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PREDICTING THE ACADEMIC ACHIEVEMENT
OF EAST-WEST CENTER GRANTEES

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CHAPTER I

INTRODUCTION

The purpose of the present study was to initially compare foreign and domestic graduate students at the East-West Center with respect to their academic achievement and in terms of factors related to achievement and secondly to examine the value of these factors in terms of the prediction of their achievement.

Every year more and more students (both foreign and domestic) are seeking higher education in the United States. Although research on graduate achievement has been voluminous, hardly any studies have been able to identify factors which are highly related to achievement. Tests typically used in the prediction of graduate success have been statistically significant as predictors, yet none of them has been shown to have high practical value. More research is clearly called for, especially with regard to foreign students, to identify new variables associated with graduate success and to further determine the validity of variables already used in prediction.

The East-West Center was established by the U. S. Congress in 1960 to promote cultural interchange between American and peoples of other cultures. Students at this institution come from more than 30 countries of Asia, the Pacific and the United States. There are currently about 600 grantees at the Center. Two thirds of them are foreign and the rest are American. The grantees are predominantly graduate students working for advanced degrees at the University of Hawaii.

Admittance to the Center is determined by applicants' undergraduate records, recommendations from undergraduate institutions and Graduate

Record Examination results. Leadership potential of applicants and national needs of participating countries are also considered in the selection of grantees.

Although the primary goal of the Center is cultural interchange, considerable emphasis is placed on grantees' academic achievement. A main concern of the admissions office has been the selection of applicants who are most likely to achieve academic success at the University of Hawaii. However, little information had been made available with regard to the prediction of grantees' achievement. There was therefore clearly a need for research to provide more information in this respect for the administration. The present study was an effort to fulfill such a need. It attempted to examine grantees' academic success and ascertain the value of some factors as predictor variables of academic success.

CHAPTER II

REVIEW OF LITERATURE

A considerable amount of research involving foreign students in the United States has been reported in the literature. Some of these studies were concerned with foreign students' academic achievement. Others dealt with their attitudes, interests and adjustment problems.

Houtras (1956) investigated the incidence of academic probation among foreign graduate students at the University of Michigan. In a sample of 587 foreign students, 257, or about 44 per cent were found to have been on probation at some time. A comparison was made of probationary and non-probationary foreign students with respect to the educational level of the degree earned. The chi-square test was used to determine the significance of the relationship between degree earned and probationary status. A significant chi-square was found which indicated that the incidence of probation was proportionately higher among the "no degree" students and proportionately lower for the "master's" and "doctor's".

In a follow-up study, Houtras (1957) found evidence to confirm the common notion that country of origin and field of study are important factors associated with academic success of foreign students. Proportionately more students from the Near East, Latin America, and the Far East were found to have incurred one or more warnings than did students from other areas. A proportionately greater number of students in the social and physical sciences experienced academic failure whereas a proportionately smaller number of students in the humanities had similar academic difficulties. The author suggested that the high incidence

of probation in the social sciences might be due to the preponderance of verbal content in these fields which placed foreign students with a language handicap at a disadvantage. The failure of students in the physical sciences was attributed to inadequate undergraduate training offered by some foreign institutions.

Again using the same sample of foreign students, Hountras (1957) made a study to determine the relationship between some pre-admission factors and academic achievement of foreign students. The pre-admission data were: sex, age upon admission, marital status, type of admission, degree held at admission and admission with or without financial aid. A series of chi-square analyses were performed on the data and evidence was obtained to support the following conclusions:

(1) There was no significant relationship between sex and achievement.

(2) There was no significant relationship between entering age and achievement.

(3) There was a significant relationship between marital status and achievement. Single students were more likely to incur one or more disciplinary actions.

(4) There was a significant relationship between the type of admission and achievement. Students who received provisional admission were more likely to incur probation than the "regular" students.

(5) There was a significant relationship between the degree held at admission and achievement. Foreign students who entered with bachelors degrees were more likely to receive disciplinary action than those who entered with advanced degrees.

(6) Students who were admitted with financial aid (scholarship, fellowship) were less likely to receive probation than those admitted without such aid.

Putman (1961) reported that only two admission criteria were of practical value for the prediction of academic success of foreign students. The first was grades in previous academic work. It was found that when the marks earned in foreign institutions were converted to American terms by a series of conversion scales devised for the purpose, the average of these converted marks correlated significantly with American grade averages. The second factor found to correlate significantly with achievement was English test scores. These findings were based on the author's investigation of 546 foreign graduate students at Columbia University.

The English Language Committee at the Waldenwoods Seminar (1961) summarized a series of unpublished studies which attempted to determine the relationship between English proficiency and academic achievement of foreign students. The committee reported that all these studies showed a high positive correlation between high scores on objective English language tests and satisfactory or better grade averages. They also showed that low language test scores correlated highly with academic failure.

Jones and Michael (1961) evaluated the predictive validity of several aptitude and achievement tests in the prediction of success of foreign students in a language course. The sample consisted of 48 students whose native language was not English. A composite of grades given by five instructors was used as the criterion. Intercorrelations

among predictors and the correlations of each one with the criterion variable were found to be around .50. The multiple correlation coefficient was computed to be .77 which is significant beyond the .01 level. The authors concluded that a diversification of measures was desirable in predicting achievement in English courses for foreign students.

Catlin (1962) made a comparison of the achievement of foreign and non-foreign college students with a sample of 37 men and 16 women in each group. Results showed that there was no difference in the mean overall performance of the two groups for their first five terms of undergraduate study. There was, however, a wider dispersion of the scholastic indices in the non-foreign group. The foreign group was found to be more homogeneous.

Maberly (1963) conducted an investigation to determine the validity of the Graduate Record Examination for the evaluation of the academic potential of English-speaking foreign graduate students. The predictor variables included the GRE Aptitude and Area Test scores. The 252 students in the sample were selected to represent as nearly as possible the characteristics of English speaking foreign students with respect to language and cultural backgrounds, geographic origins, curricular choices, types of colleges attended, sex, and period of college attendance. Correlations between grade-point average and the predictor variables were low. The highest of these correlations was .23 which is significant at the .01 level. The discriminant function data showed that the biserial coefficients computed from the proportion of students correctly classified into upper and lower 27 per cent levels on the grade-

point average distribution were also low.

Chunn and Dole (1963) made a comparative study of East-West Center grantees and University of Hawaii students relative to their values, interests, influences and reasons for seeking higher education. The study was based on 32 grantees and the 1960 University of Hawaii freshmen and seniors. Dole's modification of Iffert's Reasons for Going to College was used for the study. The opinionnaire was originally constructed to investigate the retention and withdrawal of American college students. Results of the study led the authors to conclude that the East-West Center grantees seemed to be more mature, more dedicated to education but less driven by success and security, less materialistic and degree bound than University of Hawaii students.

In a similar study, Milstein, Chunn and Dole (1963) administered the same inventory to 262 foreign and domestic graduate students. Results of the study indicated that the American graduate students and their foreign counterparts had highly similar reasons, values, influences and interests as determining their decision to seek higher education. The close similarity between the two groups was attributed to the common maturity factor, acquiescence effect, or psycholinguistic artifact.

With a sample of 80 foreign students, Jones, Kaplan and Michael (1964) investigated the predictive validity of a battery of aptitude and achievement tests. The criterion measures for the study were: (a) a composite rating by a committee of 12 members of each student's transcript of achievement and (b) the grade-point average. Results showed that the intercorrelations among the predictor variables were from moderate to high which indicated that the various tests were tapping

many of the same kinds of abilities. Multiple correlations between the predictor variables and the first and second criterion variables were found to be .38 and .32 respectively. Although the correlations were significant, the degree of relationship was not considered high.

Tatham (1964) examined the predictive accuracy of the Scholastic Aptitude Test and the Culture-Fair Intelligence Test for a group of foreign undergraduate students at the University of Hawaii. The sample consisted of 41 foreign students and two groups (of 37 each) of American freshmen. Using the two tests as predictors and grade averages as the criterion, the author computed a multiple correlation of .57 for the foreign sample, which is significant at the .05 level. With the same variables, a non-significant multiple correlation of .28 was computed for the American sample. The difference between the two correlation coefficients was found to be significant. The Culture-Fair Intelligence Test alone also showed significantly greater predictive accuracy for foreign subjects than for their American counterparts.

