

THE CONSTRUCTION AND VALIDATION OF A SCALE
TO PREDICT SUCCESS IN THE COLLEGE OF EDUCATION
OF THE UNIVERSITY OF PUERTO RICO

A Dissertation
Presented to
the Faculty of the Graduate School
University of Houston

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

by
William Gonzalez

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ABSTRACT

The purpose of this study was to construct and validate a scale for predicting academic success in the College of Education of the University of Puerto Rico. The basis for prediction was the Senior High School Average; the University of Puerto Rico Entrance Examination Test Scores; grades obtained in the first year of the College of General Studies; and the grade obtained in Practice Teaching. The University of Puerto Rico Entrance Examination includes scores in English, Spanish, Numerical Reasoning, Mathematics, and General Information. The subjects included in General Studies are English, Spanish, Physical Sciences, Biological Sciences, Social Sciences and Humanities.

The sample group used for the construction of the predictive scale were students who entered the University of Puerto Rico in the fall of 1957. They were students with no previous college training. Their academic classification after the first year of the College of General Studies was that of secondary education in the College of Education. This classification included the areas of English, Spanish, Social Sciences, History, Science and Mathematics, Industrial Arts, Commercial Education, Physical Education, Home Economics and Mathematics. The subjects were regular students with a program of twelve or more semester hours. The sample

included all students who graduated in the normal four-year period as well as those who for various reasons did not graduate. The number who met this criteria was 68 males and 86 females. Of this total 104 students graduated and 50 did not graduate.

Distribution of the scores was made for each of the four factors in relation to successful or unsuccessful graduation from the College of Education of the University of Puerto Rico. Success implied actual graduation from the College of Education. Letter grades were given numerical value as follows: A, four points; B, three; C, two; D, one; and F, zero. A score sheet was then prepared for each factor by calculating the percentage of successful students in each of the class intervals. Test scores or grades obtained by each of the 154 students were located on the score sheet and converted into point scores. The point scores for each student on each of the predictive factors were then summed to obtain the "Total Predictive Score." "Total Predictive Scores" were then tabulated on the basis of success in graduating from the College of Education. The percentage of successful individuals in each class interval was computed. This distribution was used as the predictive scale.

The validation sample consisted of 100 students randomly chosen who met the same criteria as the original sample, except that they enrolled in the fall semester of 1958.

Test scores and grades obtained by these students were converted into points by using the score sheets and summed to obtain a "Total Predictive Score." This score was then located in the appropriate interval of the predictive scale. If in the interval indicated 50 percent or more of the people whose score fell within this interval graduated from the College of Education, it was predicted that this person would also be successful. Inversely, if the percentage was 49 percent or less, it was predicted that this individual would be unsuccessful in the College of Education. These predictions were accurate in 78 percent of the cases.

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CHAPTER I

THE PROBLEM

Introduction

Education in a democracy is considered one of the inalienable rights of the people. Rousseau's idea of the "general will" gave rise to the concept of mass education. It is believed that education will develop the basic concepts and ideas that will make people intelligent participants of political action. The rapid growth of the United States in all aspects of human endeavor is a direct result of its educational programs.

A simple factor bearing directly on the educational program is the preparation of teachers. All throughout the United States we can see a constant preoccupation for the training of teachers. The training of teachers and the holding power of the system in which the teachers work determine in great measure the success of the educational program.

School systems and both private and public agencies use a great many incentives to improve the preparation of teachers. They also use many ways to induce teachers to stay in the profession.

Education is a very expensive enterprise. It is expensive for the institution, for the government, for the

general public, and for the students. In this respect, institutions are beginning to be more and more selective in the admission of students. At the same time, school systems are attempting to reduce teacher turnover.

Educators throughout the United States are very concerned with all the problems involved in the preparation of teachers. Many ideas have been advanced in relation to recruitment, selection, placement, and guidance of prospective teachers. It is a common practice in the United States for teacher-training institutions to have a well-rounded program of counseling and guidance services which includes recruitment, selection and placement of prospective teachers. Effective counseling of prospective teachers reduces expenditures in time, energy and money.

The training of teachers in Puerto Rico is patterned after that in the United States. Puerto Rico has five institutions of higher learning: the University of Puerto Rico; the Catholic University of Santa Maria; the Academy of the Sacred Heart; the Interamerican University; and the Puerto Rico Junior College. They all have teacher-training programs of instruction. As a state-supported institution, the University of Puerto Rico receives the largest number of students.

The University of Puerto Rico was established in 1903. It has three main campuses: San Juan, with the schools of

Medicine, Odontology, Tropical Medicine, and Public Health; Mayaguez, where all phases of engineering and agriculture are offered, plus a new program of nuclear energy; and the Rio Piedras campus, where the programs of arts and sciences, education, law, public administration, social work are among those offered. The University is accredited by the Middle States Association of Colleges and Secondary Schools. In addition, many of its colleges such as Pharmacy, Law, Education, Engineering, Medicine, Odontology, and others, are accredited by various national organizations of the United States. Instruction is in both English and Spanish, depending on the individual professor. Textbooks are primarily in English. In collaboration with the State Department and U. S. Department of Education the University of Puerto Rico carries on different programs of instruction for students from all over the world. In addition, special programs are prepared for visitors to Puerto Rico. Instruction through television was initiated two years ago. The largest percentage of professors have received their education in the United States. One of the outstanding features of the University of Puerto Rico is its program of scholarships and aids to students. Apendices A and B give information about the growth of enrollment since 1941 and enrolment in the different campuses since 1953.

All graduates of high school who request admission to

the University of Puerto Rico are required to take an entrance examination constructed in Puerto Rico for this purpose. Since the number of applicants is larger than the capacity of the institution, the results of the entrance examination are used as the basic tool for admission.

The result of a student's entrance examination is converted into percentile rank, as is his high school grade point average. The sum of these percentiles gives the admission rank. Students are admitted in descending order from the highest to the lowest. The capacity of the university determines the numerical cut-off. The prospective field of studies of a student may determine his particular cut-off rank. For example, the highest number of points a student may get for his high school average is 4.00 since "A" has a numerical value of 4.00. The highest number of points a student may get from his entrance examination is 295 since this is the total number of points in the entrance examination. The percentile rank for both areas is determined by what he receives in each area. If 10,000 high school students took the test and the capacity of the university for the first year of studies is 2,000 students, the sum of both percentiles for the first two thousand students determines the cut-off rank. If for example, in a given year 200 points is the cut-off rank, then all students above that rank will be admitted. In order to cope with unforeseen

circumstances such as failure to register or attending another institution, the cut-off rank is sometimes lowered.

Upon being admitted, the student attends the College of General Studies where he receives general education in Biology, Physics, Mathematics, Humanities, English, Spanish, and Social Sciences. He may transfer in his sophomore year to the division within the university that he chooses but he has to have passed at least four of the courses mentioned above. He is required to satisfy the rest while taking courses in another division.

The University regulations require that the student maintain a cumulative point average of 1.4 at the end of the first year; 1.7 at the end of the second year; 1.8 at the end of the third year, and 2.00 for graduation, based on 4.0 for A. They also state that after completing the first year of general studies, the student can transfer into any college of the university, provided he has the cumulative point average indicated.

Students may be admitted in advanced standing from other institutions if they have no less than twenty-four credit-hours approved with a cumulative point average of not less than 2.00 in courses equivalent to those of the University of Puerto Rico. At least four of these courses must be equivalent to those offered in General Studies. Upon admission he is required to complete the courses which are offered

in General Studies if not already substituted. These courses may be taken concurrently with other courses offered by other divisions of the university or of the college in which he will be doing his major work.

The College of Education of the University of Puerto Rico is the division basically responsible for the preparation of teachers for the schools of Puerto Rico. It has two basic programs, Bachelor of Arts in Elementary Education and Bachelor of Arts in Secondary Education. It also has post-bachelor diplomas in School Administration and Guidance. In order to help supply the great need for teachers, students who want elementary education can follow an alternate plan. This plan requires 39 credit-hours in education after the first year of general studies. It may be completed in two years and one summer session. After completion of the alternate plan, students may either finish the four-year elementary program or change to secondary education.

In the secondary school program of instruction, the student completes three years of instruction after the first year of general studies. He needs two concentrations in related subjects taught in secondary schools. The basic fields of instruction in secondary education include English, Spanish, Social Sciences, Mathematics, Home Economics, Physical Education, Commercial Education and Industrial Arts.

The basic difference between programs is in emphasis,

since one or more concentrations are needed in both programs. A student who finishes the four-year elementary program has one or more concentrations. He may change to secondary education by taking a course in the methodology of the subject to be taught and a seminar in secondary education. The same principle applies to students who want to change from secondary to elementary education. After completing the prescribed course of studies he receives his bachelor's degree in either elementary or secondary education. The reader is referred to Appendices C and D for information in regard to enrollment in both programs. A description of the curriculum of both programs is included in Appendix E.

Students are admitted to the College of Education after satisfactory completion of the first year of General Studies of the University of Puerto Rico. Admission to the College of Education on the basis of transfer from other colleges of the University of Puerto Rico or from any other accredited college or university, requires that the applicant have a grade index of 2.00 or above.

Actually no specific admission policies have been developed by the College of Education. The requirement for entering the second year of University work in the College of Education is the same as that for entering any other department, namely, the completion of the one-year General Studies with a minimum grade index of 1.4 as mentioned above.

There is no selective admission and retention in the College of Education other than that pertaining to students who transfer from other divisions of the university or from other institutions as indicated above.

There is no specific criteria to admit students into student teaching. University regulations specify that a student cannot be denied practice teaching if he has the cumulative point average indicated above.

Students are assigned to student-teaching in the fall or winter terms based on graduation date, grades in area of concentration, general point average, number of credit-hours on major and whether they have taken the course on the methodology of the subject to be taught.

Guidance to all students in the College of Education is offered through the Office of Guidance Services. This office is staffed by five full time counselors and ten part-time counselors, all members of the faculty of the College of Education. The University Guidance Center also offers services to students of the College of Education who are referred by the Office of Guidance Services of this college.

In addition to the personnel mentioned above, the Office of Guidance services also has one professional counselor in the University Elementary School and another one in the University High School. Psychological services are offered in both schools on a part-time basis. The Guidance

Program is then coordinated from the elementary school to college.

In 1960 the Office of Guidance Services of the College of Education was created as a responsibility of the Assistant Dean in charge of student affairs. Guidance is more of the information type than anything else.

It is not the purpose of this study to deal extensively with the services provided by the office of Guidance Services or by enumerating the problems or limitations easily discernible.

Due to the large number of students in the College of Education and lack of basic research in counseling in its local environment, the problem of counseling students is one of paramount importance. Upon entering the College of Education the student has to select the level of instruction he is to follow and the major area of concentration. It is at this stage that the student really needs effective counseling.

The College of Education does not offer services for the placement of its graduates. The State Department of Education is in charge of this function. Once the student successfully completes his training in the College of Education and is awarded a degree, his placement depends upon his position in a list of eligibles prepared by the Department of Education. Certification to teach in the schools of Puerto Rico is made by the Department of Education after receiving

an official list of candidates from the Registrar of the University of Puerto Rico. The Registrar, in turn, prepares the list after receiving a certified list of students who completed the degree requirements of the College of Education.

There is no organized program of follow-up of graduates of the College of Education although special follow-up studies have been done in the past. The writer of this paper is in the process of conducting a follow-up study of graduates of secondary education.

Statement of the Problem

The purpose of this study was to construct and validate a scale for predicting academic success in the College of Education of the University of Puerto Rico. Success was established as achieving a cumulative point average of not less than 2.00 upon graduation, in the light of present regulations. The basis for prediction was the Senior High School Average; the University of Puerto Rico Entrance Examination Test Scores; grades obtained in the first year of the College of General Studies and the grade obtained in Practice Teaching. The University of Puerto Rico Entrance Examination is required of all students who attend college for the first time. It includes scores in English, Spanish, Numerical Reasoning, Mathematics and General Information. The College of General Studies offers instruction in English, Spanish, Physical Sciences, Biological Sciences, Social

Sciences and Humanities.

Importance of the Study

At the present time very little use is made for counseling purposes of information already gathered on each student. This information includes high school average, University of Puerto Rico Entrance Examination Test Scores and grades in the first year of General Studies. No research has been conducted to determine the predictive value or practical use of this information.

Upon entering the College of Education the student is faced with the problem of selecting the level of instruction and the area of concentration in which he is going to do his teacher training while in College. This implies that the student has to select one or two subject matter areas of related subjects taught in the schools of Puerto Rico as his major concentration and either the elementary or secondary level of instruction.

It is not known what factors-interests, capacities, abilities, potential-the student takes into consideration when he makes the selection of his major, or of his level of instruction.

This study, then, attempts to bring into the counseling situation a tool or instrument by which the information already filed on each student may be used more effectively. This will not only simplify the counseling process but also

will avoid waste of time and money of the student as well as of the institution.

It will also help students plan their college life on a long-range basis, diminishing unnecessary changes in areas of concentration or fields of studies. It will also serve as a pioneer approach that other colleges of the institution could initiate to counsel their students. It is also hoped that this study will encourage additional research in areas which would be of practical value to the counseling services within the college.

CHAPTER II

REVIEW OF LITERATURE

Education in Europe and Latin America is rather selective; it is the privilege of the few although primary education is open to all. Education in the United States is a birthright of all. Everything possible is done in the United States so that the greatest number of people get the greatest amount of education. In such a program of mass education on all levels lies the advancement of the United States over all other nations of the world.

By its very nature, the concept of mass education brings with itself innumerable problems. One of the vital problems facing the American people today concerns education beyond secondary schools. The vast number of students finishing high school and wanting to go to college creates one of the most difficult problems for institutions of higher learning. Who shall be admitted? Who is the best risk? Who shall profit more from college training? What criteria shall be used to select or eliminate? These are some of the problems to be solved. The problem is aggravated when the institution has limited physical facilities, limited resources and limited personnel. Today, as in the past, answers are being sought.

Selective admission on the basis of certain predictive criteria has been constantly used. In the past high school grades or rank was predominantly used. The use of high school grades as predictors of college success has been the subject of innumerable studies. There is evidence to show that high school grades are the best single evidence to predict college achievement (2;9)¹

The problem in academic prediction is to prevent gross error and to cut waste. This is the reason why techniques are being constantly examined to improve prediction from grades. For instance there have been attempts to take into consideration the variability of grading systems and to use student experience records. Efforts are constantly being made to find a single predictor although a combination of several predictors is used by many colleges. The most common procedure involves combining the high school grades with achievement or aptitude tests. The validity of this procedure has been substantiated by various studies (2;25).

