FACTORS RELATED TO ACHIEVEMENT OF

FOREIGN STUDENTS AT IOWA STATE UNIVERSITY

by

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A Thesis Submitted to the

Graduate Faculty in Partial Fulfillment of

The Requirements for the Degree of

MASTER OF SCIENCE

Major Subject: Education

Iowa State University
Ames, Iowa

1968

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INTRODUCTION

On the campus of Iowa State University there are 500 foreign students enrolled for the 1967-68 school year. These students come from different countries from all over the world with varying cultural, educational, and social backgrounds to study in a big mid-western university in a well developed modern country.

A study, based on this group of students could reveal the possible effects of demographic and situational factors as well as the effects of the educational backgrounds and social characteristics on their academic achievement.

The question of interest is the prediction of the probability of academic success prior to the foreign student enrolling in Iowa State University. What measure, or measures, as far as the above factors are concerned, will furnish a satisfactory degree of accuracy with minimum amount of labor? What role, if any, do entrance characteristics play in student achievement? (The purpose of this study was:

1. To determine the relationship between academic achievement of foreign students and:

   a. Chronological age

   b. Sex

   c. Native language

   d. Source of support

   e. Curriculum

   f. Marital status

   g. The year of study.

2. To determine of academic achievement in various curricula in
   Iowa State University can be predicted for foreign students.

3: To develop guidelines for the advising of prospective foreign
   students.

(The data used in this study were collected through the use of
foreign student records (in the Registrar's Office at Iowa State
University.

(The population of investigation was the foreign students attending Iowa
State University at the present time (Spring Quarter 1968) at both under-
graduate and graduate levels.)

The materials in this study have been arranged in the following
manner:

Chapter one is the introductory chapter. It includes the

introduction, the statement of the problem, the purpose

of the study, source of data, and the organization of

the study.

Chapter two is a review of the literature.

Chapter three includes method and procedure.

In Chapter four the findings are presented.

Chapter five is a discussion of the findings.

Finally, the sixth chapter includes a summary.

DESCRIPTION OF THE POPULATION OF INVESTIGATION

The population of investigation for this study consisted of 500 foreign students at both undergraduate and graduate level.

On the Undergraduate Level

There were 196 foreign students, 122 males and 74 females. Concerning the factor of age, 118 were under 25 and 78 were 25 years or over. The native languages were distributed as follows: 101 their native language was English, 67 original Latin, 6 Hindi, 5 Chinese, 6 Arabic, 4 Turkish, 2 Hebrew, one Japanese, 4 Tsai. The students were distributed in the different colleges as follows: 40 in Agriculture, 72 in Engineering, 52 in Science and Humanities, 20 in Home Economics, and 12 in Veterinary Medicine. There were 159 single students and 37 married. Concerning the year of study, 24 of them were freshmen, 48 were sophomores, 59 were juniors, and 65 were seniors. The government supported students were 49 while the self-supported were 147.

On the Graduate Level

There were 304 foreign students, 255 males and 49 females, 64 were under 25 and 250 were 25 years or over. The native languages were distributed as follows: 81 were English, 72 were original Latin, 54 were Hindi, 40 were Chinese, 36 were Arabic, 15 were Japanese, 5 were Turkish, one was Hebrew, 6 were Tsai. The distribution in colleges were as follows: 128 in Agriculture, 72 in Engineering, 64 in Science and Humanities, 16 in Home Economics, and 24 in Veterinary Medicine. There were 132 single and 172 married students, 110 of them have been in their

college for one year or less, 72 for 2 years, and 122 for 3 years or over.
Those who were government supported totaled 159 and the self-supported
totaled 145.

REVIEW OF LITERATURE

Previous Studies on Foreign Students

Few studies, as was expected, have been reported in the literature concerning factors affecting the academic success of foreign students.) A recent study was completed by Ohuche (7) concerning the academic achieve- ment of Nigerian students in the United States during the academic year 1966-1967. The population of the Nigerian students in the United States was 1,882. Of this number 1,426 were undergraduates and the rest were graduate students. A representative sample of the students was chosen using proportional sampling method. The total population was separated into two groups, undergraduates including students in professional schools who had not obtained a first degree, and graduate students. The names were arranged alphabetically and from the sub-population of graduate students the first of each group of five names was selected while from the subset of undergraduates the first of each set of ten names was chosen. Thus questionnaires were mailed to 143 undergraduates and 92 graduate students. Sixty-five of the latter and 104 of the former returned the questionnaires. Data were collected on the background of the students while in Nigeria, their financial sponsorship, and academic performance in the United States. In addition, a shorter questionnaire was mailed to the faculty adviser of each student in the sample. As a result, the validity of the response of the students was checked by carrying out an analysis of variance between the cumulative grade-point averages reported by the students and those reported by the academic advisers.

