

Thank you for your cooperation.

Sincerely,

William Mehrens
Professor

MICHIGAN STATE UNIVERSITY

ENGLISH LANGUAGE CENTER
CENTER FOR INTERNATIONAL PROGRAMS

EAST LANSING • MICHIGAN • 48824

July 28, 1983

Dr. Lou Anna Simon
Assistant Provost
423 Administration Building
Michigan State University

Dear Dr. Simon:

As you know, Mr. Ali Aseeri is attempting to undertake a reasearch study which will compare English Language Center English language proficiency test scores of a group of students with their cumulative G.P.A. in academic courses in order to determine if there is a correlation which would establish predictive validity for academic success based on the ELC test scores. As I understand it, in order to gain access to the records of a group of students, the results of his project must be of some value to a unit of the University, and he has asked me if his results would be value to the English Language Center.

In fact his results will be of use to us for several reasons. There has been a fair amount of discussion among admissions people throughout the United States on the feasibility of using TOEFL scores as a substitute for SAT, ACT, and GRE scores, and some study has been conducted to determine whether such a substitution would be legitimate. To my knowledge, the studies have been inconclusive, but suggest that language proficiency scores are not synonymous with academic aptitude or achievement scores. Mr. Aseeri's project would add some information to that debate, and would be of particular value to us because the data base would be focused on scores and grades generated within Michigan State and would thus speak directly to our student body.

In addition, the project would give us the opportunity to assess our assumption that the ELC test is in fact a language test, not a test of academic aptitude. Although there may be some correlation between success in learning a second language and success in other areas of academic study, our assumption is that language learning is not the same as learning physics or sociology. Hence, students who learn English quickly and well may not be stunning academic successes, and vice versa, students who struggle through the Center may prove to be very able students in an academic class. Mr. Aseeri's study would be an aid in confirming or disconfirming this assumption.

The study might help as well in advising our students, to the extent that we will be confirmed in our standard advice that success in the English Language Center will at the very least allow the full potential of the student to come to the fore in academic classes. If language proves a barrier, academic success may well be compromised, in spite of natural academic ability in a given field. It is my understanding that Mr. Aseeri expects to find differences among nationalities in his correlations. Perhaps he will, and if he does that information could be quite useful to the Center in several respects.

We will be glad to cooperate with Mr. Aseeri and your office in supplying the information he needs on the ELC test scores, provided it is your judgment that the information can be released.

Sincerely yours,

James C. Stalker
Director

cc: Mr. Ali Aseeri

MICHIGAN STATE UNIVERSITY

OFFICE OF THE DEAN OF INTERNATIONAL STUDIES AND PROGRAMS EAST LANSING • MICHIGAN • 48824

July 27, 1983

Dr. Lou Anna K. Simon
Assistant Provost
423 Administration Bldg.
Campus

Dear Dr. Simon:

I have read and reviewed with Dr. Mehrens, Dr. Benson and Mr. Ali Aseeri the proposed dissertation research Mr. Aseeri submitted. We believe the result of such a study would be of administrative value to this office and would therefore encourage Central Administration to provide the support required to secure the data. The Office of the Director, Office of Foreign Students/Scholars is not in a position to lend assistance as suggested in the written proposal (page 28).

Sincerely yours,

Homer Higbee
Assistant Dean

bs

cc: Dr. William Mehrens
Dr. August Benson

MICHIGAN STATE UNIVERSITY EAST LANSING • MICHIGAN • 48824

OFFICE OF THE DEAN OF INTERNATIONAL STUDIES AND PROGRAMS

May 5, 1983

Dr. Henry E. Bredeck
Chairman, UCRIHS
238 Administration Bldg.
Campus

Dear Dr. Bredeck:

I recommend your concurrence in the research efforts of Mr. Ali Aseeri of Saudi Arabia. Mr. Aseeri is pursuing a Ph.D. in the Department of Counseling, Educational Psychology and Special Education. His topic is a valid one and can add additional insight to the study of academic achievement of foreign students. Thanks for your consideration.