A new concept of prediction is advanced by Robert J. Havighurst (9). He studied the children of a community for nine years and was able to predict not only academic success in high school and first year of college but also social and economic success. It is a longitudinal study which takes

¹The first number refers to the bibliographical entry while the second indicates the page.

into account all possible factors which affect success in its widest concept. "Personal and social adjustment takes its place besides socioeconomic status and intellectual ability as probable predictive of success or failure in school" (2;35).

The studies on academic prediction are rather extensive as indicated above. The construction of scales to predict academic success can be traced to the adaptation made by Ford (6) of the Delinquency Prediction Scale originally developed by Glueck and Glueck (8) in the field of sociology to predict recidivism of juvenile delinquents. Ford used the same method to predict academic success and persistence at the high school level.

The prediction of academic success by means of the techniques used in this study has been investigated extensively by Bloom (2), Cone (3), Dunn (4), Einspahr (5), Ford (6), Gillespie (7), Johnson (10), Moore (11), Morriss (12), Neumeyer (13), Richards (14), Sloan (15), Taulbee (16) and others. Predictive scales have been constructed to predict success in certain courses, schools or colleges. Most of the scales constructed used the results of certain standardized tests as factors for prediction. Whether for predicting success in a given course or in a school within the university, the scales were found to have predictive validity.

One basic recommendation stands out from work done in the construction of predictive scales. This has to do with

further research and application of the procedure for the construction of the scale in the local level.

This study attempts to use the same procedure for the construction of prediction scales which has been most extensively used at the University of Houston.

CHAPTER III

MATERIALS AND METHODS

The Sample Group

The subjects for this study were students who entered the University of Puerto Rico in the fall of 1957. They were students with no previous college training. Their academic classification after the first year of the College of General Studies was that of secondary education in the College of Education. This classification included the areas of English, Spanish, Social Sciences, History, Science and Mathematics, Industrial Arts, Commercial Education, Physical Education, Home Economics and Mathematics. The subjects were regular full-time students with a program of twelve or more semester hours. The sample included all students who graduated in the normal four-year period as well as those who for various reasons did not graduate. The number who met this criteria was 68 males and 86 females. Of this total, 104 students graduated and 50 did not.

Materials Used

The four factors included in the study were the following: (1) Senior High School point average; (2) the University of Puerto Rico Entrance Examination Test Scores; (3) the grades obtained in the basic courses of the first

year of the College of General Studies; and (4) the grade obtained in Practice Teaching.

The Senior High School of Puerto Rico is a three year institution which requires for graduation twelve credits in the following areas: English, Spanish, Science, Mathematics and Social Sciences. An average is computed on the basis that the letter grade "A" has a numerical value of four points, "B" three, "C" two, "D" one, and "F" zero.

The University of Puerto Rico Entrance Examination is an instrument constructed locally for admission purposes. It covers the areas of English, Spanish, Mathematics, Reasoning (Quantitative and Qualitative), and General Information. Each area has a total of 90, 60, 60, 60, and 25 points respectively, for a possible total score of 295 points. Each area is timed ranging from fifty minutes for English to ten minutes for General Information. The score on each area is summated and the total converted to a percentile score. This test is not standardized and is modified every year.

The College of General Studies offers instruction in the following subjects, English, Spanish, Physical Sciences, Biological Sciences, Social Sciences and Humanities.

Practice teaching is required of all prospective teachers. It is extended for three and a half hours a day for a whole term.

Phases of the Study

The first phase of the study was concerned with the selection of the sample group and the collection of data on each subject. Using the Master List of Students prepared by the Registrar, a list was prepared of all student whose identification number started with the prefix "57" for the year of admission, and who was classified as a major in secondary education at the beginning of the second year. The Graduation List for 1961 was then studied to ascertain the names of these students who had graduated in four years and those who had not graduated. The official transcript of credits for each student included in this study was studied to get the data on high school average, grades in General Studies, grade in Practice Teaching, graduation index, area of concentration, and classification. Students who had been admitted in 1957 with advanced standing or who had been granted a high school diploma under the Adult Education program of the Department of Education were eliminated from the sample. Students who for any reason were not required to take the UPR entrance examination or the first year of General Studies were also eliminated. A further elimination included students who had initially entered the program of elementary education and later changed to secondary education. The final part of the first phase was to study the official record of each subject maintained in the admission office to

collect the results of the entrance examination.

The second phase consisted of the construction of the scale. The third phase was concerned with the validation of the scale.

Procedure

The data gathered on each student of the sample group was transferred to a special sheet for tabulation purposes. Letter grades were assigned numerical values as follows: A letter grade of "A" was equal to four points; "B" equal to three points; "C" equal to two points; "D" equal to one point; and "F" equal to zero. An IBM Card was then punched which included all the information on the special sheet. On each subject, the punched card included the following information: (1) High School Average; (2) University of Puerto Rico Entrance Examination Test Scores; (3) Total score for the entrance examination; (4) Grades obtained in General Studies; (5) Total score for grades in General Studies; (6) Grade in Practice Teaching; (7) Grand Total of the High School Average, Total score of the Entrance Examination, Total value of grades in General Studies and Practice Teaching; (8) Graduation Index; and (9) Major Area of Concentration.

The sample was grouped according to a successful-unsucessful dichotomy with the dividing line set at 2.00 upon graduation since this was the point average required at the

University of Puerto Rico to earn an under-graduate degree; unsuccessful was defined as achieving less than 2.00 for the same period. Included in this group were those students who for various reasons in addition to point average did not graduate in the four-year period.

A frequency distribution was made for each of the areas included in the four factors and the scores tabulated into frequency columns, one labeled "Successful" and the other "Unsuccessful," according to the defined dichotomy. A "Score Sheet" was developed for each area included in the study. This indicated the interval and the per cent of students in each interval. The summation of scores obtained by each student in each "Score Sheet" determined each student's "Total Predictive Score." This in turn was used to construct the predictive scale.

The validation of the predictive scale was made using a representative group of students randomly selected who entered the University of Puerto Rico in the fall of 1958 and met the same criteria as the original sample for the study. The steps used in the validation procedure were as follows: (1) a score was obtained for each student for each of the predictive factors; (2) scores for each student were obtained from the "Score Sheet" for each variable and then summed to obtain the "Total Predictive Score;" (3) predictions of "success" (above 2.0) or "failure" (below 2.0) were made from

the predictive scale; (4) compare the predictions with the cumulative point average actually made during the four-year period.

CHAPTER IV

CONSTRUCTION OF THE PREDICTIVE SCALE

The four factors (Senior High School Average, University of Puerto Rico Entrance Examination Test Scores, Grades in the first year of the College of General Studies and Grade in Practice Teaching) were used as the basis for predicting academic success in terms of a cumulative point average of 2.00 or more upon graduation in four years from the College of Education of the University of Puerto Rico. Each factor was used to determine academic potential. All factors were combined into a single predictive instrument so that knowing a student's level in relation to each factor a prediction may be made which takes into consideration all predictive factors and will enable prediction not only of success in relation to a given factor but also success as far as graduation from the College of Education of the University of Puerto Rico.

The first step in the construction of the "Predictive Scale" was that of setting up a "Score Sheet." This specific "Score Sheet," Table I, consisted of a frequency distribution of scores for each of the factors and the percentage in each interval who were "successful."

The next step in the construction of the scale was to secure the "Predictive Score" for each of the students included in the sample by means of the "Score Sheet."

TABLE I

SCORE SHEET FOR PREDICTING WHETHER A STUDENT WILL SUCCEED
IN THE COLLEGE OF EDUCATION OF THE UNIVERSITY OF PUERTO RICO

PREDICTIVE FACTORS AND SUB-CATEGORIES	N	SUCCESSFUL		UNSUCCESSFUL	
		No.	%	No.	%
High School Average					
3.50 - 4.00	41	33	71	8	29
3.00 - 3.49	60	35	58	25	42
2.50 - 2.99	48	33	73	15	27
2.00 - 2.49	5	3	60	2	40
TOTAL	54	104		50	
UPR Entrance Examination English					
66 and above	6	6	100	0	
61 - 65	8	6	75	2	25
56 - 60	21	16	76	5	24
51 - 55	22	17	77	5	23
46 - 50	16	8	50	8	50
41 - 45	24	17	71	7	29
36 - 40	26	15	58	11	42
31 - 35	14	9	64	5	36
26 - 30	12	7	58	5	42
21 - 25	4	2	50	2	50
20 and below	1	1	100	0	
TOTAL	154	104		50	
UPR Entrance Examination Spanish					
41 and above	4	3	75	1	25
36 - 40	7	6	86	1	14
31 - 35	13	9	69	4	31
26 - 30	39	29	74	10	26
21 - 25	45	33	73	12	27
16 - 20	37	17	46	20	54
15 and below	9	7	78	2	22
TOTAL	154	104		50	

TABLE I (Continued)

PREDICTIVE FACTORS AND SUB-CATEGORIES	N	SUCCESSFUL		UNSUCCESSFUL	
		No.	%	No.	%
UPR Entrance Examination					
Numerical Reasoning					
51 and above	5	4	80	1	20
46 - 50	32	20	63	12	37
41 - 45	34	24	76	10	24
36 - 40	29	23	79	6	21
31 - 35	34	23	68	11	32
26 - 30	12	7	58	5	42
21 - 25	7	3	43	4	57
20 and below	1	0	0	1	100
TOTAL	154	104		50	
UPR Entrance Examination					
Mathematics					
50 and above	1	1	100	0	0
45 - 49	1	1	100	0	0
40 - 44	4	3	75	1	25
35 - 39	11	10	91	1	9
30 - 34	17	8	47	9	53
25 - 29	32	25	71	7	29
20 - 24	37	22	59	15	41
15 - 19	35	24	69	11	31
10 - 14	14	8	57	6	43
9 and below	2	2	100	0	0
TOTAL	154	104		50	
UPR Entrance Examination					
General Information					
25 and above	1	1	100	0	0
22 - 24	2	2	100	0	0
19 - 21	14	10	71	4	29
16 - 18	36	26	72	10	28
13 - 15	29	20	69	9	31
10 - 12	33	23	70	10	30
7 - 9	26	14	54	12	46
4 - 6	12	7	58	5	42
3 and below	1	1	100	0	0
TOTAL	154	104		50	

TABLE I (Continued)

PREDICTIVE FACTORS AND SUB-CATEGORIES	N	SUCCESSFUL		UNSUCCESSFUL	
		No.	%	No.	%
Grades in General Studies					
Spanish					
A	13	13	100	0	0
B	63	46	73	17	27
C	78	45	58	33	42
TOTAL	154	104		50	
Grades in General Studies					
English					
A	10	10	100	0	
B	51	38	75	13	25
C	74	48	65	26	35
D	18	8	44	10	56
F	1	0	0	1	100
TOTAL	154	104		50	
Grades in General Studies					
Physical Sciences					
A	4	4	100	0	
B	25	21	84	4	16
C	79	56	71	23	29
D	33	23	70	10	30
F	0	0	0	0	0
Not taken	13	0	0	13	100
TOTAL	154	104		50	
Grades in General Studies					
Biological Sciences					
A	3	3	100	0	0
B	19	17	89	2	11
C	86	63	73	23	27
D	34	21	62	13	38
F	2	0	0	2	100
Not taken	10	0	0	10	100
TOTAL	154	104		50	

TABLE I (Continued)

PREDICTIVE FACTORS AND SUB-CATEGORIES	N	SUCCESSFUL		UNSUCCESSFUL	
		No.	%	No.	%
Grades in General Studies					
Humanities					
A	10	8	80	2	20
B	45	38	84	7	16
C	80	50	63	30	37
D	19	8	46	11	54
TOTAL	154	104		50	
Grades in General Studies					
Social Sciences					
A	9	9	100	0	0
B	27	25	93	2	7
C	94	61	54	33	46
D	20	9	45	11	55
Not taken	4	0	0	4	100
TOTAL	154	104		50	
Practice Teaching					
A	34	34	100	0	0
B	58	58	100	0	0
C	11	11	100	0	0
D	1	1	100	0	0
Not taken	50	0	0	50	100
TOTAL	154	104		50	

The procedure used can best be shown by an example. The scores on each factor by one of the student were as follows: High School Average, 3.00; University of Puerto Rico Entrance Examination Test Scores, English 53, Spanish 28, Numerical Reasoning 39, Mathematics 24, General Information 9; Grades in General Studies - Spanish C, English B, Physical Sciences D, Biological Sciences C, Humanities B, Social Sciences A; and Practice Teaching B. His High School average of 3.00 falls in the interval 3:00 - 3:49 in the "Score Sheet." In this interval 58 per cent of the students were found to be successful. This student then was given 58 points toward his "Total Predictive Score." For each of the other scores he would get the following figures: UPR Entrance Examination Test Scores, English 77, Spanish 74, Numerical Reasoning 79, Mathematics 59, General Information 54; Grades in General Studies, Spanish 58, English 75, Physical Sciences 70, Biological Sciences 73, Humanities 84, Social Sciences 100; Practice Teaching 100. The points he earned on all factors were summed. The "Total Predictive Score" for this student turned out to be 961. In like manner, the "Total Predictive Scores" for all students included in the sample were obtained by means of the "Score Sheet," Table I.

The third step in the construction of the "Predictive Scale" was to make a frequency distribution of the 154 "Total Predictive Scores," as set up in Table II. After the

TABLE II

SCALE FOR PREDICTING ACADEMIC SUCCESS OF STUDENTS AT THE
COLLEGE OF EDUCATION OF THE UNIVERSITY OF PUERTO RICO

TOTAL PREDICTIVE SCORE INTERVALS	N	SUCCESSFUL		UNSUCCESSFUL	
		No.	%	No.	%
1151 and above	1	1	100	0	0
1100 - 1150	2	2	100	0	0
1049 - 1099	6	6	100	0	0
998 - 1048	12	12	100	0	0
947 - 997	20	18	90	2	10
896 - 946	41	40	98	1	2
845 - 895	26	21	80	5	20
794 - 844	3	3	100	0	0
743 - 793	3	1	33	2	67
692 - 742	0	0	0	0	0
641 - 691	6	0	0	6	100
590 - 640	10	0	0	10	100
539 - 589	11	0	0	11	100
488 - 538	8	0	0	8	100
487 and below	5	0	0	5	100
TOTALS		154	104	50	

intervals were decided upon, each "Total Predictive Score" was tabulated under one of the two columns, "Successful" or "Unsuccessful," according to whether the student had graduated or not. Table II then constitutes the "Predictive Scale."