A comparative study was made by Disney and Roskens (1964) to investigate factors related to the general problems of college achievement, English aptitude, and language proficiency of foreign and domestic students. The foreign sample consisted of 27 students from non-English speaking countries. The domestic group comprised 54 students. The American College Test, a battery designed to predict college success by the assessment of past achievement, was used as a measure of aptitude and proficiency for English and mathematics. Results indicated that foreign students possessed less aptitude for English than domestic students, but were as adept on measures of mathematical aptitude. They

displayed significantly greater aptitude for mathematics than for English. It was found that English and mathematics aptitude scores appeared to be equally valid for the prediction of English and mathematics achievement of both foreign and domestic students. However, judging from the English aptitude data, the investigators noted that the same prediction equation would probably not be valid for both samples. For the foreign sample a combination of the mathematics and English scores did not result in any significant improvement in the prediction of total grade-point average. For domestic students, such a combination did significantly improve the relationship.

Dizney (1965) made a comparison of TOEFL and the Michigan Test of English Language Proficiency with respect to their validity for the prediction of foreign students' English proficiency. The sample consisted of 20 foreign students who were given the American College Testing Program English Subtest as well as TOEFL and the Michigan test. Each student was also rated on English proficiency by the foreign student advisor. A high degree of congruence was found between TOEFL and the Michigan test ($r = .97$). Results also showed that TOEFL accounted for almost 13 per cent more ACT-English variance than did the Michigan test. The difference between TOEFL and the Michigan test in terms of agreement with the foreign student advisor's rating was negligible.

Halasz (1967) started a series of comparative studies of the entrance qualifications and academic performance of foreign graduate students. The first of these studies was based on students from India, Japan, the Philippines and Taiwan. However, as the author stated quite clearly, these studies were being carried out mainly for the purpose of meeting

institutional needs.

Abundant research has been done on the achievement of American graduate students. Most studies of the past decade have employed achievement and aptitude tests as predictors of success in graduate schools.

Michael, Jones and McGlothlin (1960) investigated the value of the Graduate Survey Examination score as a predictor of graduate success. With a sample of 39 graduate chemistry students they computed validity coefficients around .50.

One of the most popular tests used in the prediction of graduate achievement is the Miller Analogies Test. Ainsworth and Fox (1966) made an investigation to determine the usefulness of MAT for the prediction of grade-point ratios in graduate education courses. For their sample of 1,413 students, significant relationships (around .30) were found for MAT scores with total grade-point ratios and achievement in basic required courses and other advanced education courses.

In another study involving education students, Payne and Tuttle (1966) compared the validity of MAT relative to the criteria of grades and comprehensive examination scores. Their sample consisted of 115 male and 104 female students. The median grade in the total Master's program was used as the grade criterion. The investigators found correlations of .26 between MAT and grades and .51 between MAT and comprehensive examination scores. These relationships were interpreted as justifying the continued use of MAT for purposes of prediction.

Stordahl (1967) examined the validity of MAT as a predictor of course grades of students working for the Master of Arts degree. For

the 534 students in the sample a validity coefficient of .32 was computed for MAT. When the MAT score was combined with undergraduate grade-point average the multiple correlation with grade-point average was .45.

Also using the MAT score and undergraduate grade-point average as predictors, Jansen and Johnston (1967) found a multiple correlation of .50 with graduate grade-point average for their sample of 233 master's degree recipients. A correlation of .36 was computed between MAT scores and graduate grade-point averages. The latter correlation, although significant at the .01 level, accounted for only 13 per cent of the variance in achievement.

Another test commonly used in the prediction of graduate achievement is the Graduate Record Examination. Capps and Decosta (1957) investigated the relationships between scores on three GRE tests and the academic success of some 410 graduate students. The GRE tests were the Profile Test, the Advanced Education Test and the Aptitude Test. Correlations ranging from .29 to .49 were found between graduate school success and the three tests. The Advanced Education Test was the best single predictor.

Michael, Jones and Gibbons (1960) studied the relationships between scores on the quantitative and verbal sections of GRE and criterion measures furnished by the Background Examination in Chemistry. For the 41 students in the sample, the restriction of GRE scores was substantial compared with the national norms. When 100 was taken as an estimate of the standard deviation of an uncurtailed group significant validities of .55 and .42 were obtained for GRE(Q) and GRE(V) respectively.

Law (1960) made use of the GRE aptitude and area test scores to predict the performance of doctoral candidates on a series of examinations which partially determined admittance to the doctoral training program. The criterion measures were ratings on the total comprehensive examination, scores on Administration, Curriculum, Educational Psychology and Guidance, and History and Philosophy tests. For a sample of 46 doctoral candidates, a multiple correlation of .76 was computed between the GRE scores and a total comprehensive score.

Another study involving candidates for the Ph. D was conducted by King and Besco (1960). They were interested in evaluating the degree to which performance on the Graduate Record Examination Aptitude Test could be used to predict in-school success of 119 Purdue Research Foundation Fellows. Faculty ratings of the over-all performance of individual students were used as the main criterion of success. Results of the study showed a slight but significant relationship between verbal scores on the GRE and success as a Research Fellow as measured by faculty ratings. It was pointed out that in terms of administrative action the establishment of a minimum performance score for the GRE verbal section would tend to eliminate an appreciable percentage of low performing Fellows.

The superiority of the GRE verbal score over the quantitative score in predicting graduate success was also demonstrated in the investigation of Robertson and Nielsen (1961). With a sample of 50 students, they found that the correlation between academic ratings and the quantitative score was .20 which is not significant at the .05 level. The correlation between ratings and the verbal score was .27 which approaches the .05

level of significance. A combination of the mean GRE score and undergraduate grade-point average in math-science correlated best with the criterion. The investigators concluded that the correlation between the mean GRE score and academic ratings was statistically significant though predictively weak from a practical standpoint.

Borg (1963) did a study to ascertain the predictive validity of the GRE verbal and quantitative scores relative to grade-point averages of graduate students in education. The sample consisted of 175 master's degree candidates in elementary education, secondary education, and educational administration. Validity coefficients of .36 and .37 were obtained for GRE verbal and quantitative scores respectively. These predictive validities were considered low and it was concluded that GRE, when used alone, was of little value as a predictor of success of graduate students in education.

Using a sample of 46 recipients of the M. A. in Clinical Studies and another 46 in Education, Alexakos (1968) found that the GRE verbal score and undergraduate grade-point average were significant predictors of the graduate grade-point averages of these students. For the Clinical Studies sample GRE(V) and undergraduate GPA correlated .35 and .32 respectively with the criterion. The correlations obtained for the Education sample were .23 and .26 respectively. The variance of the graduate GPAs computed for the total sample was very small and the investigator noted that the low validity coefficients obtained in the study might be due to this factor rather than the predictors. The non-significant results in the Education sample were also attributed to the very small variability of the graduate grades. It was stated that with a larger variation in the criterion variable the predictive validity of the

GRE verbal score would probably be enhanced. The investigator also suggested that a minimum GRE verbal score of 400 be required for admission to the division of Clinical Studies.

Newman (1968) conducted a study to ascertain the predictive validity of the Aptitude and Psychology portions of GRE for 66 graduate students in psychology. Grade-point averages were used as the criterion of success. Results showed that the GRE quantitative score was the only predictor variable to correlate significantly (.21) with the criterion. The author concluded that, taken alone, the GRE Aptitude and Psychology measures were of little practical value in terms of prediction for the sample. Although the quantitative portion of GRE correlated significantly with graduate grade-point average, it accounted for only 4.45 per cent of the variance in the criterion and was therefore of little predictive value.

In summary, the review of literature shows that in most of the studies concerning foreign students, tests of aptitude and achievement were used as predictors of achievement. Few of these tests were shown to have high value in terms of prediction. Typically, validity coefficients of around .30 were obtained. Although many of the coefficients were significant, seldom did they demonstrate a high relationship between predictors and the criterion. A relatively consistent finding in the studies was the importance of English proficiency. High correlations between English language test scores and academic success were reported in many of the investigations.

The two most popular tests used in the prediction of graduate achievement of foreign and domestic students were the Miller Analogies

Test and the Graduate Record Examination. In the majority of the studies, the two tests were shown to have significant predictive value. However, the validity coefficients were rarely higher than .50. In most cases the practical value of the tests was considered low.