Sincerely,

August G. Benson, Director
Office of International
Students and Scholars

AGB/scm

MICHIGAN STATE UNIVERSITY

OFFICE OF THE PROVOST
ADMINISTRATION BUILDING

EAST LANSING · MICHIGAN · 48824

September 16, 1983

MEMORANDUM OF RECORD

Meeting on the release of data to support the dissertation proposal of Mr. Ali Aserri, held on September 16, 1983

Present: Dr. Lockhart, Dr. Higbee, Dr. Stalker, Dr. Mehrens, Mr. Aserri, Dr. Simon

The English Language Center and the Office of International Studies and Programs concur that the research proposed by Mr. Aserri would be valuable to these units.

The Office of Planning and Budgets can provide the data contained in central records to an administrative unit which will supervise this study and which will assume responsibility for assuring the confidentiality and proper use of individually identifiable data from the central University records. The administrative unit will need to assume responsibility for the collation of these data with other data requirements for this proposal and for the provision of these collated data sets to Mr. Aserri in a redacted format. The administrative unit will also need to assume responsibility for the collection of data from student advisors as proposed in the study.

It was agreed that Dr. Stalker, Director of the English Language Center, will assume the administrative responsibility for this study. He will work with Mr. Aserri, Dr. Higbee, and Dr. Mehrens to develop the necessary support arrangements for the project so that Mr. Aserri receives only a set of redacted data from the three sources (administrative, English Language Center, and academic advisors) identified in his proposal. Dr. Stalker will send a formal request to Dr. Lockhart for the data from central student records.

LAKS:jmc

CC: Dr. Bredeck
Dr. Higbee
Dr. Lockhart
Dr. Mehrens
Dr. Stalker
Mr. Aserri

English Language Center
Center for International Programs
Michigan State University
East Lansing, MI 48824
January 24, 1984

Dear Academic Advisor:

Mr. Ali Aseeri, a graduate student in the Department of Counseling, Educational Psychology, and Special Education, is conducting a study for his doctoral disseratation on the relation of academic achievement to the English language proficiency of foreign graduate students.

The academic success of the students, one of the variables of the study, will be measured by cumulative GPA, but Mr. Aseeri, as well as other measurement specialists, believe that for doctoral students the cumulative GPA does not by itself provide full data on the quality of their academic competence. Therefore, Mr. Aseeri has designed a rating scale to gather the judgments of the academic advisor of the doctoral students included in his study. The outcome of such judgments will be used as an alternative criterion to the cumulative GPA to judge the foreign doctoral students' academic competence.

Will you please complete the enclosed evaluation form(s) for the student(s) you have advised and return it(them) to me in the envelope provided? If our information is incorrect, please send back the evaluation(s) for the student(s) you did not advise. It would be helpful if you would supply the name of the advisor if you know it.

Your evaluation of the student(s) will be confidential and will be used only for this study. Mr. Aseeri will not receive the evaluation with the students' names or other identifying information attached. After the English Language Center receives your response, the top part of the questionnaire will be removed. The evaluation portion will be given to Mr. Aseeri without identification other than a randomly assigned number which correlates with other data Mr. Aseeri is collecting.

We appreciate your willingness to contribute to the success of this study. Aside from Mr. Aseeri's immediate dissertation needs, the data should be of use to the English Language Center in helping us see the relationship between English language proficiency and academic achievement.

Sincerely yours,

James C. Stalker, Director
English Language Center

Advisor's Rating Questionnaire

Student's Name_____ Card #:
last first middle

Student's Number_____

Card #:
Page #:

As the person most familiar with the above student. Please rate him on the following items in two respects: (1) in comparison with all American students in his field at the Ph.D. program and (2) in comparison with all other foreign students in his field in the Ph.D. program.

Please rate the student on the following items:

1. **The student's overall academic competence** (academic competence refers to the student's overall potential as an academician who will continue to be productive in his field).

	Rating	Per Cent of Class	Check (✓) Each Column Once: All Other Students	Check (✓) Each Column Once: Other Foreign Students	
1.	Superior	top 10%			1.
2.	Above average	next 20%			2.
3.	Average	middle 40%			3.
4.	Marginal	next lowest 20%			4.
5.	Inadequate	lowest 10%			5.

7–8

2. **The student's overall academic performance.**

	Rating	Per Cent of Class	Check (✓) Each Column Once: All Other Students	Check (✓) Each Column Once: Other Foreign Students	
1.	Superior	top 10%			1.
2.	Above average	next 20%			2.
3.	Average	middle 40%			3.
4.	Marginal	next lowest 20%			4.
5.	Inadequate	lowest 10%			5.