The statistical analysis of the data used for the construction of the scale is shown on Tables III and IV. The approach used for this analysis is that of simple correlation or the relationship between two variables. This approach is also known as simple regression. When certain data on two variables are plotted graphically the result is known as a scatter diagram. On Figures 1 through 11 we can see the relationship between the factors used in the construction of the scale. If there is a definite relationship resulting from the plotting of the data on the graph the points will follow a definite trend. The relationship may be perfect or imperfect. A perfect relationship is one in which all the points on the graph coincide with a line or curve instead of forming a path across the face of the scatter diagram. A scatter is a more or less imperfect relationship since the points tend to depart from the indicated line or curve. The trend or direction of movement may be shown by means of a line or curve. The resulting line or curve is called line or curve of regression.

The coefficient of correlation, r , is a measure of the degree of association between two variables. In a perfect

TABLE III

RELATIONSHIP BETWEEN FACTORS FOR THE CONSTRUCTION OF THE
PREDICTIVE SCALE

PREDICTING FACTOR	FUNCTIONAL RELATIONSHIP				COEFFICIENT OF CORRELATION	COEFFICIENT OF DETERMINATION	STANDARD ERROR OF ESTIMATE
UPR Entrance Examination Test Scores	U ¹	= 109.38	plus 11.47	H ¹	plus 0.18 ^b	0.032	27.60
Grades in General Studies	G	5.34	"	2.39	H " 0.32 ^a	0.102	3.05
Practice Teaching	P	2.56	"	0.20	H " 0.13 ^b	0.017	0.64
Graduating Index	I	1.41	"	0.32	H " 0.32 ^a	0.102	0.40
Grades in General Studies	G	5.12	"	0.05	U " 0.47 ^a	0.221	2.84
Practice Teaching	P	2.87	"	0.002	U " 0.10 ^b	0.010	0.65
Graduating Index	I	1.67	"	0.005	U " 0.34 ^a	0.116	0.40
Practice Teaching	P	2.82	"	0.027	G " 0.12 ^b	0.014	0.64
Graduating Index	I	1.06	"	0.106	G " 0.80 ^a	0.640	0.25
Graduating Index	I	2.18	"	0.12	P " 0.23 ^a	0.053	0.35
Graduating Index	I	0.76	"	0.004	T " 0.47 ^a	0.221	0.37

- 1 U = UPR Entrance Examination Test Scores
H = High School Average
G = Grades in General Studies
P = Grade in Practice Teaching
I = Graduating Index
T = Grand Total of all Factors (UPR Entrance Examination Test Scores, High School Average, and Grades in General Studies).

Sample Size: 154

- a 0.226 Coefficient of correlation at the 1% level of significance (Fisher's Statistical Tables)
- b 0.172 Coefficient of correlation at the 5% level of significance (Fisher's Statistical Tables)

TABLE IV
SUMMARY OF AVERAGE VALUES AND STANDARD DEVIATIONS
FOR THE CONSTRUCTION OF THE PREDICTIVE SCALE

FACTORS	AVERAGE VALUE	STANDARD DEVIATION	COEFFICIENT OF VARIATION ²
H ¹	3.16	0.43	13.6
U ¹	145.74	28.06	19.3
H	3.16	0.43	13.6
G	12.93	3.22	24.9
H	3.16	0.43	13.5
P	3.20	0.65	20.1
H	3.16	0.43	13.6
I	2.42	0.42	17.4
U	145.74	28.06	19.3
G	12.93	3.22	24.9
U	149.11	28.90	19.4
P	3.20	0.65	20.1
U	145.74	28.06	19.3
I	2.42	0.42	17.4
G	14.01	3.00	21.4
P	3.20	0.65	20.1
G	12.93	3.22	24.9
I	2.42	0.42	17.4
P	3.20	0.65	20.1
I	2.58	0.36	14.0
T	477.81	57.66	12.1
I	2.42	0.42	17.4

- 1 U = UPR Entrance Examination Test Scores
H = High School Average
G = Grades in General Studies
P = Grade in Practice Teaching
I = Graduating Index
T = Grand Total of all Factors (UPR Entrance Examination Test Scores, High School Average, and Grades in General Studies).

- 2 Coefficient of variation = standard deviation divided by the average value and expressed in percentage.

correlation $\underline{r}$ has a value of plus or minus 1. In some problems investigators will look upon $r = \text{plus } 0.90$ as small, while for others $r = \text{plus } 0.20$ may be considered as unusually large.

No relationship is perfect; therefore, the actual values will not coincide with the theoretical values estimated from the regression line. If the scatter is definitely measured, the variation may then be allowed for and a range established within which a given range of values will fall. Thus, the standard error of estimate is used for this purpose. The standard error of estimate is a measure of the variation or scatter of the observations above or below the line of regression. The standard error of estimate is used in the same manner as the standard deviation. Tables III and IV show the functional relationship, coefficient of correlation, coefficient of determination, standard error of estimate, average values, standard deviation and coefficient of variation of all factors used for the construction of the scale. The relationship between factors is also shown on Figures 1 through 11.

In Table III it can be seen that the best single predictor of success at the College of Education is the grades obtained in General Studies. The coefficient of correlation between the grades in General Studies and the graduating index is plus 0.80. The high Coefficient of Determination

between these factors, 0.640, means that graduation can be predicted on the basis of the grades obtained in General Studies with a 64 percent of accuracy on a similar sample group. Graphically it can be seen on Figure 9 the high degree of correlation since the observations are around the line and not scattered. The relationship between factors is shown on Figures 1 through 11 which follow.

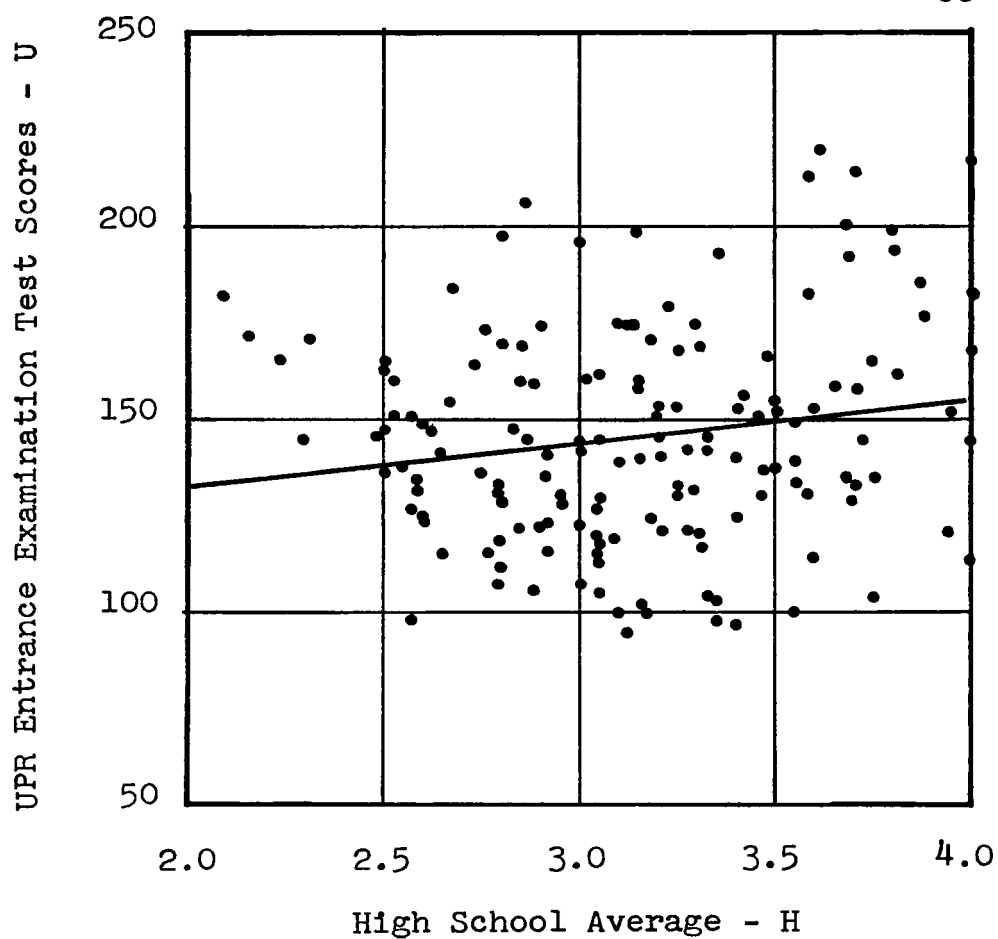


FIGURE 1

RELATIONSHIP BETWEEN UNIVERSITY OF PUERTO RICO
ENTRANCE EXAMINATION TEST SCORES AND HIGH SCHOOL
AVERAGE FOR THE CONSTRUCTION OF THE PREDICTIVE SCALE