CHAPTER III

METHOD

Procedures of the investigation included the analysis of variance, regression analysis and discriminant analysis. These procedures were to (1) compare foreign and domestic subjects with regard to their achievement and in terms of factors related to achievement; (2) identify effective predictor variables of graduate success; (3) evaluate the predictive validity of these variables separately for foreign and domestic subjects; and (4) examine the significance of group separation between subjects who completed the program at the Center and those who withdrew before completion. In the present study graduate grade-point average was used as the measure of academic success.

The specific hypotheses tested in the study were (1) there is a difference in the achievement of foreign and domestic subjects which favors the American grantees; (2) there is a difference between foreign and domestic subjects with respect to their GRE verbal scores which favors the American grantees; (3) there is a difference between foreign and domestic subjects with respect to their GRE quantitative scores which favors the American grantees; (4) there is a difference between foreign and domestic groups with respect to the predictive validity of the GRE verbal score which favors the domestic group; (5) there is a difference between foreign and domestic groups with respect to the predictive validity of the GRE quantitative score which favors the foreign group; (6) there is a difference between the retention and withdrawal groups in the foreign sample; and (7) there is a difference between the retention and withdrawal groups in the domestic sample.

The sample consisted of 342 graduate students who were enrolled at the East-West Center from 1963 to 1965. Of this total, 279 were foreign and 63 were domestic students. The subjects represented 20 countries and majored in 48 different fields of study. There were 238 male and 104 female grantees. Their average age was 27. A list of countries and number of grantees involved in the study is presented in Appendix A. Fields of study and number of students are tabulated in Appendix B.

The variables used in the study were: age, sex, marital status, nationality, field of study, ELI, grade-point average, language proficiency (other than English), GRE verbal score, GRE quantitative score, religion, work experience, father's occupation, and completion of graduate program. They were defined as follows:

Age. Age was the number of years a grantee said he was immediately prior to his arrival at the Center.

Sex. Sex was defined as male and female as indicated in the application to the Center.

Marital status. Marital status was defined as single or married as indicated in the application.

Nationality. Nationality was defined as the country or territory from which a grantee came rather than his ethnic origin. The countries and territories were grouped into two broad categories: (a) Asia and the Pacific; (b) United States.

Field of study. This was defined as a grantee's major area of academic pursuit. The majors were grouped as follows: (a) language study; (b) social and physical sciences.

ELI. This was the number of courses a grantee was required to take at

the English Language Institute of the University of Hawaii to improve his command of English.

Grade-point average. This was calculated on the basis of grade points obtained in all courses except ELI over an average period of two academic years. The majority of these courses were in a grantee's major field of study. Grades earned at mainland institutions were also included in the computation.

Language proficiency. This was the number of languages (other than English) a grantee said he knew.

GRE. The Graduate Record Examination Aptitude Test is similar in format to the Scholastic Aptitude Test but attempts to measure a higher level of ability. The verbal section consists of verbal reasoning and reading comprehension items. The quantitative section includes computation, reasoning, and data interpretation. Both verbal and quantitative scores were reported (Buros, 1965) to have reliabilities of around .90. Harvey (1968) reported predictive validities in the range of .16 and .42. All grantees in the sample were required to take the Aptitude Test. The verbal and quantitative scores used in the study were those reported by the testing authorities.

Religion. Religion was defined as that group or sect to which a grantee ascribed himself and which he had placed on the application. Religions were grouped into two broad categories: (a) Christianity; (b) others.

Work experience. This was defined as any experience which a grantee had in pursuing a vocation by which he earned his income prior to his coming to the Center.

Father's occupation. This was defined as the major vocation which a

grantee's father pursued and by which he earned his income. The major categorization breakdown was as follows: (a) professional; (b) skilled; (c) semi-skilled; (d) unskilled.

Completion of program. This was defined as a grantee fulfilling all the requirements and earning his degree from the University of Hawaii.

All the variables were available from the student records kept by the East-West Center administration. Data were obtained from grantees' applications, academic reports issued by both the University of Hawaii and mainland institutions, and reports of GRE scores. In all, data on 342 grantees were collected. Out of this total, 74 did not provide relevant information on father's occupation.

The first concern of the study was to compare foreign and domestic grantees with respect to their achievement and in terms of factors related to achievement. For this reason, the initial step of the statistical treatment of data consisted of analyses of variance which were conducted to test the following hypotheses:

(1) There is a difference in the achievement of foreign and domestic subjects which favors the American grantees.

(2) There is a difference between foreign and domestic subjects with respect to their GRE verbal scores which favors the American grantees.

(3) There is a difference between foreign and domestic subjects with respect to their GRE quantitative scores which favors the American grantees.

For the purpose of identifying effective predictor variables of grantees' achievement, step-wise multiple regression analyses were

performed to determine the validity of the various factors in the prediction of achievement. This was done separately for foreign and domestic subjects. The separation was made on an a priori basis that foreign and domestic grantees were different in terms of the predictor variables.

A closer examination of the GRE verbal and quantitative scores was made to determine their predictive value for foreign and domestic subjects. This was done by using the verbal and quantitative scores separately as a single predictor of achievement of foreign and domestic subjects. The examination was to test the following hypotheses:

(1) There is a difference between foreign and domestic groups with respect to the predictive validity of the GRE verbal score which favors the domestic group.

(2) There is a difference between foreign and domestic groups with respect to the predictive validity of the GRE quantitative score which favors the foreign group.

With regard to "father's occupation" it was found in the initial analyses that its predictive value was negligible. The variable was therefore excluded in subsequent analyses.

In addition to the analyses of variance and regression analyses, subjects who did not complete their program at the Center were separated from those who did. Discriminant analyses were carried out to test the significance of group separation. This was also done separately for foreign and domestic subjects. The specific hypotheses tested by the discriminant analyses were as follows:

(1) There is a difference between the retention and withdrawal

groups in the foreign sample.

(2) There is a difference between the retention and withdrawal groups in the domestic sample.

CHAPTER IV

RESULTS

A perusal of the data collected for the study revealed that 71 per cent of the foreign subjects and 60 per cent of the domestic subjects were males. The average foreign grantee in the sample was 27 years old and the average domestic grantee was about three years younger. About 28 per cent of the foreign grantees and 21 per cent of the domestic grantees were married. The majority of the subjects (75 per cent of the foreign group and 87 per cent of the domestic group) were in physical or social sciences. The others were in language study. The average foreign subject had to take one ELI course to improve his command of English. As a group, foreign subjects' knowledge of foreign languages (other than English) was slightly better than that of domestic subjects. Both foreign and domestic subjects knew one to two languages besides English. The data also showed that 46 per cent of the foreign subjects and 62 per cent of the domestic subjects were Christians. Most of the grantees (86 per cent of the foreign group and 92 per cent of the domestic group) had had some work experience before they came to the East-West Center.

The analyses of variance were conducted to compare the foreign and domestic groups with respect to their academic success and on their GRE scores. Mean GPAs of 3.23 and 3.39 were computed for foreign and domestic subjects respectively as measures of achievement. An F-test showed that the difference was significant at the .01 level. With regard to GRE scores, the foreign group had a mean of 337.98 for the verbal section and 450.48 for the quantitative section. The means of

the domestic group were 593.17 for the verbal section and 514.13 for the quantitative section. Results of the analyses of variance showed that the two groups differed significantly ($p < .01$) with respect to both verbal and quantitative scores.

Thus, evidence was obtained from the analyses of the difference between means to support the following hypotheses:

(1) There is a difference in the achievement of foreign and domestic subjects which favors the American grantees.

(2) There is a difference between foreign and domestic subjects with respect to their GRE verbal scores which favors the American grantees.

(3) There is a difference between foreign and domestic subjects with respect to their GRE Quantitative scores which favors the American grantees.

Means and standard deviations of variables are tabulated in Table I. A summary of the results of analyses of variance is presented in Table II.