The following conclusions were drawn from the findings of his study:

1. Previous educational experience, as measured by the grade in the school certificate examination of Nigerian undergraduates attending institutions of higher learning in the United States could not be used to predict satisfactorily the academic achievement of such students as measured by their cumulative grade-point averages.

2. Nigerian undergraduates who completed the equivalent of the higher school certificate examination performed better academically than those who did not.

3. It was discovered that there was no difference in academic achievement between those Nigerian undergraduates who held government scholarships and those who did not.

4. It was found that both the first term grade-point average and the cumulative grade-point average at the end of the first term of the second year in college correlated highly with academic achievement.

5. There was no significant difference in academic achievement between those Nigerian graduate students who obtained bachelor's degrees in the United States and those who received initial degrees elsewhere.

Intensive case studies of 76 graduate students attending Minnesota (6) during the 1951-1952 academic year showed that of the many factors affecting achievement, motivation was one of the most important

and must be understood if academic achievement is to be realistically assessed. The case studies gave evidence that among the causes of poor achievement of foreign students were the factors of English deficiency, lack of motivation, delayed or improper vocational choice and "cultural imbalance".

In the section of the study dealing with the achievement of 516 foreign students as measured by honor-point ratio (HPR) a number of statistical tests were used.

The comparisons involving the mean achievement of foreign students offered the best measure of the outcome of the study when the three variables of country of origin, field of study and degree were held constant.

A sufficient number of students from China and India with HPR distributions homogeneous in variance were available for inter-country comparisons, and it was shown that achievement of students from China and India earning a Master's degree with designation in the field of civil engineering differed significantly at the one percent level in favor of the Chinese students. Students from these same countries earning the doctorate in the field of agronomy-plant genetics did not achieve significantly different HPR levels. The Chinese students in entomology earning the Ph.D. achieved at a significantly higher level of HPR than did the Chinese students in agronomy-plant genetics but showed no significant difference in achievement when compared to Indian students earning the doctorate in plant pathology. Chinese students earning the Master's degree with designation in aeronautical engineering and civil

engineering achieved at a significantly higher HPR level than did the Chinese students in chemical engineering.

The comparisons of achievement of American and foreign graduate students gave no clear instances of statistically significant difference. Chinese students in aeronautical, civil and electrical engineering averaged HPR above those of American students but fell below the American students' achievement in agronomy-plant genetics, entomology, chemical engineering, agricultural economics and economics.

The American students ranked consistently above the Indian and the Norwegian students in the comparison made.

Another study made by Putnam (8) included a sample consisting of 546 foreign graduate students who were enrolled between September 1945 and June 1950 at Columbia University. The purpose of this study was to investigate:

1. The academic performance of graduate students enrolled in Columbia University from selected foreign countries.

2. The relationship between the first term grades and grades in subsequent enrollments.

3. The relationship between total grade-point average at Columbia University and such factors as sex, national origin and undergraduate academic standing, English language background, admission status, major, scholarship awards and age.

The results showed that the grade-point average for the total sample was 7.9, just under 8 with averages between 7.6 and 8.3 for eleven of the national groups totaling 498 cases. Undergraduate academic

standing covered to grade-points showed a correlation with the criterion of only 0.23.

Several factors together gave strong indication that language facility is an important factor in the academic success of foreign students at Columbia University. He found that first term grade-point average correlated highly with both overall grade-point average and remainder grade-point average. It would have been a satisfactory predictor of total grade-point average in 94.2 percent of individual cases.

In addition, he found that age, admission status, scholarship awards, and national origin had no appreciable relationship with academic achievement.

Clark (1) studied the cross-cultural academic experience of Ghanaian students in the United States during the 1959-60 academic year. She defined academic achievement as the rating of the student on a pass or fail basis by the educational institution attended and academic satisfaction as the satisfaction of the student with the academic standing assigned to him by the institution. Clark, then sampled two populations: Ghanaian students in the United States and the educational institutions they were attending.

Subsequently questionnaires were mailed to 190 students and 98 educational institutions. All the institutions returned the question-naires. The return from the students was 76 percent. Clark investigated factors selected from the educational background of the students in Ghana and the characteristics of the responding students and of the

educational institutions. Her findings were reported at the five percent level of significance.

She discovered that significantly more students were passing who:

1. held government grants than those who did not.