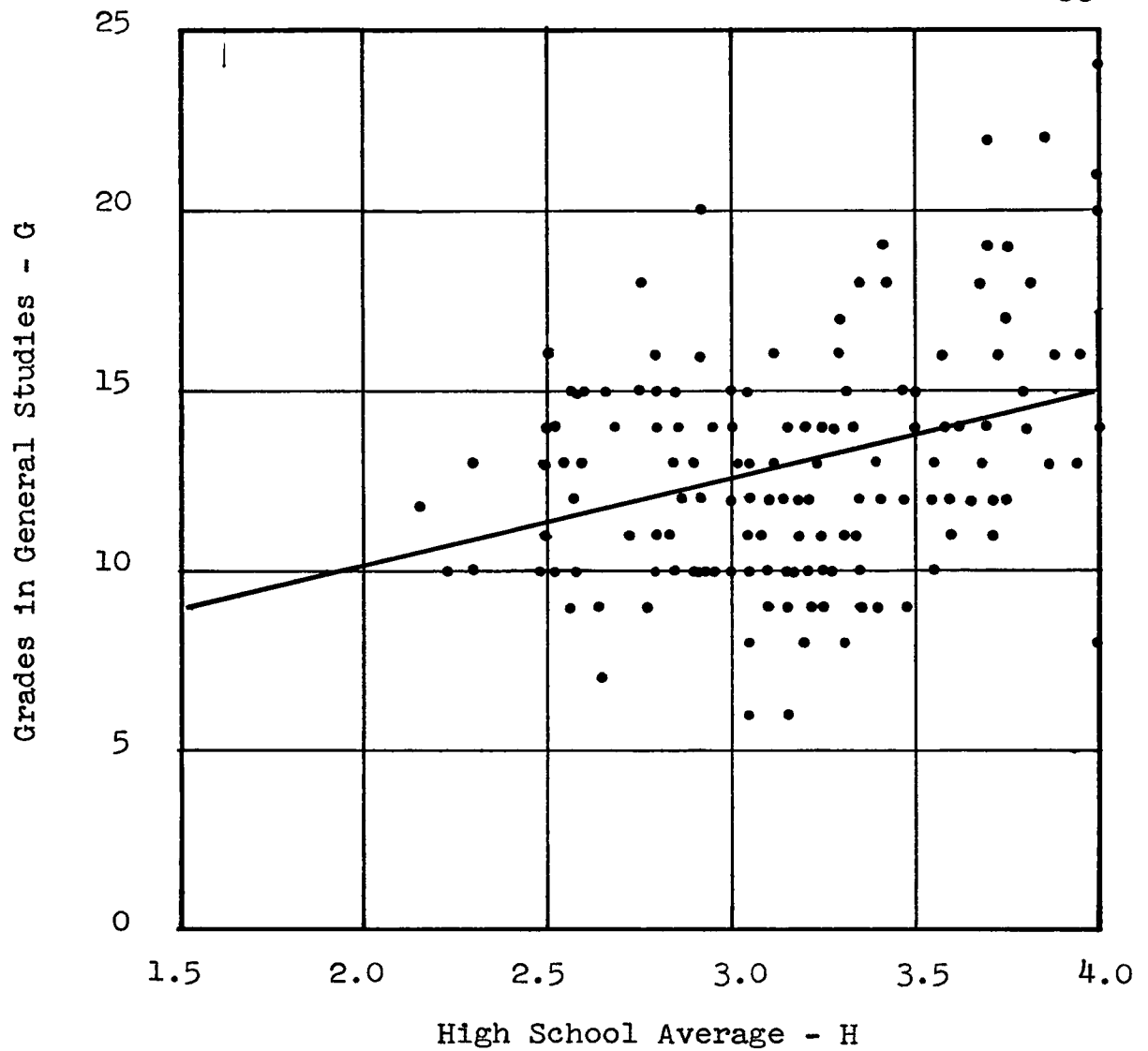


FIGURE 2

RELATIONSHIP BETWEEN GRADES IN GENERAL STUDIES
AND HIGH SCHOOL AVERAGE FOR THE CONSTRUCTION
OF THE PREDICTIVE SCALE

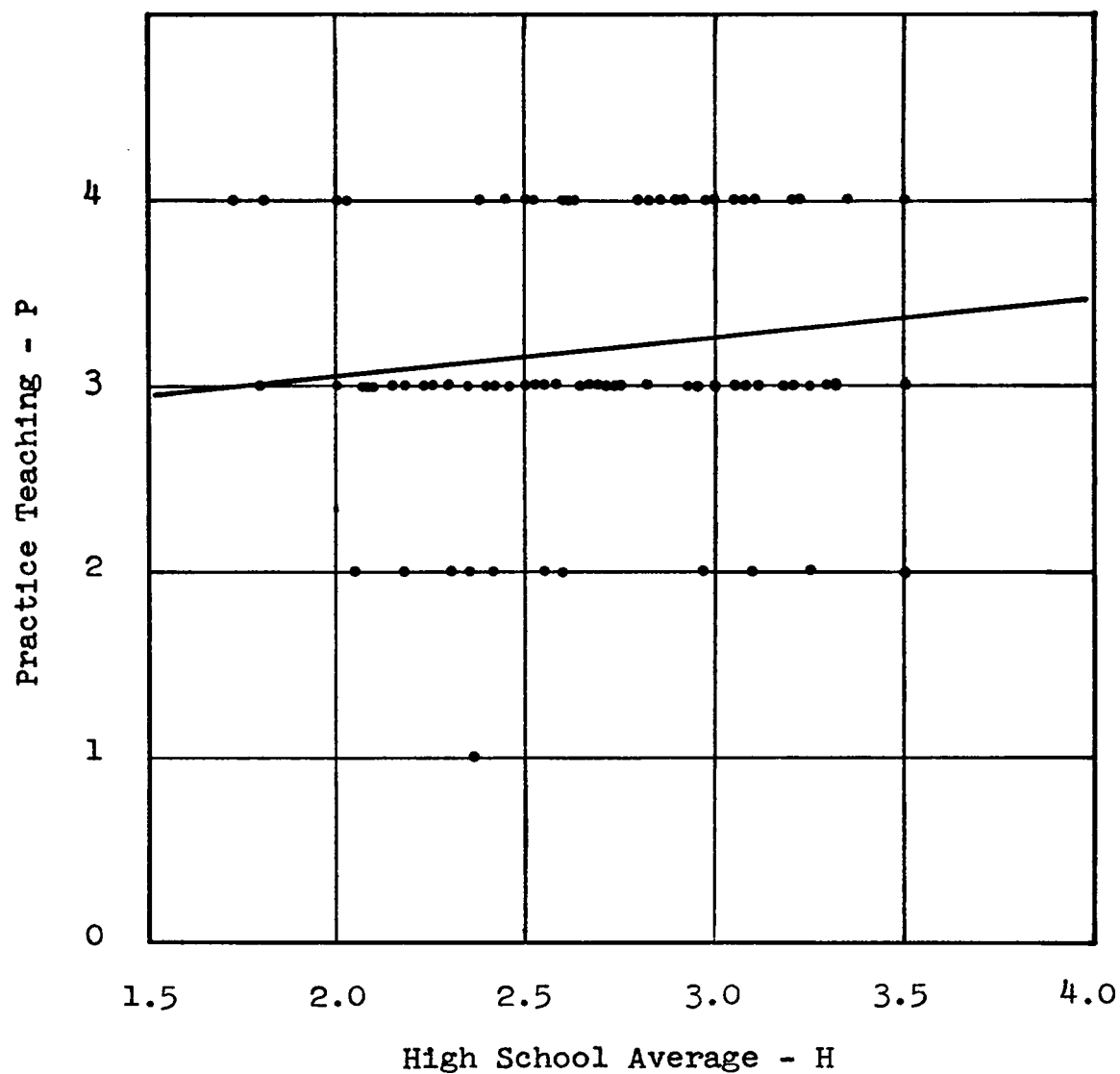


FIGURE 3

RELATIONSHIP BETWEEN PRACTICE TEACHING AND
HIGH SCHOOL AVERAGE FOR THE CONSTRUCTION OF THE SCALE

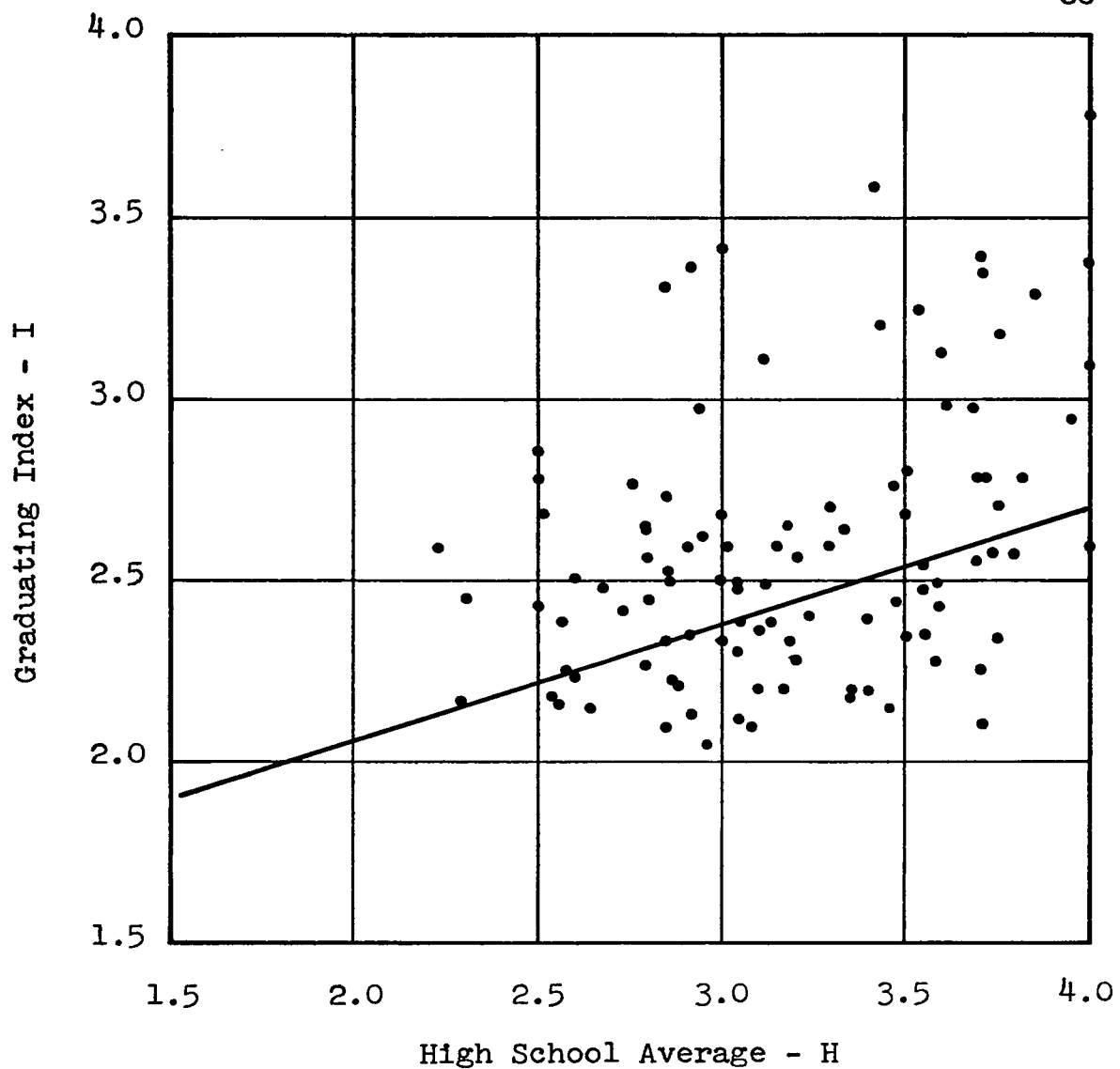


FIGURE 4

RELATIONSHIP BETWEEN GRADUATING INDEX AND
HIGH SCHOOL AVERAGE FOR THE CONSTRUCTION
OF THE PREDICTIVE SCALE

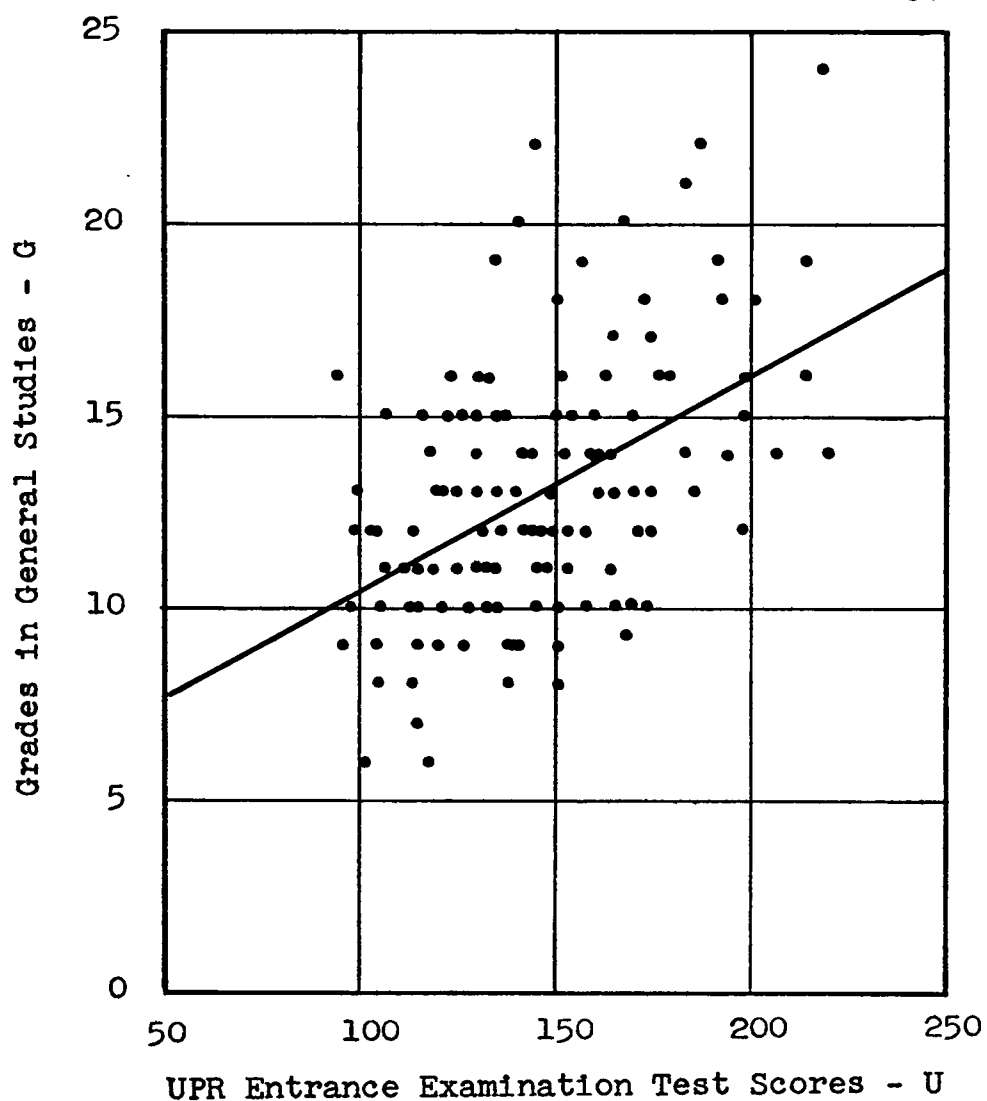


FIGURE 5

RELATIONSHIP BETWEEN GRADES IN GENERAL STUDIES
AND UPR ENTRANCE EXAMINATION TEST SCORES
FOR THE CONSTRUCTION OF THE SCALE

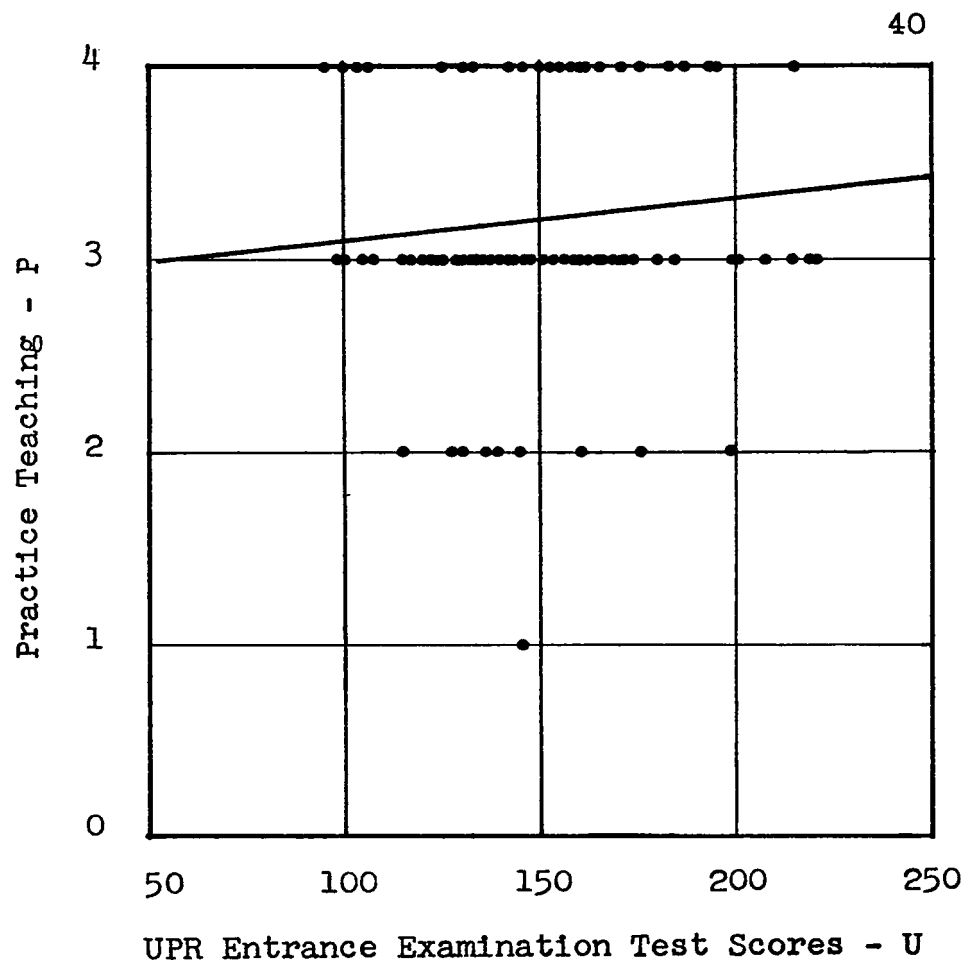


FIGURE 6

RELATIONSHIP BETWEEN PRACTICE TEACHING AND
UPR ENTRANCE EXAMINATION TEST SCORES FOR
THE CONSTRUCTION OF THE PREDICTIVE SCALE