In the regression analyses, intercorrelations among variables were computed for the foreign and domestic groups. For the foreign group, the correlation coefficients indicated a tendency for younger and single subjects to do graduate work in the physical and social sciences rather than pursue a course in language study. The data also showed that older subjects needed more preparation in English than younger subjects before they could pursue their graduate work. Subjects in language study achieved higher than those in physical and social sciences. Those who needed more ELI courses had lower achievement than those who needed

fewer or no ELI courses. Female and younger subjects had higher GRE(V) scores than male and older subjects. Subjects with low GRE(V) scores needed more ELI courses to improve their language skill. Subjects who knew more languages scored higher on GRE(V). Male subjects and those in physical and social sciences had higher GRE(Q) scores. There was a significant but low (.15, $p < .05$) correlation between GRE(V) and GRE(Q). Christian subjects possessed better English language skill and had higher GRE(V) but lower GRE(Q) scores than non-Christian subjects.

TABLE I
Means and Standard Deviations of Variables
for Foreign and Domestic Groups

<u>Foreign Group (N = 279)</u>		
Variable	Mean	Standard Deviation
Sex	.71	.45
Age	27.01	4.70
Marital status	.28	.45
Field	.75	.43
ELI	1.04	1.15
GPA	3.23	.45
Language proficiency	1.97	.87
GRE(V)	337.98	89.68
GRE(Q)	450.48	106.33
Religion	1.40	.49
Work experience	.86	.35

<u>Domestic Group (N = 63)</u>		
Variable	Mean	Standard Deviation
Sex	.60	.49
Age	24.44	4.63
Marital status	.21	.41
Field	.87	.34
GPA	3.39	.35
Language proficiency	1.30	.78
GRE(V)	593.17	86.52

TABLE I (Continued)
Means and Standard Deviations of Variables
for Foreign and Domestic Groups

Variable	<u>Domestic Group (N = 63)</u>	
	Mean	Standard Deviation
GRE(Q)	514.13	105.73
Religion	1.87	.34
Work experience	.92	.27

TABLE II

Foreign-Domestic Group by GPA and GRE
Scores Analyses of Variance (N = 342)

<u>GPA</u>				
Source	SS	df	MS	F
Between Groups	1.30	1	1.30	7.02**
Within Groups	<u>63.05</u>	<u>340</u>	.19	
Total	<u>64.35</u>	<u>341</u>		

<u>GRE(V)</u>				
Source	SS	df	MS	F
Between Groups	3347008.00	1	3347008.00	421.44**
Within Groups	<u>2700203.00</u>	<u>340</u>	7941.77	
Total	<u>6047211.00</u>	<u>341</u>		

<u>GRE(O)</u>				
Source	SS	df	MS	F
Between Groups	208176.44	1	208176.44	18.45**
Within Groups	<u>3836405.00</u>	<u>340</u>	11283.54	
Total	<u>4044581.44</u>	<u>341</u>		

** Significant at the .01 level

For the domestic group, the data also showed that there was a tendency for younger subjects to do graduate work in the physical and social sciences rather than to take up language study. Male subjects had higher GRE(Q) scores than female subjects. There was a high correlation (.61, $p < .01$) between GRE(V) and GRE(Q). Christian subjects scored lower on both GRE(V) and GRE(Q) than non-Christian subjects. Intercorrelation matrices for foreign and domestic groups are presented in Tables III and IV.

TABLE III
 Intercorrelation Matrix of Variables for Foreign Group
 (N = 279)

Variables	2	3	4	5	6
1. Sex	.195**	.324**	.004	.098	.010
2. Age		.594**	-.237**	.195**	.036
3. Marital status			-.309**	.055	.099
4. Field of study				.063	-.146*
5. ELI					-.233**
6. GPA					

(Continued)

Variables	7	8	9	10	11
1. Sex	.061	-.194**	.262**	-.327**	.047
2. Age	.026	-.191**	-.038	-.118	.382**
3. Marital status	.094	-.096	.029	-.098	.218**
4. Field of study	-.086	.070	.165**	.093	-.103
5. ELI	.026	-.515**	-.048	-.131*	.146*
6. GPA	-.028	.254**	.243**	-.033	-.100
7. Language proficiency		.132*	.085	.086	.022
8. GRE(V)			.152*	.270**	-.110
9. GRE(Q)				-.171**	-.081
10. Religion					.002
11. Work experience					

* p < .05

** p < .01

TABLE IV
 Intercorrelation Matrix of Variables for Domestic Group
 (N = 63)

Variables	2	3	4	5	6
1. Sex	-.013	.253*	.080	-.100	-.146
2. Age		.292*	-.575**	.118	-.029
3. Marital status			-.159	-.152	-.098
4. Field of study				-.217	.150
5. GPA					-.008
6. Language proficiency					

(Continued)

Variables	7	8	9	10
1. Sex	.215	.307*	.178	.122
2. Age	-.188	-.238	-.108	.156
3. Marital status	-.028	-.057	-.041	.005
4. Field of study	.109	.079	.141	-.112
5. GPA	.446**	.153	-.239	.012
6. Language proficiency	-.019	.000	-.098	.191
7. GRE (V)		.611**	-.291*	-.071
8. GRE (Q)			-.308*	-.156
9. Religion				.064
10. Work experience				

* $p < .05$

** $p < .01$

The main purpose of the step-wise regression analyses was to identify effective variables for the prediction of grantees' achievement. This was done separately for the foreign and domestic groups. For all regression analyses graduate grade-point average was used as the criterion measure.

In the analysis for the foreign group a total of 10 variables were included in the regression equations. Out of this total five were found to be significant predictors. They were (in order of significance) GRE(V), GRE(Q), field of study, ELI, and language proficiency. GRE(V), the best single predictor, correlated .25 with the criterion. The correlation is significant at the .01 level. When GRE(V) was combined with the other four variables, a multiple correlation of .41 ($p < .01$) was obtained. This accounted for about 17 per cent of the variance in the criterion. A regression equation including the five significant predictors was written as follows:

$$Y = .00092X_1 + .00105X_2 - .20694X_3 - .04318X_4 \\ - .04498X_5 + 2.73992$$

where Y represents the criterion and X_1 to X_5 stand for GRE(V), GRE(Q), field of study, ELI and language proficiency respectively. The standard error of estimate for the equation was .41.

The non-significant predictors for the foreign group were marital status, work experience, age, sex and religion. Together, they accounted for less than two per cent of the variance in the criterion. When they were combined with the significant predictors, a multiple correlation of .42 ($p < .01$) was obtained, explaining about 18 per cent of the variance in the criterion.

For the domestic group, three significant predictors were identified out of a total of eight predictors. They were (in order of significance) GRE(V), field of study and sex. GRE(V), the best single predictor, correlated .45 ($p < .01$) with the criterion. It accounted for almost 20 per cent of the criterion variance. A combination of GRE(V), field of study and sex correlated .55 ($p < .01$) with the criterion, accounting for about 30 per cent of the variance. A regression equation using these three variables was written as follows:

$$Y = .00208X_1 - .26868X_2 - .13483X_3 + 2.47372$$

where Y is the criterion and X_1 to X_3 represent GRE(V), field of study and sex respectively. The standard error of estimate for the equation was .30.

The non-significant predictors for the domestic group were marital status, GRE(Q), age, religion and work experience. When they were combined with the significant predictors, a multiple correlation of .59 ($p < .01$) was computed. This explained slightly more than one-third of the criterion variance.

In summary, all the multiple correlations obtained in the regression analyses were significant at the .01 level. Among the significant predictors, GRE(V) and field of study showed relatively high validity for both foreign and domestic groups. A summary of the multiple correlations is presented in Table V. Regression equations with correlation coefficients and standard errors of estimate are presented in Table VI.