9–10

3. **The student's degree of mastery of the fundamental knowledge in his field.**

	Rating	Per Cent of Class	Check (✓) Each Column Once: All Other Students	Check (✓) Each Column Once: Other Foreign Students	
1.	Superior	top 10%			1.
2.	Above average	next 20%			2.
3.	Average	middle 40%			3.
4.	Marginal	next lowest 20%			4.
5.	Inadequate	lowest 10%			5.

11–12

4. **The student's knowledge and ability to use the basic research techniques in his field.**

13–14

	Rating	Per Cent of Class	Check (✓) Each Column Once: All Other Students	Check (✓) Each Column Once: Other Foreign Students	
1.	Superior	top 10%			1.
2.	Above average	next 20%			2.
3.	Average	middle 40%			3.
4.	Marginal	next lowest 20%			4.
5.	Inadequate	lowest 10%			5.

5. **The student's ability to express himself in writing.**

15–16

	Rating	Per Cent of Class	Check (✓) Each Column Once: All Other Students	Check (✓) Each Column Once: Other Foreign Students	
1.	Superior	top 10%			1.
2.	Above average	next 20%			2.
3.	Average	middle 40%			3.
4.	Marginal	next lowest 20%			4.
5.	Inadequate	lowest 10%			5.

6. **The student's ability to express himself verbally.**

17–18

	Rating	Per Cent of Class	Check (✓) Each Column Once: All Other Students	Check (✓) Each Column Once: Other Foreign Students	
1.	Superior	top 10%			1.
2.	Above average	next 20%			2.
3.	Average	middle 40%			3.
4.	Marginal	next lowest 20%			4.
5.	Inadequate	lowest 10%			5.

7. **Overall judgment of the student's English language competency.**

19–20

	Rating	Per Cent of Class	Check (✓) Each Column Once: All Other Students	Check (✓) Each Column Once: Other Foreign Students	
1.	Superior	top 10%			1.
2.	Above average	next 20%			2.
3.	Average	middle 40%			3.
4.	Marginal	next lowest 20%			4.
5.	Inadequate	lowest 10%			5.

Student name: Card #:

Card #:

Code	Variable	Score	
7-9	TOEFL		
10-11	Grammar		M.S.U. English test scores for those students who took the test and passed.
12-13	Vocabulary		
14-15	Reading		
16-17	Listening		
18-19	Writing		
20-21	Average		
22-23	Interview		
24-25	Grammar		M.S.U. English test scores for those students who took the test and studied at ELCI
26-27	Vocabulary		
28-29	Reading		
30-31	Listening		
32-33	Writing		
34-35	Average		
36-37	Interview		

Student faked name: #
Student name:
Student number:

#

Variable #	Code	Variable Name	Data	Comment
V 16	38	Sex		
17	39	Marital status		
18	40–41	Age at the time of admission		
19	42–43	Curriculum		
20	44	Degree level		
21	45–47	Country		
22	48–49	Major field		
23	50–52	G.P.A. - First term		
24	53–54	Number of credits completed		
25	55–57	Cumulative G.P.A. - First year		
26	58–59	Number of credits completed		
27	60–62	Cumulative G.P.A. - Second year		
28	63–64	Number of credits completed		
29	65–67	Cumulative G.P.A.		
30	68–70	Number of credits completed		
31	71–73	Index of previous academic achievment		
32	74	Academic status		
33	75	P.A.A.		

MICHIGAN STATE UNIVERSITY

OFFICE OF ADMISSIONS AND SCHOLARSHIPS
(517) 355-8332

EAST LANSING · MICHIGAN · 48824

Dear International Student:

All international applicants without full native fluency in English must fulfill certain requirements as part of admission on either a regular or provisional basis. If admitted provisionally, the deficiency must be corrected within three consecutive terms.