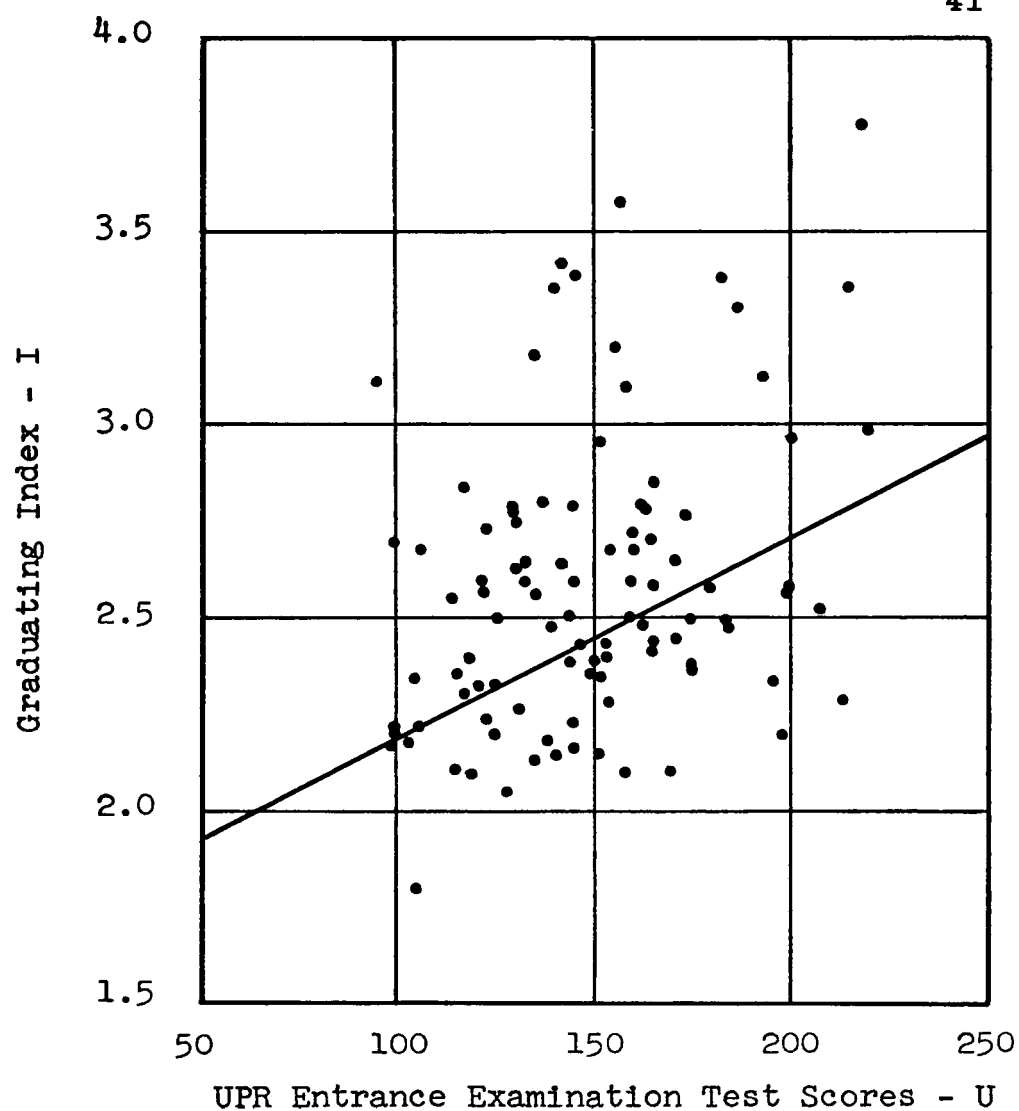


FIGURE 7

RELATIONSHIP BETWEEN GRADUATING INDEX AND
UPR ENTRANCE EXAMINATION TEST SCORES
FOR THE CONSTRUCTION OF THE SCALE

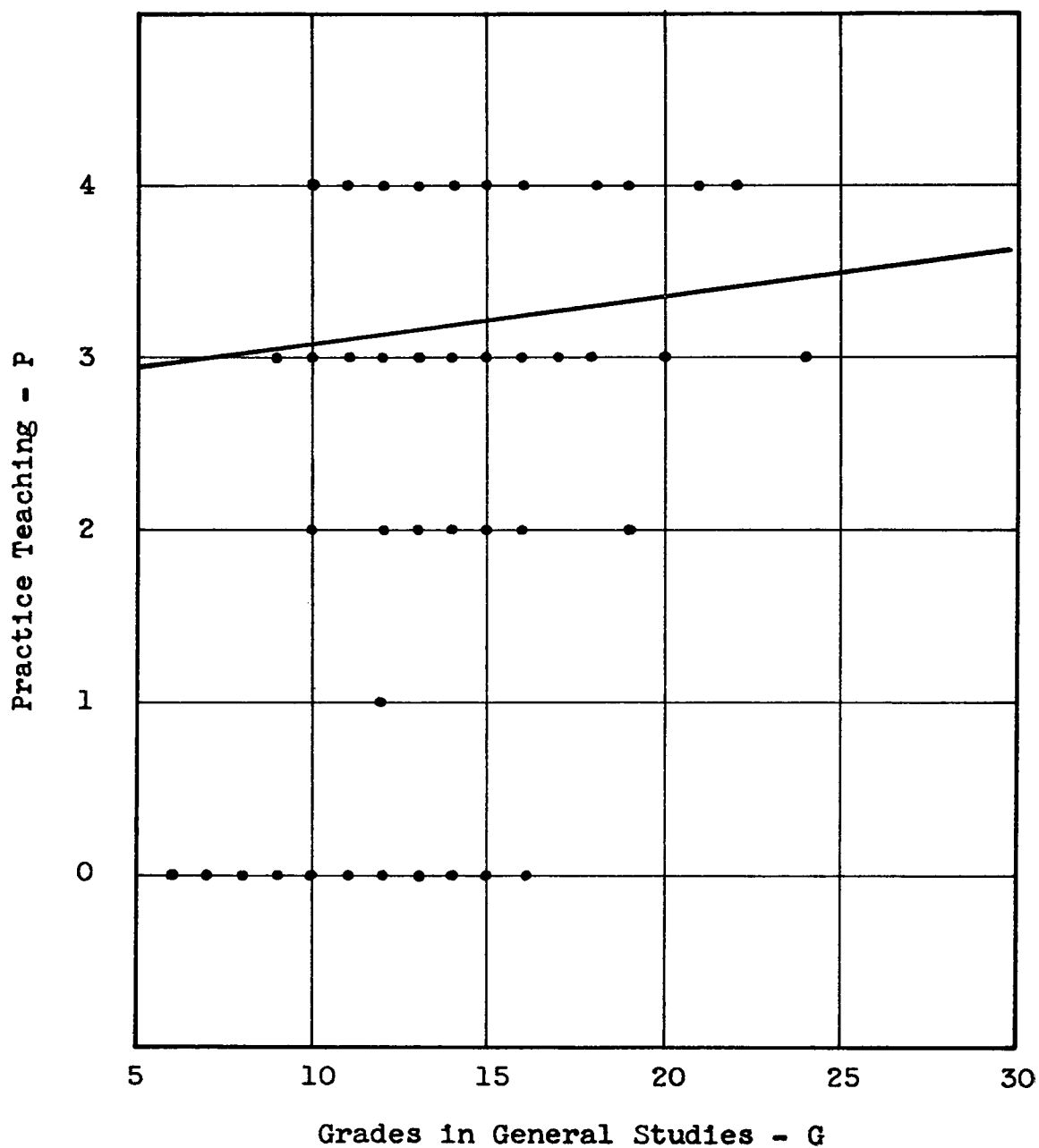


FIGURE 8

RELATIONSHIP BETWEEN PRACTICE TEACHING AND GRADES
IN GENERAL STUDIES FOR THE CONSTRUCTION
OF THE PREDICTIVE SCALE

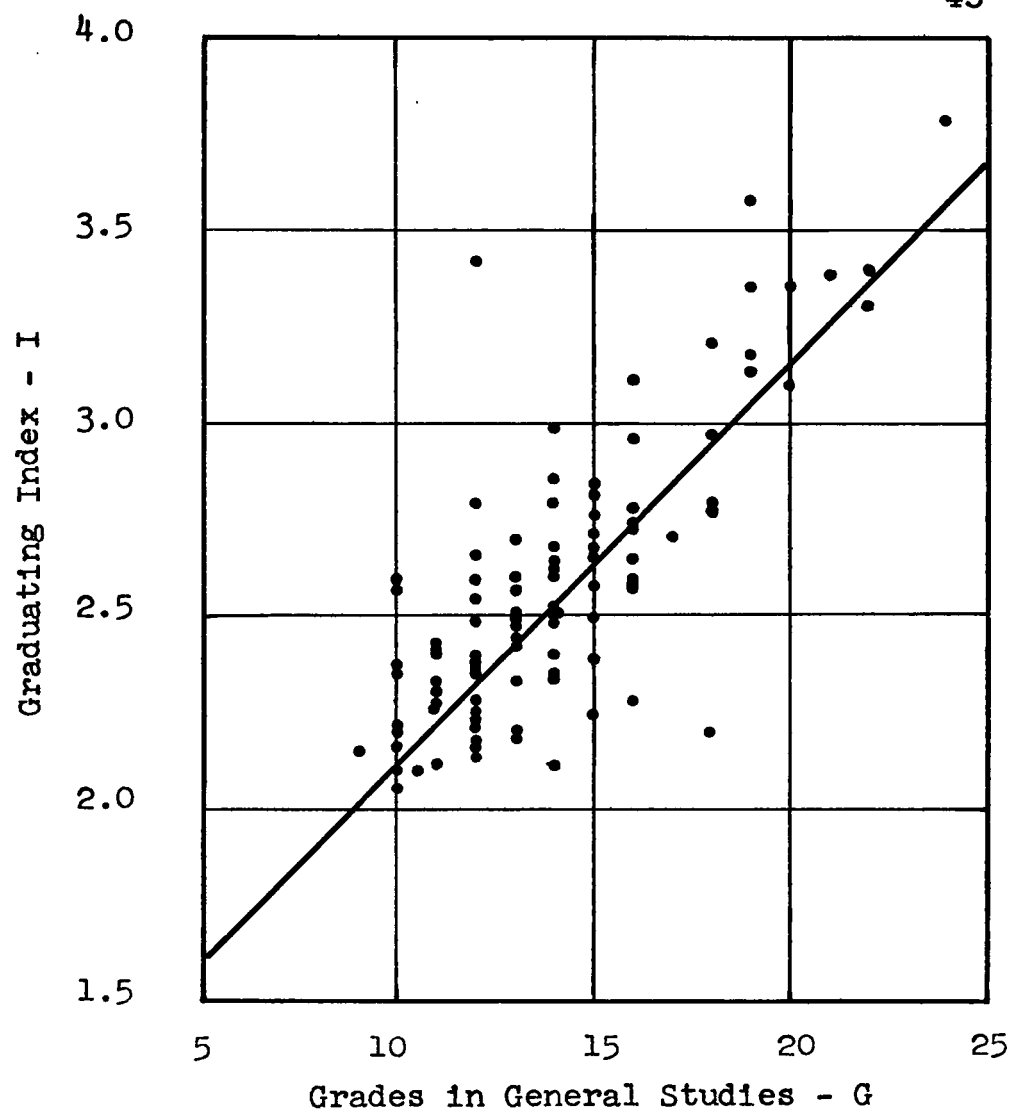


FIGURE 9

RELATIONSHIP BETWEEN GRADUATING INDEX AND
GRADES IN GENERAL STUDIES FOR THE
CONSTRUCTION OF THE PREDICTIVE SCALE

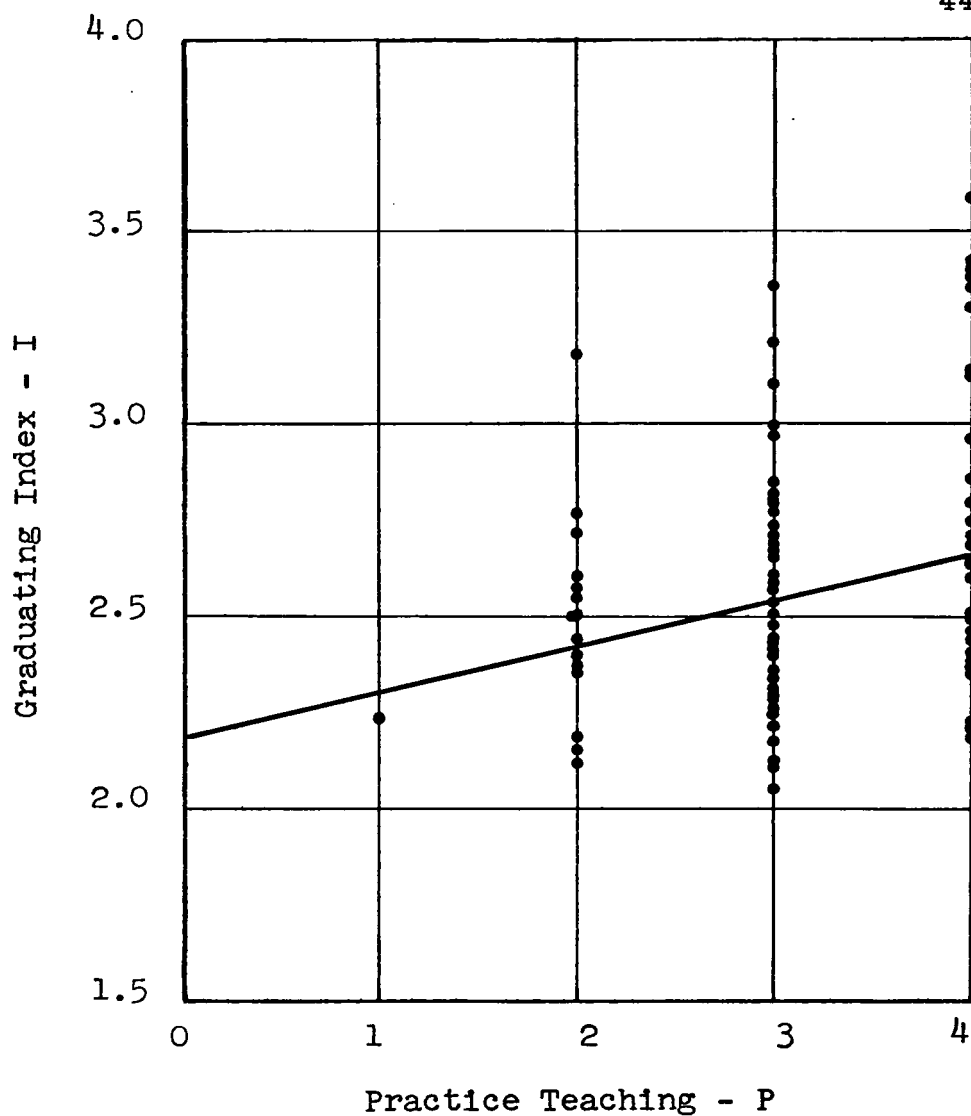


FIGURE 10

RELATIONSHIP BETWEEN GRADUATING INDEX AND
PRACTICE TEACHING FOR THE CONSTRUCTION
OF THE PREDICTIVE SCALE

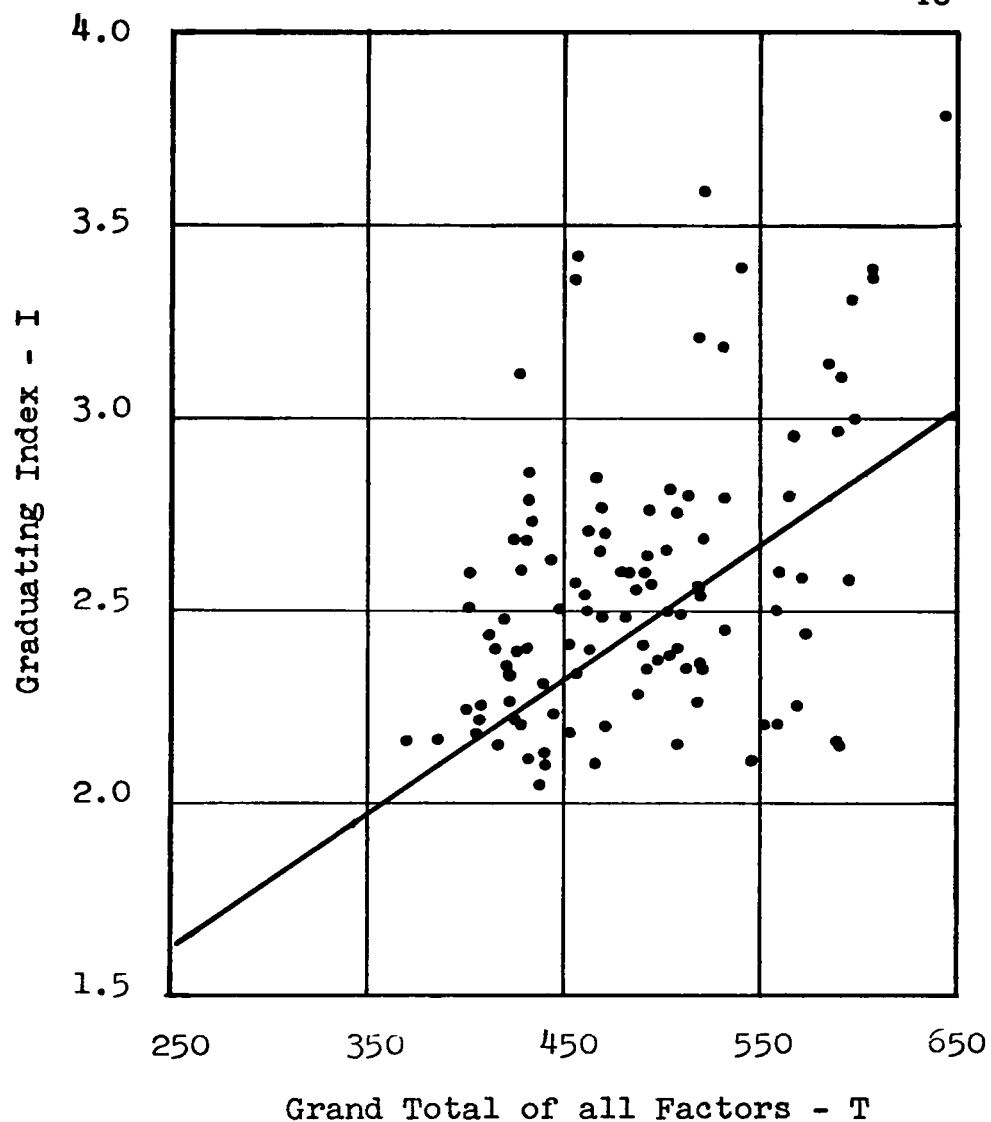


FIGURE 11

RELATIONSHIP BETWEEN GRADUATING INDEX AND
GRAND TOTAL OF ALL FACTORS FOR THE
CONSTRUCTION OF THE SCALE

CHAPTER V

VALIDATION OF THE PREDICTIVE SCALE

The validation of the predictive scale was made using a representative group of students randomly selected who entered the University of Puerto Rico in the fall of 1958 and met the same criteria as the original sample for the study. The steps used in validating the predictive scale were as follows: (1) a score was obtained for each student for each of the four predictive factors including sub-scores; (2) a score for each student was obtained from the "Score Sheet" for each variable and these values were then summed to obtain the "Total Predictive Score," (3) predictions were made for each student by means of the "Total Predictive Score;" (4) predictions were compared to actual grade and graduation to determine the accuracy of prediction.

Each of the scores made by each student on all the factors was converted into a point score with the use of Table I. These points were then summed for each of the 100 individuals to obtain the "Total Predictive Score." The "Total Predictive Score" for each student was located in the appropriate class interval on the "Predictive Scale," Table II. Predictions were made on the basis of the percentage who were successful within the appropriate class interval. If 50% or more of the students were successful in the interval, it was

predicted that the student would succeed in the College of Education. Inversely, if less than 50% were successful within the interval, the prediction was that the student would not succeed in the College of Education.

The following example may be helpful in understanding this technique. A student obtained the following scores on each of the factors: High School Average, 2.54; University of Puerto Rico Entrance Examination Test Scores, English 27, Spanish 33, Numerical Reasoning 42, Mathematics 12, General Information 9; Grades in General Studies, Spanish B, English C, Humanities C, Social Sciences C; Grade in Practice Teaching B. It must be remembered that letter grades were given numerical value as follows: A, four points; B, three; C, two; D, one; and F zero. By locating his scores on the "Score Sheet" (Table I), these scores can be converted into point scores. In this example these values would be respectively 73, 58, 69, 76, 57, 54, 73, 65, 71, 73, 63, 54, and 100. The sum of these points is 886. The interval within which this number falls is next located on the "Scale for Predicting Academic Success of Students at the College of Education of the University of Puerto Rico," (Table II), in order to determine the percentage of students who were successful. In the example given the percentage would be 80. Since this is above the 50% cutting point, it would be predicted that the student would succeed in the College of Education of the

University of Puerto Rico. The entry of 80 in the "Predictive Scale" for this particular student indicates the odds are 80 in 100 that the student will succeed in the College of Education of the University of Puerto Rico.

The accuracy of the predictions are shown in Table V. In this particular interval, 845 - 895, used in the sample above, the accuracy of prediction was 78 per cent. Thus, the validation study shows an error of 2% for this interval. At the lower end of the scale below the score 539, the predictive scale shows that 100% of the students whose total scores were below this number were unsuccessful in the College of Education. In the validation scale the twelve people whose scores were below that number were predicted to be unsuccessful. The accuracy of this prediction was 100%, meaning that, as compared with the original predictive scale, the group within these intervals was 100% in agreement with the number expected to be unsuccessful.

Even though it is extremely difficult to make individual predictions, 78 per cent of the predictions made for the validation group were correct. Of the 100 predictions made, only 22 were incorrect.