TABLE V
Multiple Correlations Between Predictor Variables
and GPA for Foreign and Domestic Groups

Variable Entered	Foreign Group (N = 279)		Increase in		F Value to Enter
	R	Multiple RSQ	RSQ	RSQ	
1. GRE(V)	.2539**	.0644	.0644		19.0803**
2. GRE(Q)	.3274**	.1072	.0428		13.2214**
3. Field	.3829**	.1466	.0394		12.7050**
4. ELI	.3970**	.1576	.0110		3.5764**
5. Language proficiency	.4062**	.1650	.0074		2.4053*
6. Marital status	.4114**	.1692	.0042		1.3896
7. Work experience	.4186**	.1752	.0060		1.9645
8. Age	.4220**	.1781	.0029		.9554
9. Sex	.4228**	.1788	.0007		.2220
10. Religion	.4239**	.1797	.0009		.2895

Variable Entered	Domestic Group (N = 63)		Increase in		F Value to Enter
	R	Multiple RSQ	RSQ	RSQ	
1. GRE(V)	.4458**	.1987	.1987		15.1295**
2. Field	.5195**	.2699	.0712		5.8499**
3. Sex	.5515**	.3042	.0342		2.9033*
4. Marital status	.5684**	.3231	.0190		1.6239
5. GRE(Q)	.5821**	.3389	.0157		1.3578
6. Age	.5897**	.3477	.0089		.7606
7. Religion	.5925**	.3510	.0033		.2788
8. Work experience	.5925**	.3510	.0000		.0008

* p < .05

** p < .01

TABLE VI

Regression Equations, Correlation Coefficients and
Standard Errors of Estimate for the Prediction of
GPA for Foreign and Domestic Groups

<u>Foreign Group (N = 279)</u>		
Predictor Variables	Regression Equation	
(1) GRE(V)	(1) $Y = .00126X + 2.80720$	
(2) GRE(Q)	(2) $Y = .00102X + 2.77483$	
(3) GRE(V), GRE(Q), Field of study, ELI and Language proficiency	(3) $Y = .00092X_1 + .00105X_2$ $-.20694X_3 - .04318X_4$ $-.04498X_5 + 2.73992$	
<u>Domestic Group (N = 63)</u>		
Predictor Variables	Regression Equation	
(1) GRE(V)	(1) $Y = .0018X + 2.32303$	
(2) GRE(Q)	(2) $Y = .00051X + 3.13340$	
(3) GRE(V), Field of study and Sex	(3) $Y = .00208X_1 - .26868X_2$ $-.13483X_3 + 2.47372$	
<u>Foreign Group</u>		
Regression Equation	Correlation Coefficient	Standard Error of Estimate
(1)	.2539**	.4327
(2)	.2429**	.4340
(3)	.4062**	.4118
<u>Domestic Group</u>		
Regression Equation	Correlation Coefficient	Standard Error of Estimate
(1)	.4458**	.3161
(2)	.1528	.3490
(3)	.5515**	.2996

* $p < .05$ ** $p < .01$

In the examination of the predictive value of the GRE verbal and quantitative scores for foreign and domestic subjects, it was found that the verbal score correlated significantly ($p < .01$) with the criterion for both foreign and domestic groups. For the foreign group it correlated .25 with the criterion, accounting for about six per cent of the criterion variance. For the domestic group the correlation (.45) was considerably higher and explained 20 per cent of the criterion variance.

The quantitative score, on the other hand, correlated .24 ($p < .01$) with the criterion for the foreign group, accounting for slightly less than six per cent of the variance. For the domestic group, a correlation of .15 was obtained which is not significant.

To further determine the validity of GRE(V) and GRE(Q) for foreign and domestic subjects, a comparison was made between the correlations of each of the two scores with the achievement of foreign and domestic subjects. The z' transformation was carried out to test the significance of the difference between the correlations. A z' value of 1.54 was computed for the verbal score. This approaches the .10 level of significance. The z' value for the quantitative score was .66 which is not significant.

Thus, no evidence was obtained to support the following hypotheses:

(1) There is a difference between foreign and domestic groups with respect to the predictive validity of the GRE verbal score which favors the domestic group.

(2) There is a difference between foreign and domestic groups with respect to the predictive validity of the GRE quantitative score which favors the foreign group.

For the purpose of investigating the comparability of the GRE scores of foreign and domestic subjects, regression lines were plotted for the foreign group, the domestic group and the total sample (see Figures 1 and 2). The intercepts of these lines were found to be different for both the verbal and quantitative scores. In the case of the verbal score, the achievement of a foreign subject would probably be underpredicted if the domestic or common regression line was used to predict his academic success. This was confirmed by an actual count of the residuals when the common regression line was used to predict the achievement of foreign and domestic subjects. The residuals showed that the achievement of about 63 per cent of the foreign subjects was underpredicted whereas the achievement of 60 per cent of the domestic subjects was overpredicted. In the case of the quantitative score, a foreign subject's achievement would still probably be underpredicted although the likelihood seemed smaller. When the common line was used in the prediction, an actual count of the residuals showed that the achievement of about 57 per cent of the foreign subjects was underpredicted and the achievement of almost half of the domestic subjects was overpredicted.

Thus, there seemed to be evidence that while each of the two scores (GRE verbal and quantitative) had statistically equal validity for the foreign and domestic groups, the raw scores of foreign and domestic subjects were not actually comparable.

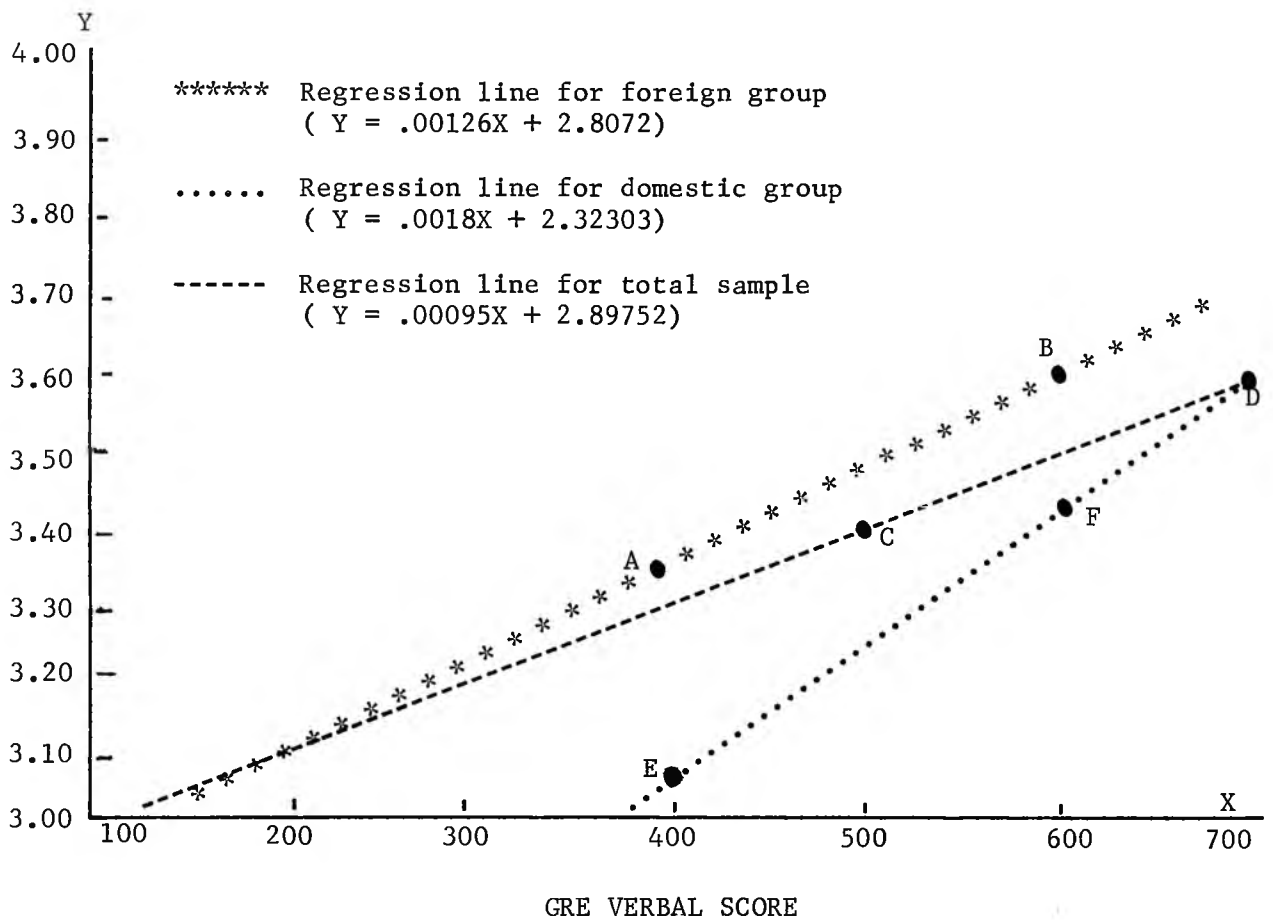


Figure 1. Regression Lines for Foreign Group, Domestic Group and Total Sample Using GRE(V) as Predictor.