2. attended accredited institutions.

3. held the equivalent of the advanced level General Certificate of Education.

In addition, the investigation revealed a significant difference in satisfaction between married and unmarried students. Significantly more of the former were satisfied than the latter. Also students 30 years or older were more satisfied than those under 30.

✕ Elaine Forstat (2) explored specific areas in which international students at Purdue University encountered difficulties. Her mail questionnaire to 201 foreign students in West Lafayette included a check list of problems. She discovered that academic status and country of origin were factors associated with the total number of adjustment problems of the students in her sample. On the other hand, age, length of stay in the United States, and field of study appeared unrelated to difficulties encountered by foreign students. ✕

In one of his studies, Hountras (3) investigated factors relating to the academic achievement of foreign graduate students enrolled at the University of Michigan in the years 1947 to 1949. He studied and analyzed the records of 587 foreign graduate students, 257 of whom were on academic probation sometime during the period under study. Hountras

concluded that:

1. There was a significant relationship between the geographical
   origin of the students and their academic achievement. Students
   from the Far East, Near East and Latin America were more likely
   to be on temporary enrollment than those from other parts of
   the world.

2. There was a significant relationship between academic achieve-
   ment and field of study. Students in the social and physical
   sciences were more apt to incur probation than those in the
   other broad academic areas.

3. There was predictive association between academic achievement
   and such variables as type of admission, degree held at admis-
   sion, marital status, and length of residence in graduate
   school. In connection with the last factor, academic
   difficulties were almost concentrated in the first and second
   terms of enrollment.

4. There was no significant relationship between academic
   achievement and variables like sex, age at entrance, employ-
   ment status and summer attendance.

In another study, Hountras (4) reviewed Miller's work and a study
done with the Miller Analogies Test at the University of Michigan on
foreign graduate students. He concluded that the test should be included
in the admission requirements of foreign graduate students because it
showed great promise as a yardstick for selecting foreign students who
have the knowledge, aptitude, ability, and skill to profit from
graduate education.

Finally, an important survey of students from Africa, South of the Sahara, excluding the Union of South Africa, was carried out in 1961. This survey was made by the Institute of International Education through the International Center of the University of Michigan.

Writing in the forward to the Survey Report (5), the president of the Institute of International Education defined the purpose of the survey thus:

> "The assignment was to obtain comprehensive, up-to-date statistical information on African Students in the United States during 1961, their backgrounds, major problems, educational and social experiences and future plans."

There was a total of 1,600 students who qualified for the population. The investigating team located and sent mail questionnaires to 1,533 of these. Sixty-seven percent of the recipient students returned the questionnaires. Following the returns, a sample of 208 of the students and 112 institutional administrators in 43 of the 366 colleges and universities were given an oral interview. The Survey (5) found the composite student in the population to be "a 26-year-old single male from either Nigeria or Kenya who was beginning the junior year and was studying social science." Twenty-seven percent of the students were freshmen, 17 percent were sophomores, 16 percent juniors, 10 percent seniors and 22 percent graduate students. In spite of the fact that about 50 percent of the students were still in their initial adjustment phase, 79 percent of them reported satisfaction with their academic program. In the words of the report:

"In contrast to American students who frequently change
their major field of study, only a handful of the African
students have changed their major since their arrival here.
This seems to indicate that they have semi-definite ideas
about their academic interests, although they may not have
as definite ideas on how they will be able to apply their
knowledge upon their return home."

The students reported that their major problems were in communication, discrimination, adjustment to school, academic work, adjustment to the United States, social adjustment, finance, food, and homesickness. Six percent of the students reported having academic difficulties. The major reasons given by the students for academic problems were language and communication differences and the difficulty of adjusting to the American educational system with its objectives tests and fast pace.

The overall grade-point average of the sample as reported by the students was a B-, which seems relatively high. However, it should be remembered that 22 percent of the sample was made up of graduate students who were expected to maintain no less than a B average. The only check on the accuracy of the students' responses was provided by opinions voiced by 31 academic advisors. Thirty-six percent of these thought the African students were doing better than American students, 23 percent thought the African students were doing worse and 19 percent thought there was no appreciable difference.

The academic advisors agreed with the students that there were communication problems and that it was not easy adjusting to objective tests. They added that in some cases preparation was inadequate. Nevertheless, most of the advisers "believed that a majority of the students make satisfactory academic progress after an initial period of adjustment."

Observations, Evaluation, and Summary

It is obvious that no attempt has been made to include all the research that has been done on academic prediction.