Predictions were also made for the validation group using each of the factors independently. The accuracy of these predictions is indicated in Tables VI through IX.

TABLE V

THE DISTRIBUTION OF THE VALIDATION GROUP FOR COMPARISON
OF THE PREDICTION AND GRADUATION FROM THE COLLEGE
OF EDUCATION OF THE UNIVERSITY OF PUERTO RICO

TOTAL PREDICTED SCORE INTERVALS	N	SUCCESSFUL		UNSUCCESSFUL		ACCURACY OF PREDICTION %
		Predicted	Actual	Predicted	Actual	
1151 and above	0					
1100 - 1150	0					
1049 - 1099	2	2	2			100
998 - 1048	6	6	6			100
947 - 997	16	16	11		5	69
896 - 946	20	20	16		4	80
845 - 895	27	27	21		6	78
794 - 884	16	16	10		6	63
743 - 793	1		1	1		0
692 - 742	0					
641 - 691	0					
590 - 640	0					
539 - 589	1			1	1	100
488 - 538	7			7	7	100
487 and below	4			4	4	100
TOTALS	100	87	67	13	33	

In Tables X and XI are presented the relationship between factors and the summary values and standard deviations for the validation of the predictive scale. The procedure followed for the presentation of these data was the same as the one used for the construction of the scale. Figures 12 through 22 show the graphical presentation of the relationship between factors.

In Table X one can see the high degree of correlation between grades obtained in General Studies and graduation from the College of Education. The figures are very similar to the corresponding ones for the construction of the scale.

TABLE VI

THE DISTRIBUTION OF THE VALIDATION GROUP FOR COMPARISON OF THE
PREDICTION AND GRADUATION FROM THE COLLEGE OF EDUCATION
USING THE HIGH SCHOOL AVERAGE FOR THE PREDICTIVE SCORE

HIGH SCHOOL AVERAGE	N	SUCCESSFUL		UNSUCCESSFUL		ACCURACY OF PREDICTION %
		Predicted	Actual	Predicted	Actual	
3.50 - 4.00	37	37	28		9	76
3.00 - 3.49	39	39	22		17	56
2.50 - 2.99	22	22	16		6	73
2.00 - 2.49	2	2	1		1	50
TOTAL	100	100	67		33	

TABLE VII

THE DISTRIBUTION OF THE VALIDATION GROUP FOR COMPARISON OF
THE PREDICTION AND GRADUATION FROM THE COLLEGE OF EDUCATION
USING THE UNIVERSITY OF PUERTO RICO ENTRANCE EXAMINATION
TEST SCORES FOR THE PREDICTIVE SCORE

UPR ENTRANCE EXAMINATION	N	SUCCESSFUL		UNSUCCESSFUL		ACCURACY OF PREDICTION
		Predicted	Actual	Predicted	Actual	%
English						
66 and above	5	5	4		1	80
61 - 65	4	4	1		3	25
56 - 60	6	6	3		3	50
51 - 55	3	3	2		1	67
46 - 50	5		2	5	3	60
41 - 45	9	9	5		4	56
36 - 40	16	16	13		3	81
31 - 35	10	10	7		3	70
26 - 30	13	13	12		1	92
21 - 25	20	20	12		8	60
16 - 20	7	7	5		2	71
15 and below	2	2	1		1	50
TOTAL	100	95	67	5	33	
Spanish						
41 and above	11	11	8		3	73
36 - 40	8	8	5		3	62
31 - 35	17	17	11		6	65
26 - 30	26	26	17		9	65
21 - 25	27	27	17		10	63
16 - 20	8		6	8	2	25
15 and below	3	3	3			100
TOTAL	100	92	67	8	33	
Numerical Reasoning						
51 and above	2				2	0
46 - 50	11	11	10		1	91
41 - 45	23	23	18		5	78
36 - 40	28	28	15		13	54
31 - 35	17	17	11		6	65
26 - 30	13	13	9		4	69
21 - 25	4		2	4	2	50
20 and below	2		2	2		0
TOTAL	100	94	67	6	33	

TABLE VII (Continued)

UPR ENTRANCE EXAMINATION	N	SUCCESSFUL		UNSUCCESSFUL		ACCURACY OF PREDICTION
		Predicted	Actual	Predicted	Actual	%
Mathematics						
50 and above	1	1	1			100
45 - 49	1	1			1	0
40 - 44	4	4	2		2	50
35 - 39	7	7	5		2	72
30 - 34	9		6	9	3	33
25 - 29	25	25	16		9	64
20 - 24	29	29	22		7	76
15 - 19	18	18	12		6	67
10 - 14	6	6	3		3	50
9 and below	0					
TOTAL	100	91	67	9	33	
General Information						
25 and above						
22 - 24						
19 - 21						
16 - 18	1	1			1	0
13 - 15	6	6	6			100
10 - 12	19	19	11		8	58
7 - 9	40	40	28		12	70
4 - 6	28	28	19		9	68
3 and below	6	6	4		2	67
TOTAL	100	100	68		32	

TABLE VIII

THE DISTRIBUTION OF THE VALIDATION GROUP FOR COMPARISON OF THE PREDICTION AND GRADUATION FROM THE COLLEGE OF EDUCATION USING THE GRADES IN GENERAL STUDIES FOR THE PREDICTIVE SCORES

GRADES IN GENERAL STUDIES	N	SUCCESSFUL		UNSUCCESSFUL		ACCURACY OF PREDICTION
		Predicted	Actual	Predicted	Actual	%
Spanish						
A	7	7	7			100
B	38	38	24	14		63
C	52	52	33	19		63
D	3	3	3			100
TOTAL	100	100	67	33		
English						
A	9	9	6	3		67
B	33	33	21	12		64
C	42	42	27	15		64
D	16	16	13	3		81
TOTAL	100	100	67	33		
Physical Sciences						
A	2	2	2			100
B	20	20	15	5		75
C	52	52	36	16		69
D	23	23	14	9		61
Not taken	3			3	3	100
TOTAL	100	97	67	3	33	
Biological Sciences						
A	3	3	2	1		67
B	11	11	6	5		55
C	60	60	45	15		75
D	23	23	13	10		57
Not taken	3		1	3	2	67
TOTAL	100	97	67	3	33	

TABLE VIII (Continued)

GRADES IN GENERAL STUDIES	N	SUCCESSFUL		UNSUCCESSFUL		ACCURACY OF PREDICTION
		Predicted	Actual	Predicted	Actual	%
Humanities						
A	3	3	3			100
B	20	20	14		6	70
C	61	61	40		21	66
D	16		10	16	6	38
TOTAL	100	84	67	16	33	
Social Sciences						
A	6	6	6			100
B	18	18	13		5	72
C	56	56	34		22	61
D	17		12	17	5	29
Not taken	3		2	3	1	33
TOTAL	100	80	67	20	33	

TABLE IX

THE DISTRIBUTION OF THE VALIDATION GROUP FOR COMPARISON OF THE
PREDICTION AND GRADUATION FROM THE COLLEGE OF EDUCATION
USING PRACTICE TEACHING FOR THE PREDICTIVE SCORE