I) REGULAR ADMISSION: Applicants must demonstrate proficiency on one of the following tests: a) Test of English as Foreign Language (TOEFL) (Educational Testing Service, Box 899, Princeton, New Jersey 08549, U.S.A.); an average of 550 or above with no subscore below 52 is needed. The official report must come directly from the Educational Testing Service to the English Language Center, b) Michigan Test of English Language Proficiency (Testing and Certification Division, the English Language Institute, the University of Michigan, Ann Arbor, Michigan 48109, U.S.A.); an average score of 83 or higher with no subscore below 80 is needed. The official report must come directly from the University of Michigan, c) English Language Center (English Language Center, Michigan State University, East Lansing, Michigan 48824, U.S.A.); an average score of 80-85 with no subscore below 78 is needed.

INTERVIEW: Students admitted to the University on a regular basis will be interviewed by the ELC upon arrival.

II) PROVISIONAL ADMISSION: Students with acceptable academic credentials may be admitted on a provisional basis if TOEFL scores are between 450 and 550 or between 60 and 80 and 83 on the Michigan or MSU tests.

Provisional status will continue until minimum competency (see I above) is attained. Provisionally admitted students must take classes at the English Language Center, with restrictions placed on the number of academic courses.

Any communication regarding the English Language Proficiency requirement should be directed to the English Language Center, Michigan State University, East Lansing, Michigan 48824.

Sincerely yours,

Ellis Hammond
Associate Director

REFERENCES

REFERENCES

Ainsworth, L. L. (1957). An exploratory study of the academic achievement of Arab students. Unpublished doctoral dissertation, University of Texas.

Allen, M. J., & Yen, W. M. (1979). Introduction to measurement theory. Monterey, CA: Brooks/Cole Publishing Co.

Allen, W. P. (1965). International students' achievement: English test scores related to first semester grades. In Research in international education. New York: NAFSA and the Institute for International Education.

Anastasi, A. (1982). Psychological testing. 5th ed. New York: Macmillan.

Aseeri, A. (1980). The problems encountered by Arab students with objective tests at Michigan State University. Apprenticeship paper.

Ayers, J. B., & Peters, R. M. (1977). Predictive validity of the Test of English as a Foreign Language for Asian graduate students in engineering, chemistry, or mathematics. Educational and Psychological Measurement, 37, 461-463.

Bartlett, C. J., & O'Leary, B. S. (1969). A differential prediction model to moderate the effect of heterogeneous groups in personnel selection and classification. Personnel Psychology, 22, 1-17.

Bean, A. (1975). The prediction of performance in an educational psychology master's degree program. Educational and Psychological Measurement, 35, 963-967.

Bloom, B. S., & Petus, F. K. (1965). The use of academic prediction scales for counseling and selecting college entrants. Glencoe, IL: The Free Press.

Borg, W. R. (1963). GRE aptitude scores as predictors of GPA for graduate students in education. Educational and Psychological Measurement, 123, 379-382.

Bowen, J. R. (1971). The AACRAO-AID participation, selection and placement study. Washington, D.C.: American Association of Collegiate Registrars and Admission Officers. ED 095 929

Broadus, R. N., & Elmore, K. E. (1983). The comparative validities of undergraduate grade point average and of part score on the Graduate Record Examination in the prediction of two criterion measures in a graduate library school program. Educational and Psychological Measurement, 43, 543-547.

Brogden, H. E. (1946). On the interpretation of the correlation coefficient as a measure of predictive efficiency. Journal of Educational Psychology, 37, 65-76.

Brogden, H. E. (1949a). A new coefficient: Application to biserial correlation and to estimation of selective efficiency. Psychometrica, 14, 169-182.

Brogden, H. E. (1949b). When testing pays off. Personnel Psychology, 2, 171-185.

Bross, I. (1953). Design for decision. New York: Macmillan.

Camp, J., & Clawson, T. (1979). The relationship between the Graduate Record Examination aptitude test and graduate grade point average in a Master of Arts in Counseling program. Educational and Psychological Measurement, 39, 429-431.

Carlson, A. B. (1967). Further results on the validity of prueba de aptitude academica in United States colleges and universities. SR-67-67. Princeton, N.J.: Educational Testing Service.

Cheernoff, H., & Mosea, L. (1959). Elementary decision theory. New York: Wiley.

Cieboter, F. J. (1969). Factors related to the performance of foreign graduate students. Journal of Educational Research, 62, 360-365.

Covert, R. W., & Chansky, N. M. (1975). The moderator effect of undergraduate grade point average on the prediction of success in graduate education. Educational and Psychological Measurement, 35, 947-950.