Some of the findings were unusual, some surprising, some apparently contradictory to others. Forstat's (2) conclusion that the adjustment problems of international students were not correlated to the students' length of stay in the United States sharply contradicted the conclusion arrived at by the team that did the 1961 survey on African students. In the words of that Survey report (5):

> "As the length of stay increased . . . communication
> difficulties which had been listed initially by 21%
> was later important to only 4% . . . . While the
> American way of life may not have been what the students
> generally expected, adjusting to it was apparently not
> difficult. It decreased as a major problem from 17% for
> the students when they first arrived to 3%."

Of course, the populations were different. Nevertheless, it would appear that, while a linear relationship may not exist, the longer a foreign student stayed in any country, the better able he is to adjust to economic, cultural and educational differences between that country and his country.

Finally it must be remembered that English deficiency and lack of motivation correlated highly with poor academic achievement.

METHOD AND PROCEDURE

The population of foreign students at Iowa State University attending Spring Quarter in 1968 was 500 students.

A random sample was drawn from the above population through the use of the students permanent records in the registrar's office and consisted of:

1. 50 undergraduates

2. 70 graduates.

The data were placed on code sheets and the facilities of the Computation Center at Iowa State University were used to process the data collected for the following factors:

1. age

2. sex

3. native language

4. source of support

5. kind of curriculum

6. marital status

7. the year of study.

Basic Assumptions

For purpose of this study, the following basic assumptions were made:

1. That the different factors are normally and independently distributed.

2. That the grade-point average is a valid criterion for the academic achievement.

Delimitation of the Study

1. There are delimitations in time and place because the sample

   of foreign students was taken only from one particular

   institution (Iowa State University) at a specific time

   (Spring Quarter 1968).

2. The high school background, which has a great effect on the

   academic achievement, is not touched.

Criterion

The cumulative grade-point average obtained by the students in

Iowa State University was used as the measure of achievement in this

study. The letter grades are used in Iowa State University but for

purposes in this study were converted to numerical values as follows:

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4  indicates an  A
3  indicates a   B
2  indicates a   C
1  indicates a   D
0  indicates an  F
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Statistical Technique

Analysis of variance — single classification was used to test the

following null hypothesis:

1. There is no significant difference between the mean Grade-

   Point Average (GPA) when foreign students are categorized

   on the basis of age.

2. There is no significant difference between the mean GPA

   when foreign students are categorized on the basis of sex.

3. There is no significant difference between the mean GPA when foreign students are categorized on the basis of native language.

4. There is no significant difference between the mean GPA when foreign students are categorized on the basis of source of support.

5. There is no significant difference between the mean GPA when foreign students are categorized on the basis of curriculum.

6. There is no significant difference between the mean GPA when foreign students are categorized on the basis of marital status.

7. There is no significant difference between the mean GPA when foreign students are categorized on the basis of the year of study.

FINDINGS

On the Undergraduate Level

An analysis of variance was employed to discover if there was significant difference between the academic achievement of the different groups as far as the mean Grade-Point Average was concerned.

Table 1. Analysis of variance of academic achievement of undergraduate students by age groups

Source	D.f.	Sum of Squares	Mean Square	F. Value
Between	1	2686.52	2686.52	.776
Within	48	166055	3459.4	
Total	49	168741.52		

.05 = 4.04

Table F. Value

.01 = 7.19

When the undergraduate foreign students were categorized on the basis of age, under 25 and 25 years old or over, no significant difference was found in their academic achievement. The first null hypothesis of no difference in academic achievement on the basis of age cannot therefor be rejected.

When undergraduate foreign students were categorized on the basis

Table 2. Analysis of variance of academic achievement of undergraduate students by sex group

Source	D.f.	Sum of squares	Mean Square	F. Value
Between	1	21779.68	21779.68	7.1135
Within	48	146961.84	3061.7	
Total	49	168741.52		

.05 = 4.04

Table F. Value

.01 = 7.19

of sex the difference between the mean Grade-Point Average was found to be significant at .05 level. Females achievement was better than males, and accordingly, the second null hypothesis of no difference in the academic achievement of the undergraduate foreign students on the basis of sex is rejected at the .05 level.

No significant difference between the mean Grade-Point Average was found when undergraduate foreign students were categorized on the basis of their native language. The third null hypothesis of no difference in academic achievement on the basis of native language could not be rejected at the .05 level.