A = (400, 3.31)	C = (500, 3.37)	E = (400, 3.04)
B = (600, 3.56)	D = (700, 3.56)	F = (600, 3.40)

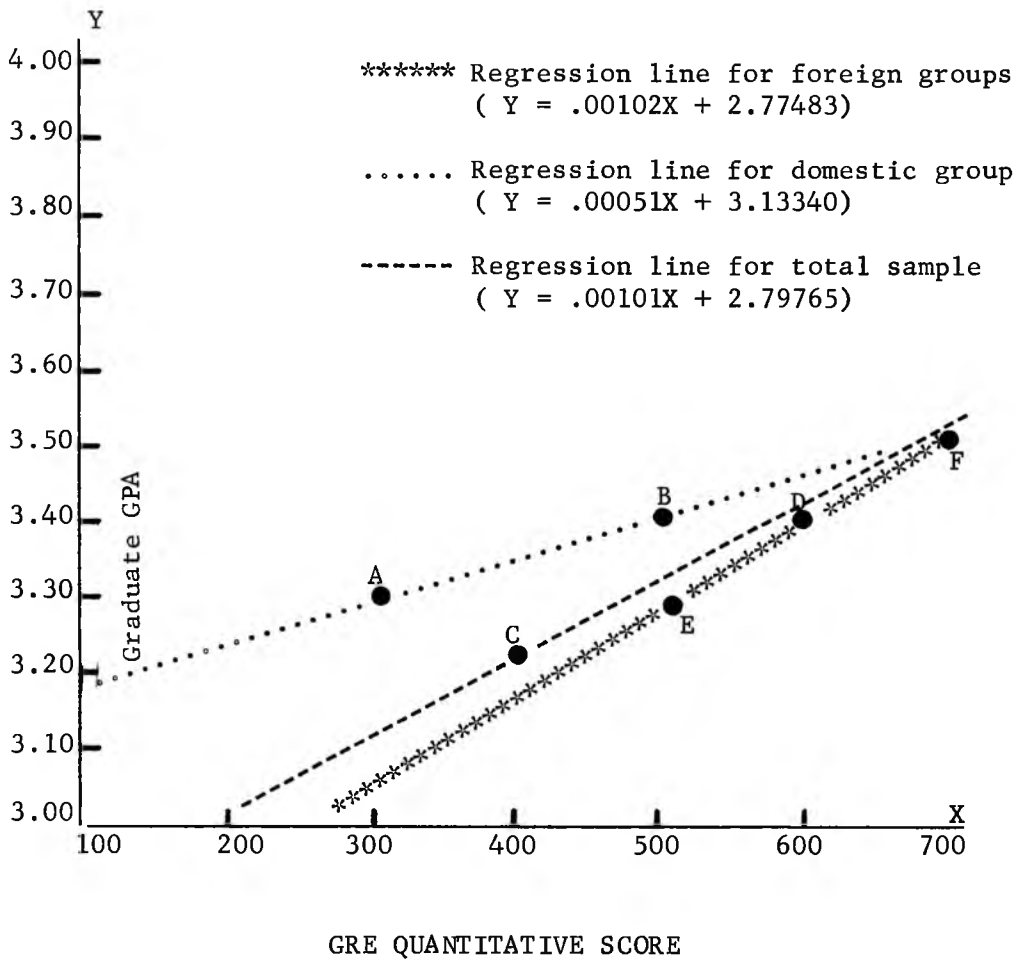


Figure 2. Regression Lines for Foreign Group, Domestic Group and Total Sample Using GRE(Q) as Predictor.

A = (300,3.29)	C = (400,3.20)	E = (500,3.28)
B = (500,3.39)	D = (600,3.40)	F = (700,3.49)

The discriminant analyses were conducted to compare subjects who completed their program at the Center and those who did not. The significance of group separation was tested separately for foreign and domestic subjects. In the first two analyses, graduate grade-point average was excluded as a factor. For the foreign group, 10 variables were included in the discriminant function. They were sex, age, marital status, field of study, ELI, language proficiency, GRE(V), GRE(Q), religion and work experience. For the domestic group, nine variables were used. They were sex, age, marital status, field of study, language proficiency, GRE(V), GRE(Q), religion and work experience.

The discriminant functions resulted from the analyses were found to be non-significant. For the foreign group the F value was 1.71 which is not significant at the .05 level. For the domestic group, the F value was .49 which is also not significant at the .05 level. Thus, as far as the variables involved in the analyses were concerned, there did not seem to be any significant differences between the withdrawal and retention groups.

In following analyses, GPA was included in the discriminant functions in addition to variables used in the first analyses. Different results were obtained for foreign and domestic groups. For foreign subjects, a significant F value (11.30, $p < .01$) was computed. The discriminant function was able to correctly classify 62 per cent of the withdrawal subjects. The F value (1.20) obtained for the domestic group was still not significant although a relatively high weighting was also computed for GPA. As the other factors were non-significant, no further examination was made of the discriminant function coefficients. It should, however, be noted that the coefficients of foreign and domestic groups

were not directly comparable because the discriminant function values for foreign and domestic subjects were different.

Thus, the data indicated that foreign withdrawal and retention groups differed significantly when grade-point average was included as a factor. The two groups showed no significant differences when this variable was excluded from the discriminant function. For domestic subjects, group separation was not significant with respect to all variables. In other words, evidence obtained in the analyses was contrary to the hypothesis that there was a difference between the retention and withdrawal groups in the domestic sample but lent support to a similar hypothesis regarding the foreign sample.

As the results supported the hypothesis concerning foreign subjects, a comparison of the withdrawal and retention groups in the foreign sample was made. The mean GPA of the withdrawal group was found to be 2.61 while the retention group had a much higher mean of 3.32. In general, subjects in the withdrawal group had lower GRE(V) and GRE(Q) scores than those in the retention group. Also, as compared with the retention group, the withdrawal group was younger and involved more single subjects and subjects in physical or social sciences. Withdrawal subjects were shown to have a better knowledge of foreign languages and more work experience than those in the retention group. Means of variables and coefficients of discriminant functions are presented in Tables VII and VIII.

TABLE VII

Means of Variables for Withdrawal and Retention Groups

Variable	<u>Foreign Subjects</u>		<u>Domestic Subjects</u>	
	Withdrawal (N = 34)	Retention (N = 245)	Withdrawal (N = 12)	Retention (N = 51)
	<u>Group Mean</u>			
Sex	.74	.71	.42	.65
Age	26.41	27.10	24.25	24.49
Marital status	.18	.29	.17	.22
Field of study	.85	.74	.92	.86
ELI	1.06	1.04	.00	.00
GPA	2.61	3.32	3.16	3.45
Language proficiency	2.21	1.94	1.33	1.29
GRE(V)	344.71	377.05	568.33	599.02
GRE(Q)	419.12	454.84	485.00	520.98
Religion	1.50	1.38	1.92	1.86
Work experience	.94	.85	.83	.94

TABLE VIII

Coefficients and Significance of Discriminant Functions

Variables	Foreign Subjects	Domestic Subjects
	<u>Discriminant Function Coefficients</u>	
Sex	.00291	-.01875
Age	.00005	.00078
Marital status	-.00231	-.01047
Field of study	-.00027	-.00245
ELI	-.00090	
GPA	-.02016	-.05894
Language proficiency	.00120	.00139
GRE(V)	.00003	.00010
GRE(Q)	-.00000	-.00006
Religion	.00090	.00426
Work experience	.00237	-.02847
	<u>Significance of Discriminant Functions</u>	
	F (11,267) = 11.30 p < .01	F (10,52) = 1.20 non-significant

CHAPTER V

DISCUSSION

Results of analyses of variance showed that the foreign and domestic groups differed significantly with respect to their achievement and GRE scores. The domestic subjects were shown to be better achievers and have higher GRE scores in both verbal and quantitative sections. The following factors may partially account for this phenomenon:

(1) Domestic subjects had probably undergone a more efficient selection process. Their records were in most cases comparable with one another and they were readily available for careful study. As a result, there was a greater likelihood that only the best applicants were selected. This may explain the higher accomplishment of domestic subjects. Foreign subjects, on the other hand, came from different education systems. Their records were, in many cases, not comparable with one another or with those of domestic subjects. Less accurate procedures might have to be used in their selection. This may in part account for the lower average achievement.