Cronbach, L. J. (1971). Test validation. In R. L. Thorndike (Ed.), Educational measurement (2nd ed.). Washington, D.C.: American Council on Education.

Cronbach, L. J., & Glaser, G. (1965). Psychological tests and personnel decisions. Urbana: University of Illinois Press.

Dinkel, J., Kochenberger, G., & Plane, D. (1978). Management science text and applications. Homewood, Ill.: Richard D. Irwin.

Dole, A. A., & Baggaley, A. R. (1979). Prediction of performance in a doctoral education program by the Graduate Record Examination and other measures. Educational and Psychological Measurement, 39, 421-427.

Draper, N., & Smith, H. (1981). Applied regression analysis. New York: Wiley.

Elkins, R. A. (1970). The prediction of freshman year academic performance of foreign students from pre-admission data. Unpublished doctoral dissertation, New York University.

Elting, R. A. (1970). The prediction of freshman year academic performance of foreign students from pre-admission data. Unpublished doctoral dissertation, New York University.

Eysenck, S. H. (1965). Fact and fiction in psychology. Baltimore: Penguin Books.

Federici, L., & Schuerger, J. (1974). Prediction of success in applied M.A. psychology program. Educational and Psychological Measurement, 34, 945-952.

Fishman, J. A., & Pasanella, A. K. (1960). College admission selection studies. Review of Educational Research, 30(4), 298-310.

Furst, E. J., & Roelfs, P. J. (1979). Validation of the Graduate Record Examination and the Miller Analogies Test in a doctoral program in education. Educational and Psychological Measurement, 39, 147-151.

Garrett, L. N. (1979). The foreign students in American higher education: A study of the policies and practices of selected host institutions as they relate to English language proficiency and academic advisement. Unpublished doctoral dissertation, The University of Georgia.

Ghiselli, E. E., Campbell, J. P., & Zedeck, S. (1981). Measurement theory for the behavioral sciences. San Francisco: W. H. Freeman & Co.

Green, T. E., & Carroll, G. D. (1978). Analyzing multivariate data. Hinsdale, IL: The Dryden Press.

Gue, L. R., & Holdaway, E. A. (1973). English proficiency tests as predictors of success in graduate studies in education. Language Learning, 23, 89-103.

Hackman, J. R., Wiggins, N., & Bass, A. R. (1970). Prediction of long-term success in doctoral work in psychology. Educational and Psychological Measurement, 30, 365-374.

Hamburg, M. (1970). Statistical analysis for decision. New York: Harcourt, Brace & World, Inc.

Hamlin, E. C. (1972). An analysis of the relationship between the English language proficiency scores of entering foreign graduate students and their academic achievement in an advanced degree program. Unpublished doctoral dissertation, University of Oregon.

Hebert, D. S., & Holms, A. F. (1979). Graduate Record Examination aptitude test scores as a predictor of graduate grade point average. Educational and Psychological Measurement, 39, 415-420.

Hendel, D. D., & Doyel, K. O. (1978). Predicting success for graduate study in business for English-speaking and non-English-speaking students. Educational and Psychological Measurement, 38, 411-414.

Hill, J. R. (1971). Use of measurement in selection and placement. In R. L. Thorndike (Ed.), Educational measurement (2nd ed.). Washington, D.C.: American Council on Education.

Horst, P. (1966). Psychological measurement and prediction. Belmont, CA: Wadsworth.

Hountras, P. T. (1955). Factors associated with the academic achievement of foreign students at the University of Michigan from 1947-1949. Unpublished doctoral dissertation, University of Michigan.

Hountras, P. T. (1957). The relationship between pre-admission data and achievement of foreign graduate students. Journal of Educational Psychology, 48, 157-163.

Howell, J. J. (1968). On the meaning of SAT scores obtained by foreign students of non-English-language background. College and University, 225-232.

Hwang, K., & Dizney, H. (1970). Predictive validity of the Test of English as a Foreign Language for Chinese graduate students at an American university. Educational and Psychological Measurement, 30, 475-477.

Jones, R. A., Kaplan, R., & Michael, W. P. (1964). The predictive validity of a modified battery of tests in language skills for foreign students at an American university. Educational and Psychological Meaurement, 24, 961-965.