Categorizing the undergraduate foreign students on the basis of self or government support showed significant difference between the mean Grade-Point Average at .05 level. Those who were self supported had

Table 3. Analysis of variance of academic achievement of undergraduate students by native language groups

Source	D.f.	Sum of Squares	Mean Square	F. Value
Between	6	31240.63	5206.7	1.62
Within	43	137500.89	3197.6	
Total	49	168741.52		

.05 = 2.31

Table F. Value

.01 = 3.24

Table 4. Analysis of variance of academic achievement of undergraduate students by source of support groups

Source	D.f.	Sum of Squares	Mean Square	F. Value
Between	1	15303	15303	4.8
Within	48	153439	3196.6	
Total	49	168742		

.05 = 4.04

Table F. Value

.01 = 7.19

a higher mean Grade-Point Average than those who were government supported. The fourth null hypothesis of no difference in the mean Grade-Point Average on basis of support was rejected at .05 level.

Table 5. Analysis of variance of academic achievement of undergraduate students by curriculum groups

Source	D.f.	Sum of Squares	Mean Square	F. Value
Between	4	13575.79	3393.95	.9843
Within	45	155165.73	3448.1	
Total	49	168741.52		

.05 = 2.57

Table F. Value

.01 = 3.76

When the undergraduate foreign students were categorized on the basis of kind of curriculum there was no significant difference between the mean Grade-Point Average. Therefor, the fifth null hypothesis of no difference in the mean Grade-Point Average on the basis of curriculum cannot be rejected.

Categorizing the undergraduate foreign students on the basis of marital status produced no significant difference between the mean Grade-Point Average at the .05 level. The sixth null hypothesis of no difference between the mean .Grade-Point Average according to marital

status cannot be therefor rejected.

Table 6. Analysis of variance of academic achievement of undergraduate
students by marital status groups

Source	D.f.	Sum of Squares	Mean Square	F. Value
Between	1	10908.52	10908.52	3.3174
Within	48	157833.00	3288.18	
Total	49	168741.52		

.05 = 4.04

Table F. Value

.01 = 7.19

Table 7. Analysis of variance of academic achievement of undergraduate
students by year of study groups

Source	D.f.	Sum of Squares	Mean Square	F. Value
Between	3	14877.00	4959.00	1.48
Within	46	153865.00	3344.00	
Total	49	168742.00		

.05 = 2.81

Table F. Value

.01 = 4.24

No significant difference between the mean Grade-Point Average was found when undergraduate foreign students were categorized on the basis of thè year of study. Therefor, the seventh null hypothesis of no difference between the mean Grade-Point Average on the basis of the year of study could not be rejected at the .05 level.

On the Graduate Level

An analysis of variance was used to discover if there was significant difference between the academic achievement of the different groups as far as the mean Grade-Point Average was concerned.

Table 8. Analysis of variance of academic achievement of graduate students by age groups

Source	D.f.	Sum of Squares	Mean Square	F. Value
Between	1	18791.97	18791.97	14.2698534
Within	68	89331.00	1316.9	
Total	69	108122.97		

.05 = 3.98

Table F. Value

.01 = 7.01

When the graduate foreign students were categorized on the basis of age the difference in their academic achievement was found to be

significant at the .01 level. Those who were 25 years old or over had a

higher mean Grade-Point Average than those who were under 25 years.

The first null hypothesis of no difference in academic achievement on

the basis of age was therefor rejected at the .01 level.

Table 9. Analysis of variance of academic achievement of graduate
students by sex groups

Source	D.f.	Sum of Squares	Mean Square	F. Value
Between	1	73.74	73.74	.00464
Within	68	108049.23	1588.9	
Total	69			

.05 = 3.98

Table F. Value

.01 = 7.01

When graduate foreign students were categorized on the basis of

sex the difference between the mean Grade-Point Average was not found

to be significant. The second null hypothesis of no difference in the

academic achievement of graduate foreign students on the basis of sex

cannot be rejected.

No significant difference between the mean Grade-Point Average was

found when graduate foreign students were categorized on the basis of

their native language. The third null hypothesis of no difference in

Table 10. Analysis of variance of academic achievement of graduate
students by native language groups

Source	D.f.	Sum of squares	Mean Square	F. Value
Between	5	7727.49	1545.49	.985
Within	64	100395.48	1568.6	
Total	69	108122.97		

.05 ≈ 2.36

Table F. Value

.01 = 3.31

academic achievement on the basis of native language could not be

rejected.