PRACTICE TEACHING	N	SUCCESSFUL		UNSUCCESSFUL		ACCURACY OF PREDICTION %
		Predicted	Actual	Predicted	Actual	
A	40	40	40			100
B	24	24	24			100
C	2	2	2			100
D	1	1	1			100
Not taken	33			33	33	100
TOTAL	100	67	67	33	33	

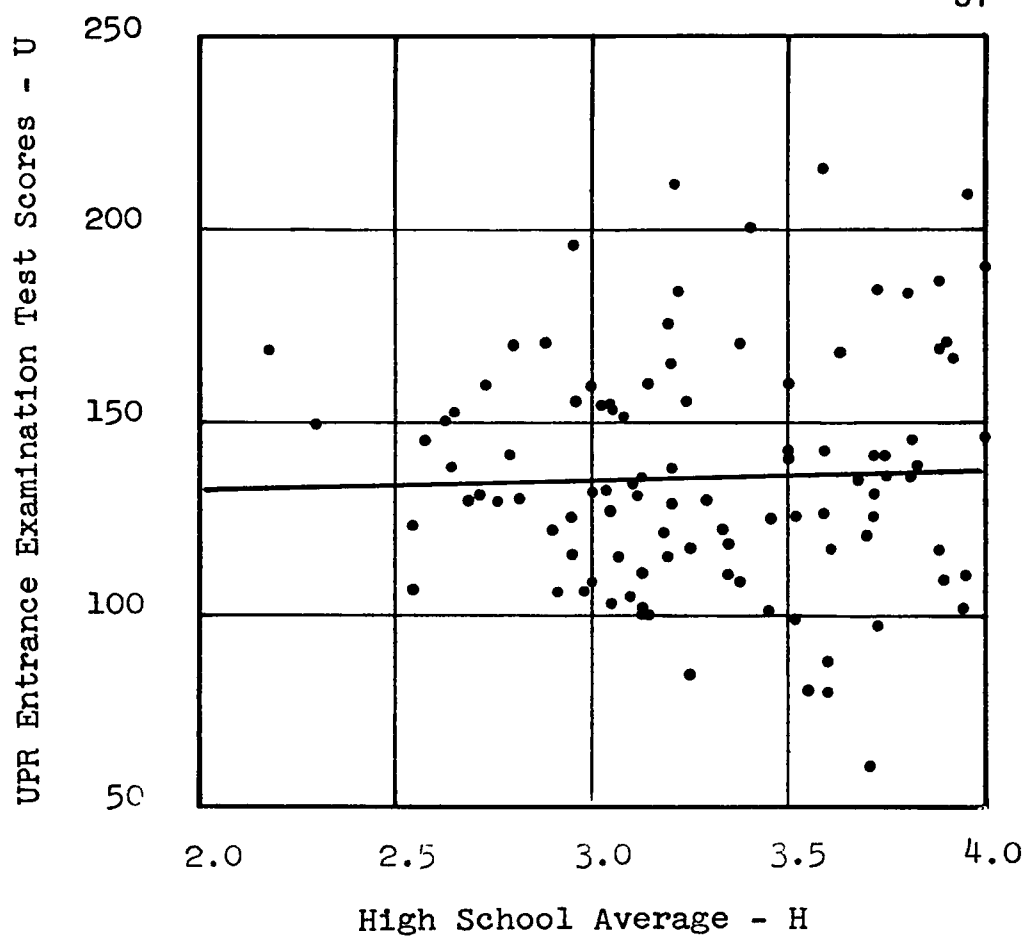


FIGURE 12

RELATIONSHIP BETWEEN UPR ENTRANCE EXAMINATION
TEST SCORES AND HIGH SCHOOL AVERAGE FOR THE
VALIDATION OF THE SCALE

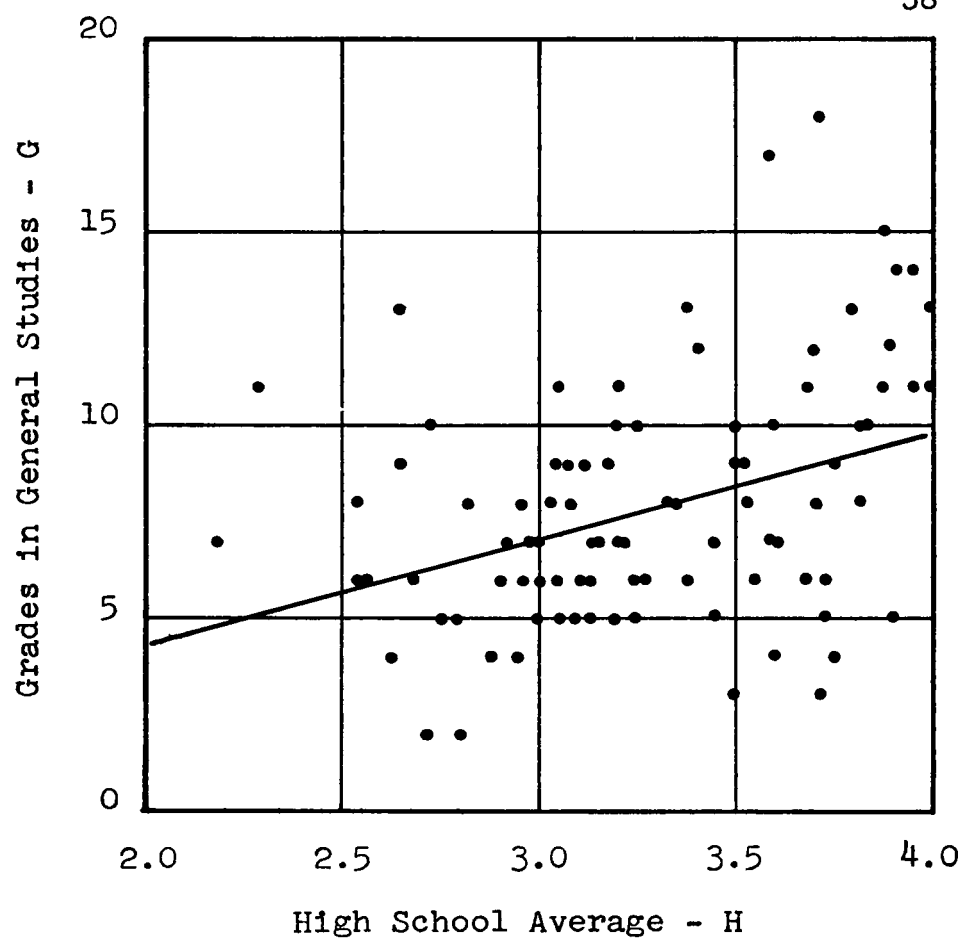


FIGURE 13

RELATIONSHIP BETWEEN GRADES IN GENERAL STUDIES
AND HIGH SCHOOL AVERAGE FOR THE VALIDATION OF THE SCALE

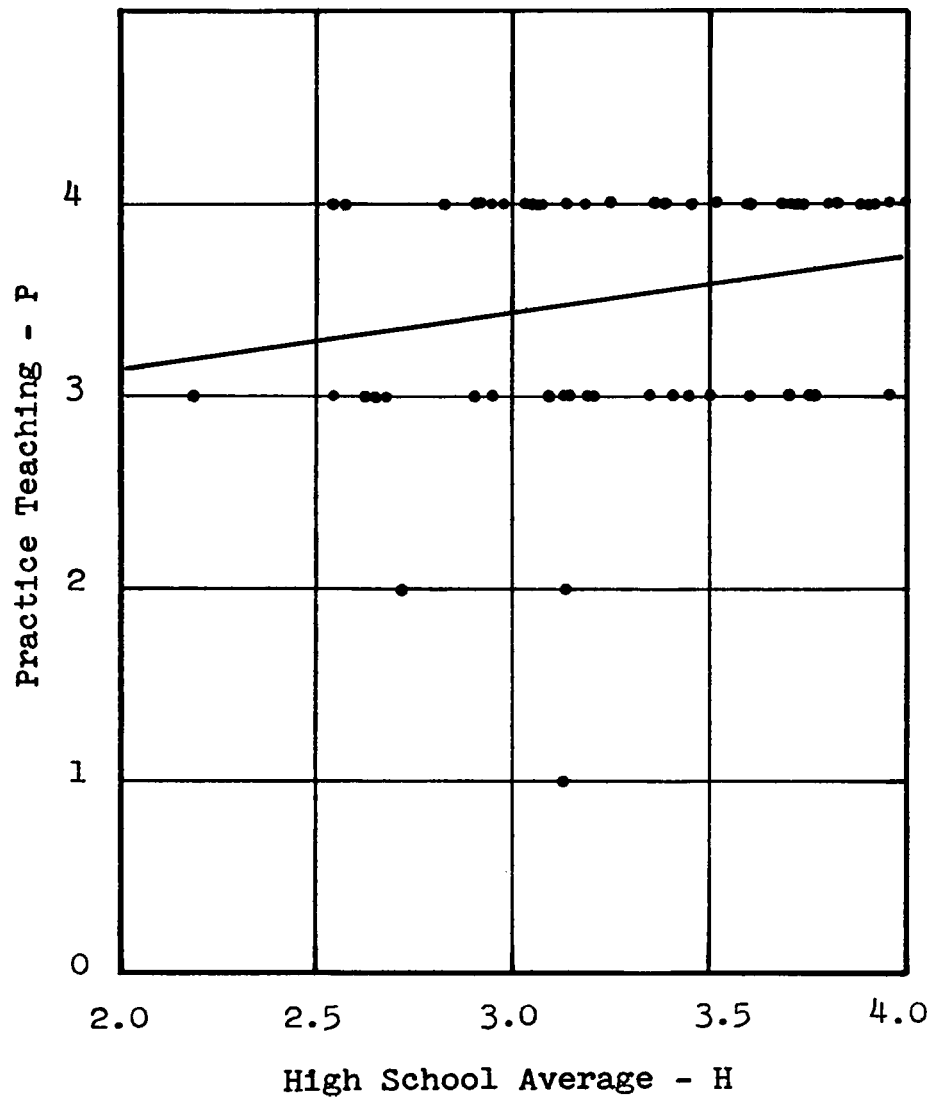


FIGURE 14

RELATIONSHIP BETWEEN PRACTICE TEACHING AND
HIGH SCHOOL AVERAGE FOR THE VALIDATION OF THE SCALE

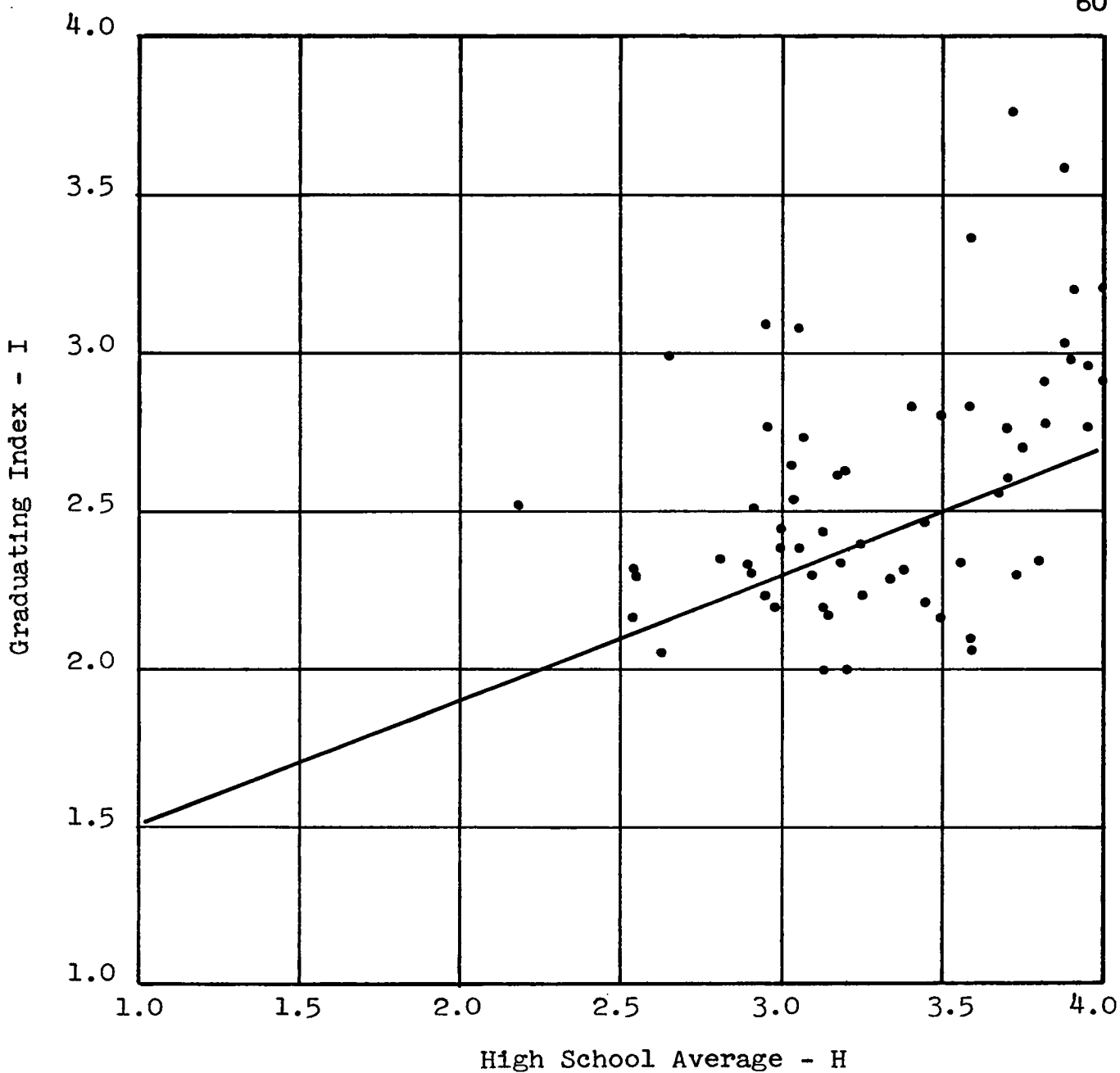


FIGURE 15