(2) The lower achievement of foreign subjects might also be due to their language handicap. Results of the study showed that the average foreign subject had to take one ELI course to enhance his language skill. Also, the mean GRE(V) of foreign subjects was almost three standard deviations below the mean of domestic subjects. Thus, where verbal skill was called for, foreign subjects would be at a considerable disadvantage.

(3) The lower GRE scores (both verbal and quantitative) of foreign subjects were in a large measure due to their lower aptitude for English.

The general pattern of the results obtained in the regression analyses was consistent with those of previous studies. As typical of previous findings, the portion of criterion variance which could be accounted for by individual or combinations of predictors was low and it was particularly so with foreign subjects. The low relationships between the predictor variables and the criterion measure were probably due to the following factors.

First, the attrition rate of East-West Center grantees seemed to be exceptionally low. Previous studies (Wright, 1964; Tucker, Gottlieb and Pease, 1964) have reported attrition rates of 40 per cent at the master's level and 31 to 54 per cent at the doctoral level. For foreign graduate students, Owen (1967) reported a lower rate of 17 per cent. Data of the present study showed that only 12 per cent of the foreign subjects and 19 per cent of the domestic subjects discontinued their graduate study without earning a degree. It was also shown that attrition of domestic subjects was due to factors other than academic failure. It would therefore appear that about 88 per cent of the foreign grantees and almost all of the domestic grantees in the sample were successful in their graduate work. In other words, a predominant majority of the subjects earned grade-point averages ranging from 3.00 to 4.00. It would be expected that the curtailment of range in GPA had considerably reduced the predictability of achievement. Had there been a higher attrition rate due to academic failure, the predictor variables used in the study would probably have demonstrated greater predictive validity.

Secondly, some invalid variability might exist in the criterion itself. It seemed that techniques of evaluation of academic success varied from department to department. In some departments, grades were essentially determined by scores obtained from objective tests. In others, more emphasis was placed on performance in class, interest and motivation. Also, in some cases, special consideration might have been given to foreign subjects in view of their language handicap. It would therefore be expected that due to departmental variations, considerable invalid variance existed in the criterion. If grades could be adjusted to eliminate these variations, it might be possible to considerably enhance the predictive validity of the variables used in the study.

As results of the present study stood, the highest multiple correlation obtained for the foreign group was .42 which accounted for about 18 per cent of the criterion variance. The highest multiple correlation computed for the domestic group was .59 which explained about 35 per cent of the variance in the criterion. The predictive validities of the GRE scores were also found to be generally in agreement with those obtained in previous investigations. They ranged from .15 (non-significant) to .45 ($p < .01$). For domestic subjects, GRE(V) demonstrated higher validity in the study than in most previous investigations (Michael, Jones and Gibbons, 1960; Robertson and Nielsen, 1961; Borg, 1963; and Alexakos, 1968). The validity coefficient of .45 also compared favorably with those obtained in studies (Ainsworth and Fox, 1966; Payne and Tuttle, 1966; and Jansen and Johnston, 1967) using the Miller Analogies Test score as the predictor.

The GRE scores were shown to have statistically equal predictive

validity for foreign and domestic subjects. However, it was also found that the raw scores of foreign subjects were not comparable with those of domestic subjects for purposes of prediction. This was demonstrated by a comparison of the regression lines and an actual count of residuals. When separate regression lines were used for foreign and domestic subjects, an average grade of B would be predicted for a domestic subject with a GRE(V) score of 376. For a foreign subject, a much lower score of 153 would be adequate for the prediction of a B grade average. When the common regression line was used in the prediction, the achievement of 63 per cent of the foreign subjects would be underpredicted and the achievement of 60 per cent of the domestic subjects overpredicted. Due to the non-significant validity of GRE(Q) for domestic subjects, a higher GRE(Q) score was required for foreign than for domestic subjects to result in the prediction of a same grade-point average. However, when the common regression line was used in the prediction, it was still found that the achievement of 57 per cent of the foreign subjects was underpredicted.

The difference with regard to comparability of scores seems attributable to foreign subjects' lower standard of English but adequate attainment with respect to other qualities necessary for success in graduate work. The GRE might not be able to effectively measure these qualities of foreign subjects because of the latter's language deficiency.

The intercorrelations among GRE(V), GRE(Q) and the criterion measure also led to some useful information. In the foreign group, GRE(V) and GRE(Q) correlated about equally well (.25 and .24 respectively) with grade-point average. The correlation between themselves (.15) was low. These data seemed to indicate that for foreign subjects, GRE(V)

and GRE(Q) represented measures of different abilities. In the quantitative section, verbal content was considerably reduced and subjects performed differently in this part of the examination. The GRE(Q) score might therefore be a more accurate indicator of their overall ability when English proficiency was discounted as a factor. However, in their graduate work, verbal ability was heavily called for, hence the slight superiority of GRE(V) over GRE(Q) in terms of predictive value.

In the domestic group, GRE(V) and GRE(Q) correlated .45 and .15 with grade-point average. The correlation between the two variables themselves was .61. It thus appeared that domestic subjects' performances in the verbal and quantitative parts of the examination were similar although the two parts represented measures of different abilities. The difference in predictive value between GRE(V) and GRE(Q) should therefore be attributed to the heavy verbal content of graduate education.

Results also showed that GRE(V) possessed higher predictive validity for domestic subjects than for foreign subjects. GRE(Q) on the other hand was shown to have higher validity for foreign subjects than for domestic subjects. Although the differences were non-significant at the .05 level, the data did tend to support the hypothesis that when verbal ability was excluded as a factor, GRE(Q) appeared to be a more accurate measure of foreign subjects' general aptitude for graduate work.

With regard to the "moderating" variables used in the study, results revealed that most of these factors possessed low or negligible predictive value. Father's occupation was found to be negligible as a factor and was excluded in later analyses. In the foreign group, five

of the "moderating variables (marital status, work experience, age, sex and religion) together accounted for only about two per cent of the criterion variance. The only effective "moderating" variable was field of study which explained about four per cent of the criterion variance. In the domestic group, two "moderating" variables (field of study and sex) were shown to have significant predictive validity. Field of study explained about seven per cent of the criterion variance and sex about three per cent. The other four variables (marital status, age, religion and work experience) together accounted for only about three per cent of the criterion variance. These results seemed to depart from those obtained in previous studies (MacArthur and Mosychuck, 1966; and Klein, Rock and Evans, 1968) which demonstrated the usefulness of "moderating" variables. One possible explanation for this might be that both foreign and domestic subjects had attained a high level of maturity and individual differences represented by the "moderating" variables had little effect on their academic achievement.

In both foreign and domestic groups, field of study correlated negatively with the criterion measure but positively with GRE(V). Also, the variable had negative regression coefficients. It would therefore appear that field of study was a suppressor variable rather than a positive predictor. It probably suppressed variance in GRE(V) which was not found in the criterion measure for subjects in the physical and social sciences. In other words, part of the language skill represented by GRE(V) seemed to be irrelevant to success in the physical and social sciences. The predictive value of sex for domestic subjects was difficult to explain. Like field of study, this variable correlated

negatively with the criterion measure but positively with GRE(V). It might be that a high score on GRE(V) would help a female subject to achieve higher than it would a male subject.

For foreign subjects, the significant predictors included ELI and language proficiency. ELI correlated negatively with the criterion. This was expected because subjects who needed more ELI courses possessed lower language ability. Language proficiency correlated negatively with the criterion but positively with GRE(V). This was difficult to explain. However, it might be suggested that subjects who knew many languages probably had slightly lower overall aptitude for graduate work.

In summary it may be stated that results of the analyses of variance and the regression analyses seemed to underline the importance of English proficiency, particularly in the case of foreign students, in the pursuit of graduate study. In the analyses of variance it was shown that there was a significant difference between foreign and domestic subjects with respect to their GRE scores (especially in the verbal section) and academic achievement. The differences on all three variables favored the American grantees. Given the significant correlation between GRE(V) and achievement, it would seem that verbal skill was a prime factor for high accomplishment. For the foreign group, ELI correlated negatively ($-.23, p < .01$) with the criterion. This finding also attested to the importance of English proficiency for academic success.