Table 11. Analysis of variance of academic achievement of graduate
students by source of support groups

Source	D.f.	Sum of Squares	Mean Square	F. Value
Between	1	152	152	.0957
Within	68	107971	1587.8	
Total	69	108123		

.05 = 3.98

Table F. Value

.01 = 7.01

Categorizing the graduate foreign students on the basis of self

or government support showed no significant difference between the mean

Grade-Point Average. The fourth null hypothesis of no difference in

the academic achievement on the basis of support could not be rejected.

Table 12. Analysis of variance of academic achievement of graduate
students by curriculum groups

Source	D.f.	Sum of Squares	Mean Square	F. Value
Between	4	13708.71	3427.18	2.3594604
Within	65	94414.26	1452.527076	
Total	69	108122.97		

.05 = 2.51

Table F. Value

.01 = 3.62

When the graduate foreign students were categorized on the basis of

kind of curriculum there was no significant difference between the mean

Grade-Point Average. Therefor, the fifth null hypothesis of no

difference in the mean Grade-Point Average on the basis of kind of

curriculum cannot be rejected.

Table 13. Analysis of variance of academic achievement of graduate students by marital status groups

Source	D.f.	Sum of Squares	Mean Square	F. Value
Between	1	10724.98	10724.98	7.488
Within	68	97398.00	1432.00	
Total	69			

.05 = 3.98

Table F. Value

.01 = 7.01

Categorizing the graduate foreign students on the basis of marital status showed significant difference at the .05 level between the mean Grade-Point Average. Married graduate students were better in their academic achievement than single graduate students. The sixth null hypothesis of no difference between the mean Grade-Point Average according to marital status was, therefor, rejected at .05 level.

No significant difference between the mean Grade-Point Average was found when graduate foreign students were categorized on the basis of the year of study. Therefor, the seventh null hypothesis of no difference between the mean Grade-Point Average on the basis of the year of study could not be rejected for graduate students.

Table 14. Analysis of variance of academic achievement of graduate
students by year of study groups

Source	D.f.	Sum of Squares	Mean Square	F. Value
Between	2	17.319	8.659	.0064
Within	67	90804.00	1355.00	
Total	69	108123.00		

.05 = 3.13

Table F. Value

.01 = 4.92

Interaction Between Sex, Age, and
Marital Status — Undergraduates

Due to the smallness of the size of the sample, testing the inter-
action between the different variables was not possible except for
three variables: sex, age, and marital status.

1. Analysis of variance was employed for the subjects who were
   similar in all the factors except the sex variable to discover
   the main effect of sex on the academic achievement of the
   foreign undergraduate students. As shown in Table 15
   significant difference was found at the .05 level. Females
   were performing better than males as far as the Grade-Point
   Average was concerned.

Table 15. Analysis of variance of academic achievement of undergraduate students by sex, age, and marital status

Source	D.f.	Sum of Squares	Mean Squares	F. Value
Sex	1	1.272572517	1.272572517	4.13
Age	1	0.013132095	0.013132095	.00426
Marital Status	1	1.284602165	1.284602165	4.1721
Sex x Age	1	0.321078300	0.321078300	1.0428
Sex x Marital Status	1	0.054460526	.054460526	.0177
Age x Marital Status	1	0.021460533	0.021460533	.00697
Sex x Age x Marital Status	1	0.152594566	0.152594566	.49558
Error	42	12.932104111	0.307907224	

.05 = 4.07

Table F. Value

.01 = 7.27

2. Analysis of variance was employed for the subjects who were similar in all the factors except the age variable to discover the main effect of age on the academic achievement of the foreign undergraduate students. No significant difference was found between the mean Grade-Point Average of those who were under 25 years old and those who were 25 years or over.

3. Analysis of variance was used for the subjects who were
    similar in all the factors except the marital status
    variable, to discover the main effect of marital status on the
    academic achievement of foreign undergraduate students. As
    shown in Table 15 above, significant difference was found at
    the .05 level. Married foreign students' mean Grade-Point
    Average was significantly higher than single foreign students.

4. Testing the interaction between sex and age, sex and marital
    status, age and marital status, or sex and age and marital
    status resulted in no significant difference at the .05 level
    as indicated in Table 15.

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Interaction Between Sex, Age, and

Marital Status — Graduates

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As on the undergraduate level, and because of the same reason of
the smallness of the size of the sample, testing the interaction between
the different variables was not possible except for the three variables:
sex, age, and marital status.

1. In order to discover the main effect of the sex variable on the
    academic achievement of the foreign graduate students, an
    analysis of variance was employed for the subjects who were
    similar in all the factors except the sex variable. No
    significant difference between the mean Grade-Point Average
    of males and females was found at the .05 level.