Jones, R. A., & Michael, W. D. (1961). The validity of a battery of tests in communication skills for foreign students attending an American university. Educational and Psychological Measurement, 21, 493-496.

Jordan, A. (1922, February). Correlation of four intelligence tests with grades of students and with each other. Psychological Bulletin, 93-94.

Kaiser, J. (1982). The predictive validity of GRE aptitude test. Paper presented at the Annual Meeting of the Rocky Mountain Research Association. ED 226 021

Kendall, M. G., & Buckland, W. R. (1971). A dictionary of statistical terms. New York: Hafner Publishing Co.

Kerlinger, F. N., & Pedhazur, E. J. (1973). Multiple regression in behavioral research. New York: Holt, Rinehart, & Winston.

Krug, R. E. (1966). Some suggested approaches for test development and measurement. Personnel Psychology.

Lannholm, G. V. (1968). Review of studies employing GRE scores in predicting success in graduate study, 1952-1967. Special report. Princeton, N.J.: Educational Testing Service.

Lannholm, G. V. (1972). Summaries of GRE validity studies, 1966-1970. (GRE Rep. 72-1) Princeton, N.J.: Educational Testing Service.

Lavin, D. E. (1965). The prediction of academic performance. New York: Russell Sage Foundation.

Levin, R. (1978). Statistics for management. Englewood Cliffs, N.J.: Prentice-Hall, Inc.

Lincoln, E. (1917). The relative standing of pupils in high school, in early college and college entrance examination. School and Society, 5, 417-420.

Lindquist, E. F. (1963). An evaluation of techniques for scaling high school grades to improve prediction of college success. Educational and Psychological Measurement, 23, 623-646.

Linn, R. L. (1966). Grade adjustments for prediction of academic performance: A review. Journal of Educational Measurement, 3, 313-329.

Lord, F. M., & Novick, M. R. (1968). Statistical theories of mental test scores. Menlo Park, Calif.: Addison-Wesley.

Maberly, N. C. (1963). The validity of the Graduate Record Examination as used with English-speaking foreign students. Educational and Psychological Measurement, 28, 785-788.

Madaus, G. F., & Walsh, J. J. (1965). Departmental differentials in the predictive validity of the Graduate Record Examination aptitude tests. Educational and Psychological Measurement, 4, 1105-1110.

Marascuilo, L. A., & Levin, J. R. (1982). Multivariate statistics in the social sciences. Monterey, CA: Brooks/Cole Publishing Co.

Mayhew, D. C. (1972). The literature of higher education. San Francisco: Jossey-Bass.

Mehrens, W. A., & Lehmann, I. J. (1984). Measurement and evaluation in education and psychology. New York: Holt, Rinehart & Winston.

Moghrabi, K. M. (1966). An analysis of factors that influence the degree of success or failure of foreign students at Texas A & M University. Unpublished doctoral dissertation, Texas A & M University.

Moore, F. G. (1953). Factors affecting the academic success of foreign students in an American university. Unpublished doctoral dissertation, University of Minnesota.

Newman, R. L. (1968). GRE scores as predictors of GPA for psychology graduate students. Educational and Psychological Measurement, 28, 433-436.

Nunnally, J. (1978). Psychometric theory. New York: McGraw-Hill

Omizo, M. M., & Michael, W. R. (1979). The prediction of performance in counselor education master's degree program. Educational and Psychological Measurement, 39, 433-437.

Paolillo, J. P. (1982). The predictive validity of selected admissions variables relative to grade point average earned in a Master of Business Administration program. Educational and Psychological Measurement, 4, 1163-1167.

Paraskevopoulos, J., & Dremuk, R. (1969). Grading patterns for foreign students: A faculty survey. College Students Personnel Abstract, 4, 450.

Paraskevopoulos, J., & Kirstein, L. (1968). The prediction of academic performance of foreign students. Research Memorandum 68.3. Champaign: Office of the University Dean of Admission and Records, University of Illinois.

Pedhazur, E. J. (1983). Multiple regression in behavioral research, explanation and prediction. New York: Holt, Rinehart, & Winston.

Perren, G. (1967). Testing ability in English as a second language: 2. Techniques. English Language Teaching, 21, 22-29.

Putman, I. J. (1953). Admission data and the academic performance of foreign graduate students at Columbia University. Unpublished doctoral dissertation, Columbia University.