The discriminant analyses revealed no significant differences between the withdrawal and retention groups of domestic subjects. The average achievement of the withdrawal group was higher than the B average which precluded academic failure as a factor of dropping out.

Results did show that the retention group had higher means of grade-point averages, GRE(V) and GRE(Q) scores. The differences were, however, not significant. Attrition of domestic subjects must therefore be attributed to factors other than those included in the discriminant functions.

For foreign subjects, withdrawal and retention groups differed significantly when grade-point average was included as a factor. Besides having higher GRE(V) and GRE(Q) scores than the withdrawal group, the retention group had a mean GPA of 3.32. The withdrawal group had a mean GPA of 2.61 which was below the B average required of graduate students at the University of Hawaii. It seemed evident that foreign subjects' withdrawal was largely due to academic failure.

CHAPTER VI

SUMMARY AND CONCLUSIONS

This study examined the academic achievement of 342 East-West Center grantees who were enrolled at the Center from 1963 to 1965. It also evaluated several factors related to their graduate achievement. The most important factors investigated were the Graduate Record Examination verbal and quantitative scores. Other variables included in the study were age, sex, marital status, nationality, field of study, English language course (ELI), language proficiency (other than English), religion, work experience and father's occupation. Graduate GPA was used as the measure of academic success except in the discriminant analyses where completion of graduate program was the criterion.

The foreign group (N = 279) was compared with the domestic group (N = 63) with respect to graduate success and the GRE verbal and quantitative scores. Domestic subjects were shown to have significantly higher achievement and higher GRE verbal and quantitative scores.

Results of regression analyses showed that the GRE verbal score was the best single predictor for both foreign and domestic subjects. For the foreign group, this factor accounted for six per cent of the criterion variance ($r = .25$, $p < .01$). For the domestic group, it accounted for 20 per cent of the criterion variance ($r = .45$, $p < .01$). For foreign subjects, the other significant predictor variables were GRE quantitative score, field of study, ELI and language proficiency. Together with GRE(V) they explained about 17 per cent of the criterion variance ($R = .41$, $p < .01$). When other predictor variables (marital status, work experience, age, sex and religion) were also included, the

multiple correlation was .42 ($p < .01$), accounting for 18 per cent of the variance in the criterion. For domestic subjects, significant predictors besides GRE(V) were field of study and sex. The three variables together explained 30 per cent of the variance in the criterion ($R = .55$, $p < .01$). When they were combined with marital status, GRE(Q), age, religion and work experience, the multiple correlation was .59 ($p < .01$).

The GRE verbal and quantitative scores were shown to possess statistically equal validity for both foreign and domestic subjects. However, the higher GRE(V) validity coefficient was computed for the domestic group whereas the higher GRE(Q) validity coefficient was computed for the foreign group. It was also shown that the raw GRE(V) and GRE(Q) scores of foreign subjects were not comparable with those of domestic subjects. In the case of GRE(V), the achievement of the majority (63 per cent) of the foreign subjects would be underpredicted and the achievement of the majority (60 per cent) of the domestic subjects would be overpredicted if the raw scores were treated as comparable and used in the common regression line. In the case of GRE(Q) the achievement of 57 per cent of the foreign subjects would be underpredicted and the achievement of almost half of the domestic subjects would be overpredicted.

The discriminant analyses revealed no significant differences between the withdrawal and retention groups of domestic subjects. The withdrawal and retention groups of foreign subjects were shown to differ significantly when grade-point average was included as a factor in the discriminant function. The data indicated that the attrition

of foreign subjects was mainly due to academic failure.

Results of the present study suggest the following conclusions:

(1) Domestic subjects had higher GRE(V) and GRE(Q) scores and were better achievers as compared with foreign subjects. Their higher achievement was mainly due to their superior verbal skill which seemed to be an important factor of success in graduate study. By the same token, the lower achievement of foreign subjects was mainly due to their poorer language skill.

(2) Although all the multiple correlations obtained in the regression analyses were significant at the .01 level, none of them demonstrated a high relationship from a practical standpoint.

(3) The validity coefficients computed for GRE were significant but low. They offered little support to the use of the scores as an absolute criterion in the selection of graduate students. The significant validity which the scores were shown to possess justifies their being used as a check in assessing graduate students' potential.

(4) The GRE had equal predictive value for foreign and domestic subjects. However, domestic subjects' achievement was better predicted by GRE(V) in terms of the amount of criterion variance explained by the variable.

(5) The GRE raw scores of foreign subjects were not comparable with those of domestic subjects for purposes of prediction. Results of the study showed that the achievement of foreign subjects would be underpredicted if the raw scores of foreign and domestic subjects were treated as comparable. Separate regression lines should therefore be used in the prediction of the achievement of foreign and domestic

subjects.

(6) There seemed to be some evidence that for foreign subjects, GRE(V) would be more meaningful if it was treated as an indicator of English proficiency and GRE(Q) should be treated as a more accurate measure of other qualities required for graduate success.

(7) Most of the "moderating" variables had negligible predictive value for both foreign and domestic subjects. This could be due to subjects' high level of maturity and overall aptitude for graduate study.

(8) The attrition of foreign subjects was largely due to academic failure. The attrition of domestic subjects did not seem to be significantly related to any of the factors investigated in the study.

(9) In view of the low attrition rates (12 per cent for foreign and 19 per cent for domestic subjects) it might be said that the selection procedures currently used by the East-West Center administration are satisfactory although future efforts are clearly called for to identify more effective predictors of grantees' academic success.

(1) The finding that the attrition of foreign subjects was mainly due to academic failure lends validity to GPA as a measure of success for foreign grantees even in the context of the Center's primary goal of cultural interchange and international understanding.

APPENDIX A

Nations and Number of Grantees Included in the Study

Nation	Number of Grantees
Australia	4
Burma	4
Cambodia	2
Ceylon	2
Fiji	2
Hong Kong	3
India	30
Indonesia	11
Japan	60
Korea	44
Malaysia	6
Nepal	5
New Zealand	3
Okinawa	9
Pakistan	14
Philippines	37
Taiwan	22
Thailand	17
U. S.	63
Vietnam	4
Total	342

APPENDIX B
Fields of Study and Number of
Grantees Included in the Study

Field	Number of Grantees
Agricultural Economics	6
Agricultural Engineering	2
Agriculture	1
Agronomy	2
American Studies	4
Animal Science	3
Anthropology	9
Art	5
Asian Studies	20
Biochemistry	2
Botany	7
Business Administration	11
Chemistry	7
Chinese	1
Civil Engineering	9
Drama	6
Economics	15
Education	18
Electrical Engineering	6
English	4
Entomology	10
Food Science	6

APPENDIX B (Continued)
 Fields of Study and Number of
 Grantees Included in the Study

Field	Number of Grantees
Geography	9
Geology	1
History	8
Horticulture	6
Japanese	1
Linguistics	4
Mathematics	3
Meteorology	1
Microbiology	6
Music	2
Nutrition	2
Oceanography	1
Overseas Career Program	10
Pacific Institute Studies	1
Philosophy	3
Physics	3
Plant Physiology	1
Political Science	30
Psychology	8
Public Health	4
Social Work	3
Sociology	2

APPENDIX B (Continued)
Fields of Study and Number of
Grantees Included in the Study

Field	Number of Grantees
Soil Science	8
Teacher Interchange Program	30
Teaching English as a Second Language	35
Zoology	<u>6</u>
Total	342

APPENDIX C

Codes or Ranges of Variables

Variable	Code or Range
Sex	0 = Female 1 = Male
Age	20 - 49
Marital status	0 = Single 1 = Married
Nationality	0 = Asia and the Pacific 1 = U. S.
Field of study	0 = Language study 1 = Physical and social sciences
ELI	0 - 5
GPA	0 - 4.00
Language proficiency	0 - 5
GRE(V)	200 - 750
GRE(Q)	240 - 800
Religion	1 = Others 2 = Christianity
Work experience	0 = No 1 = Yes
Father's occupation	1 = Unskilled 2 = Semi-skilled 3 = Skilled 4 = Professional
Completion of program	0 = No 1 = Yes

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