2. An analysis of variance was employed for the subjects who were
    similar in all the factors except the age variable in order to

Table 16. Analysis of variance of academic achievement of graduate students by sex, age, and marital status

Source	D.f.	Sum of Squares	Mean Squares	F. Value
Sex	1	0.327748299	0.327748299	2.6
Age	1	0.458072662	0.458072662	3.6
Marital Status	1	0.008769989	0.008769989	.07
Sex x Age	1	0.331357956	0.331357956	.26
Sex x Marital Status	1	0.017713547	0.017713547	.14
Age x Marital Status	1	0.247435570	0.247435570	.20
Sex x Age x Marital Status	1	0.000228882	0.000228882	.0018
Error	61	7.685039520	0.125984251	

$.05 = 4.00$

Table F. Value

$.01 = 7.00$

discover the main effect of age on the academic achievement of the foreign graduate students. As shown in Table 16, no significant difference was found at .05 level between the mean Grade-Point Average of those who were under 25 years old and those who were 25 years or over.

3. In order to discover the main effect of the marital status variable on the academic achievement of the foreign graduate students, an analysis of variance was employed for the subjects

who were similar in all the factors except the marital status variable. No significant difference was found between the mean Grade-Point Average of married and single students.

4. Testing the interaction between sex and age, sex and marital status, age and marital status, or sex and age and marital status resulted in no significant difference as indicated in Table 16.

DISCUSSION

This study was done on the foreign students enrolled in Iowa State University in the Spring Quarter 1968 to determine the possible relationship between the foreign student's academic achievement and some demographic, social, and situational factors.

1. The Age Factor. It was found that the factor of age did not have any significant effect on the student's academic achievement except on the graduate level. But when the main effect of age on the graduate student's academic achievement was tested by taking only the students who were similar in all the factors except the age variable, no significant difference was found. This shows that the significant difference was due to the interaction between the age factor and some other factors. This finding confirms the results of previous research as found in the review of literature in this study. Forstat (2) discovered that the age factor was unrelated to difficulties encountered by foreign students in her sample. Hountras (3) concluded that there was no significant relationship between academic achievement and the age variable of the foreign students. Putnam (8) also found that age had no appreciable relationship with academic achievement of foreign students.

2. The Sex Factor. It was found that the factor of sex had no significant effect on the foreign students' academic achievement on the graduate level. This finding confirms Hountras' (3) conclusion that there was no significant relationship between

academic achievement and sex variable. But, on the other hand, it was found in this study that sex had a significant effect on the foreign students' academic achievement on the undergraduate level. Females performed better than males.

3. The Native Language. It was found that the factor of the native language did not have any significant effect on the foreign students' academic achievement on both the graduate and undergraduate level. To some extent, this finding confirms the results of Putnam's study (8) who found that national origin had no appreciable relationship with the foreign student's academic achievement. On the other hand, Hountras (3) found that there was a significant relationship between the geographical origin of the foreign graduate students and their academic achievement. Students from Far East, Near East, and Latin America were more likely to be on temporary enrollment than those from other parts of the world.

4. The self supported undergraduate foreign students had a significantly higher Grade-Point Average than those who were government supported. This is in contrast with Clark's finding (1) in her study on Ghanaian students in the United States, who, on a pass or fail basis, discovered that significantly more students were passing who held government grants than those who did not. Anyhow, on the graduate level no significant difference was found, and the significant difference which was found on the undergraduate level might

be due to the interaction between the source of support

variable and some or any other variable.

5. Categorizing the foreign students on the basis of the kind of

curriculum did not show any significant difference between the

mean Grade Point Average on both levels graduate and under-

graduate. The same conclusion was made by Elaine Forstat (2)

in her study of international students at Purdue University

where she discovered that the field of study appeared unrelated

to difficulties encountered by foreign students. On the other

hand, Hountras (3) concluded in one of his studies that there

was a significant relationship between academic achievement

and field of study of the foreign students. He found that

students in the social and physical sciences were more apt to

incur probation than those in the other broad academic areas.

6. The marital status factor had no significant effect on the

undergraduate foreign students' academic achievement, but

when the main effect of that factor was tested by taking only

the students who were similar in all the factors except the

marital status variable, significant difference was found at

.05 level. Married students were performing better than single

students. This finding confirms Hountras's (3) who concluded

in one of his studies that there was predictive association

between academic achievement and the marital status of the

foreign students. Clark (1) also, in her study on the

Ghanaian students in the United States, concluded that

significantly more of the married students were satisfied than the single students. On the graduate level the result was reversed. When the marital status factor was interacting with other variables there was significant difference at .05 level, but when the main effect of the marital status variable was tested by taking the students who were similar in all the factors except the marital status no significant difference was found.