Putman, I. J. (1961). The academic performance of foreign students. Annals of the American Academy of Political and Social Science, 42-53.

Quann, G. J. & Associates. (1979). Admission, academic record and registrar services: A handbook of policies and procedures. San Francisco, Calif.: Jossey-Bass.

Riggs, J. M. (1981). Cloze testing procedures in ESL: A prediction of academic success of foreign students and comparison with TOFEL scores. Unpublished doctoral dissertation, Indiana University.

Roscoe, J. T., & Houston, S. R. (1969). The predictive validity of GRE scores for a doctoral program in education. Educational and Psy-Psychological Measurement, 29, 507-509.

Rose, C., & Trent, J. W. (1973). Teaching environment. In R. M. W. Travers (Ed.), Second handbook on research on teaching. Chicago: Rand McNally.

Saunders, D. R. (1956). Moderator variables in prediction. Educational and Psychological Measurement, 16, 209-222.

Schmidt, F. L., & Hunter, J. E. (1980). The future of criterion-related validity. Personnel Psychology, 33, 41-60.

Schmidt, F., Hunter, J. E., McKenzie, R. C., & Maldrow, T. W. (1979). Impact of valid selection procedures on work force productivity. Journal of Applied Psychology, 64, 262-274.

Segel, D. (1934). Prediction of success in college. Bulletin No. 15. U.S. Office of Education. Washington, D.C.: U.S. Government Printing Office.

Sharon, A. T. (1972). English proficiency, verbal aptitude, and foreign students' success in American schools. Educational and Psychological Measurement, 32, 425-431.

Sleeper, M. L. (1961). Relationship of scores on the Graduate Record Examination to grade point average of graduate students in occupational therapy. Educational and Psychological Measurement, 21, 1039-1040.

Smith, Conrad L. (1981). Selected predictors of academic achievement of college freshmen with lower range admission test scores. Unpublished doctoral dissertation, The University of Alabama.

Sokari, H. (1966). Predictors of college success among foreign students from various ethnocultural backgrounds. Unpublished doctoral dissertation, University of San Francisco.

Stilson, D. W. (1966). Probability and statistics in psychological research and theory. San Francisco: Holden-Day.

Stordahl, K. E. (1967). Predicting grades in a master's degree program. Journal of Educational Measurement, 4, 119-122.

Striker, G., & Huber, J. T. (1967). The Graduate Record Examination and undergraduate grades as predictors of success in graduate school. Journal of Educational Research, 60, 466-468.

Stuit, D. D., & Peterson, S. C. (1951). The prediction of scholastic success in the graduate college of the State of Iowa college and university.

Taylor, C. W. (1950). Maximizing predictive efficiency for a fixed total testing time. Psychometrika, 15, 391-406.

Taylor, H. C., & Russel, J. T. (1939). The relationship of validity coefficient to the practical effectiveness of tests in selection. Journal of Applied Psychology, 23, 565-578.

Telleen, J. G. (1971). A predictive model of the academic achievement of graduate students from India. Unpublished doctoral disserta-ration, The University of Michigan.

Thacker, A. J., & Williams, R. E. (1974). The relationship of the Graduate Record Examination to grade point average. Educational and Psychological Measurement, 34, 939-944.

Thomas, B. C., & Marguerite, M. M. (1968). English aural comprehension test scores as a predictor of academic success among foreign students. Educational and Psychological Measurement, 28, 1229-1231.

Tucker, L. R. (1963). Formal models for central prediction system. Psychometric Monograph No. 10. Richmond, Va.: Wm. Byrd Press,

Upshr, J. A. (1967). English-language tests and prediction of academic success. In D. C. Wigglesworth (Ed.), Selected conference papers of ATESL (NAFSA). Loss Altos, Calif.: Language Research Association Press.

Wilcox, L. (1973). A plan for institutional/national foreign students' admission research. College and University, 48, 623-630.

Wilcox, L. O. (1974). The prediction of academic success of undergraduate foreign students. Unpublished doctoral dissertation, University of Minnesota.

Williams, J. D., Harlow, S. D., & Gab, D. (1970). A longitudinal study examining prediction of doctoral success, grade point average as criterion or graduation vs. non-graduation as criterion. Journal of Educational Research, 64, 161-164.