7. There was no significant difference between the mean Grade Point Average of foreign graduate or undergraduate students when they were categorized on the basis of the year of study. Forstat (2) also concluded that length of stay in the United States appeared unrelated to difficulties encountered by foreign students at Purdue University. On the other hand, Hountras (3) found predictive association between academic achievement and length of residence in school. Academic difficulties were almost concentrated in the first and second terms of enrollment.

SUMMARY

This study was conducted to determine the relationship between the academic achievement of foreign students at Iowa State University and:

A. Chronological age

B. Sex

C. Native language

D. Source of support

E. Kind of curriculum

F. Marital status

G. The year of study.

The data for the study were gathered from the students' permanent records in the Registrar's office in Iowa State University.

The study included 120 subjects: 50 undergraduates and 70 graduates who were enrolled in the Spring Quarter 1968.

The cumulative Grade-Point Average obtained by the students in Iowa State University was used as the measure of achievement in this study.

Analysis of Variance was used to test the null hypothesis of no difference between the various categories on the basis of the Grade-Point Average.

The findings of this study were as follows:

1. The factor of age had no significant effect on the under-graduate foreign student's academic achievement but there was significant difference at the graduate level at .01 level. (Graduate students who were 25 years old or over had a higher mean Grade-Point Average than those who were under 25 years old.)

This difference might be due to the interaction between age
and some other factors since testing the main effect of the
age factor showed no significant difference at both levels,
graduate and undergraduate.)

2. Categorizing the undergraduate foreign students on the basis
   of sex showed significant difference at the .05 level. Under-
   graduate females had a higher mean Grade Point Average than
   Undergraduate males. On the graduate level the factor of sex
   had no significant effect on the foreign student's academic
   achievement.

3. The Native language factor had no significant effect on the
   foreign student's academic achievement at both levels, graduate
   and undergraduate.

4. The factor of source of support showed no significant effect
   on the academic achievement at the graduate level while at the
   undergraduate level the self-supported students had a signifi-
   cantly higher mean Grade-Point average at the .05 level than the
   government supported students.

5. The factor of kind of curriculum had no significant effect on
   the foreign student's academic achievement at both levels,
   graduate and undergraduate.

6. At the undergraduate level the factor of marital status had no
   significant effect on the academic achievement of foreign
   students but when the main effect of the factor was tested
   there was significant difference at the .05 level. Married

students had a higher mean Grade-Point Average than single students. At the Graduate level the factor of marital status showed significant effect at the .05 level. Married graduate foreign students had a higher mean Grade-Point Average then single graduate students. But when the main effect of the marital status factor was tested there was no significant effect on the academic achievement of graduate students.

7. The factor of the year of study had no significant effect on the foreign student's academic achievement at both levels, graduate and undergraduate.

8. Testing the interaction between sex and age, sex and marital status, age and marital status, or sex and age and marital status resulted in no significant difference at the .05 level at both levels, graduate and undergraduate.

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ACKNOWLEDGMENTS

The author gratefully acknowledges the assistance and encouragement of his major professor, Dr. R. Bryan for his guidance and his helpful comments offered during the development of this thesis.

APPENDIX

This study dealt with foreign students registered in Iowa State University in the Spring Quarter 1968 on both undergraduate and graduate levels.

According to the records in the Foreign Students Adviser's Office there are 500 foreign students. A representative sample of 120 students (50 undergraduates and 70 graduates) was chosen at random from the list of names of foreign students in the Foreign Students Adviser's Office.

Data were collected on the students by checking the items of the following form:

1. Name: ....
2. Sex: ☐ Male   ☐ Female
3. Age: ☐ 20-24 years   ☐ 25 years and over.
4. Native language: ☐ English   ☐ original Latin
                        ☐ Hindi   ☐ Arabic
                        ☐ Chinese   ☐ Persian
                        ☐ Tsai
5. College: ☐ Agriculture   ☐ Engineering
                ☐ Science & Humanities   ☐ Home Economics
                ☐ Veterinary
6. Educational background: ☐ Undergraduate   ☐ Graduate
7. Marital Status: ☐ Single   ☐ Married
8. The Year of Study: ☐ Freshman   ☐ Sophomore
                          ☐ Junior   ☐ Senior
                Years in the graduate college
                          ☐ one year or less
                          ☐ 2 years
                          ☐ 3 years and over
9. Source of Support: ☐ Government   ☐ Self
10. G.P.A. ....