RELATIONSHIP BETWEEN GRADUATING INDEX AND
HIGH SCHOOL AVERAGE FOR THE VALIDATION OF THE SCALE

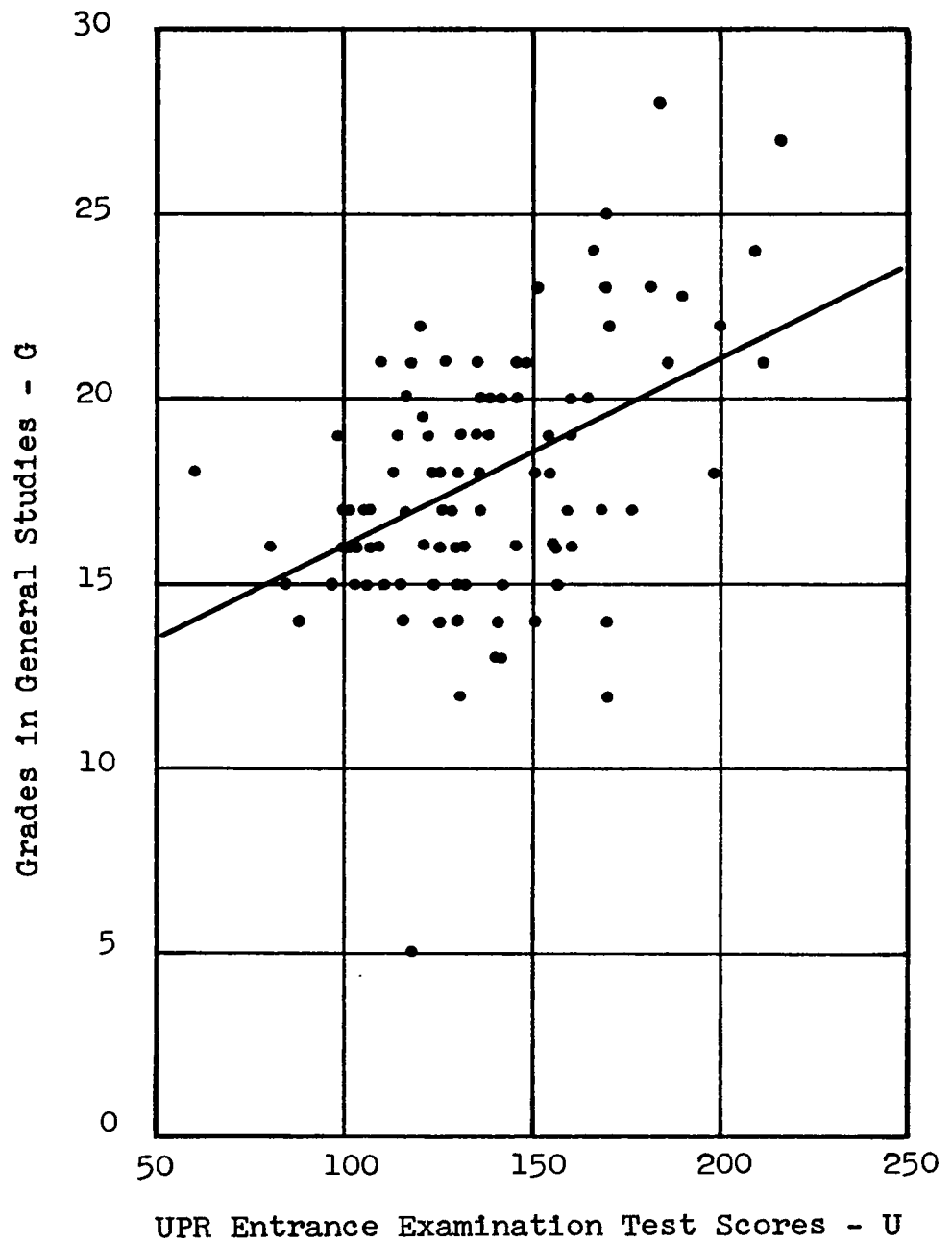


FIGURE 16

RELATIONSHIP BETWEEN GRADES IN GENERAL STUDIES AND
UPR ENTRANCE EXAMINATION TEST SCORES FOR
THE VALIDATION OF THE SCALE

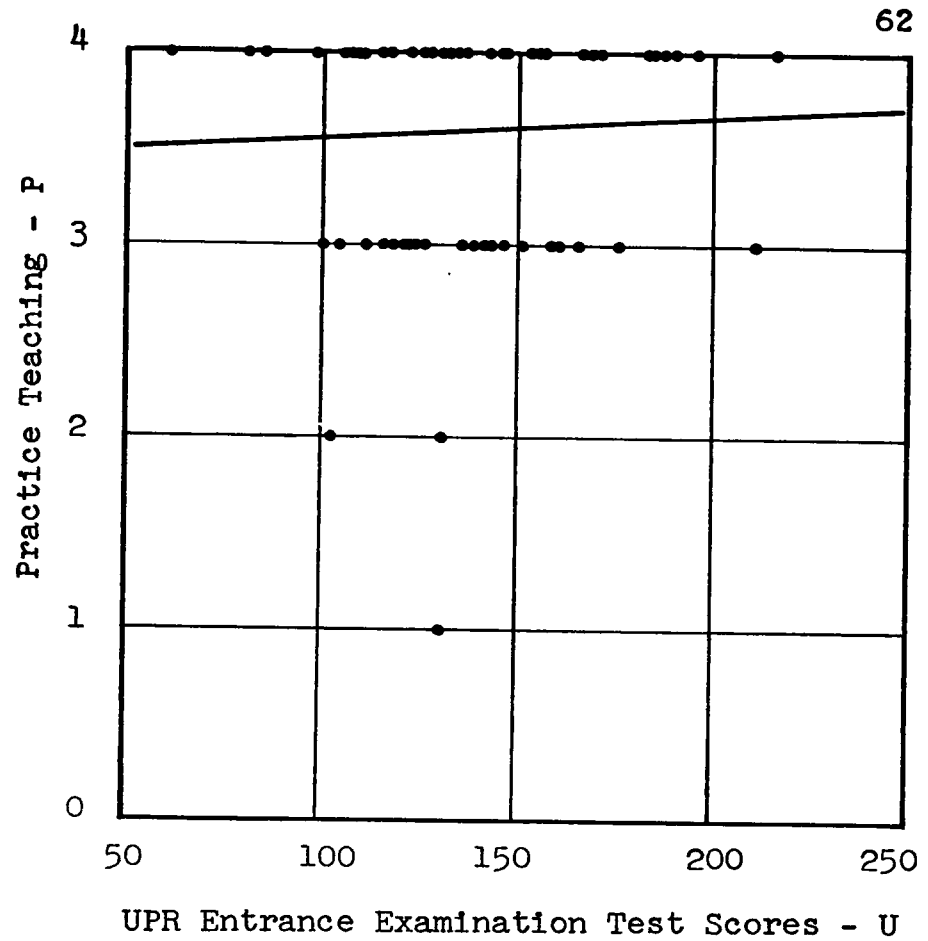


FIGURE 17

RELATIONSHIP BETWEEN PRACTICE TEACHING AND
 UPR ENTRANCE EXAMINATION TEST SCORES
 FOR THE VALIDATION OF THE SCALE

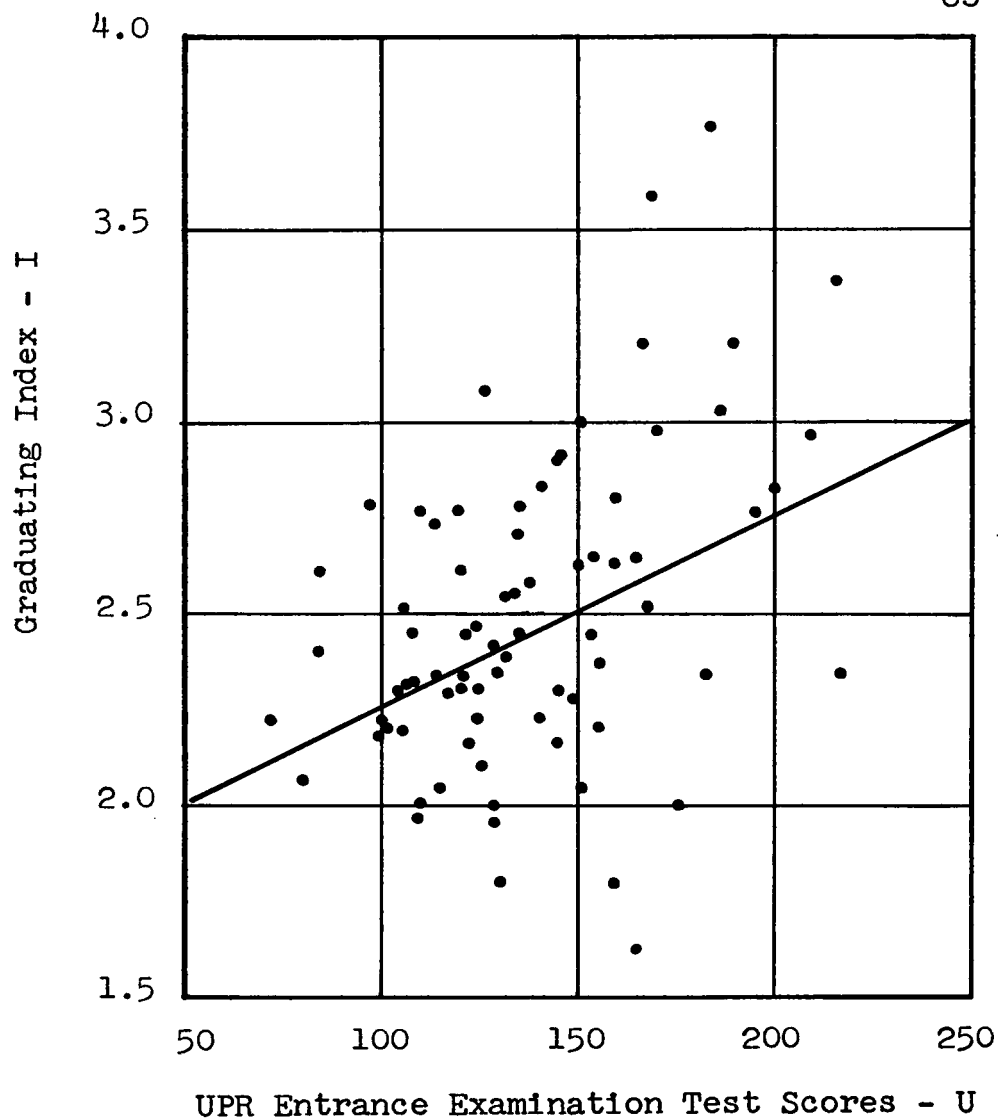


FIGURE 18

RELATIONSHIP BETWEEN GRADUATING INDEX AND
UPR ENTRANCE EXAMINATION TEST SCORES
FOR THE VALIDATION OF THE SCALE

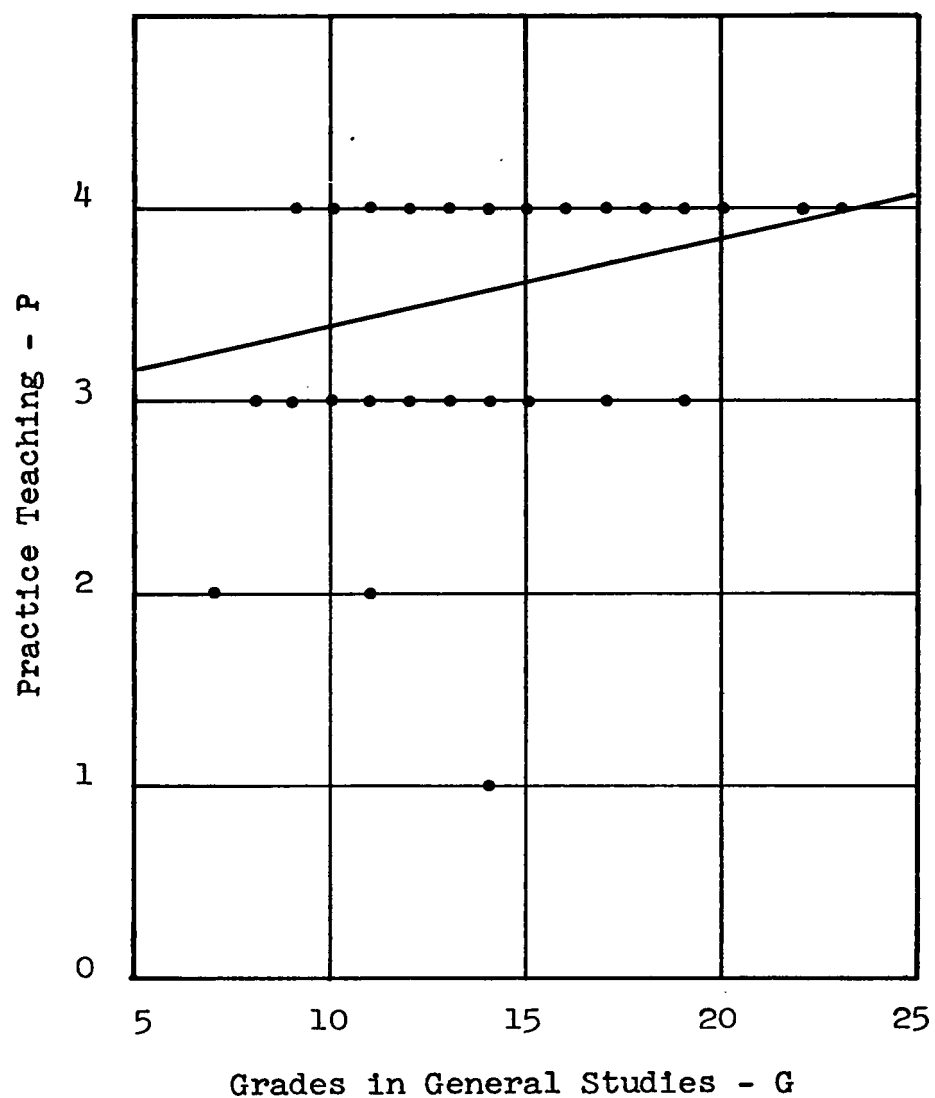


FIGURE 19

RELATIONSHIP BETWEEN PRACTICE TEACHING AND
GRADES IN GENERAL STUDIES FOR THE
VALIDATION OF THE SCALE

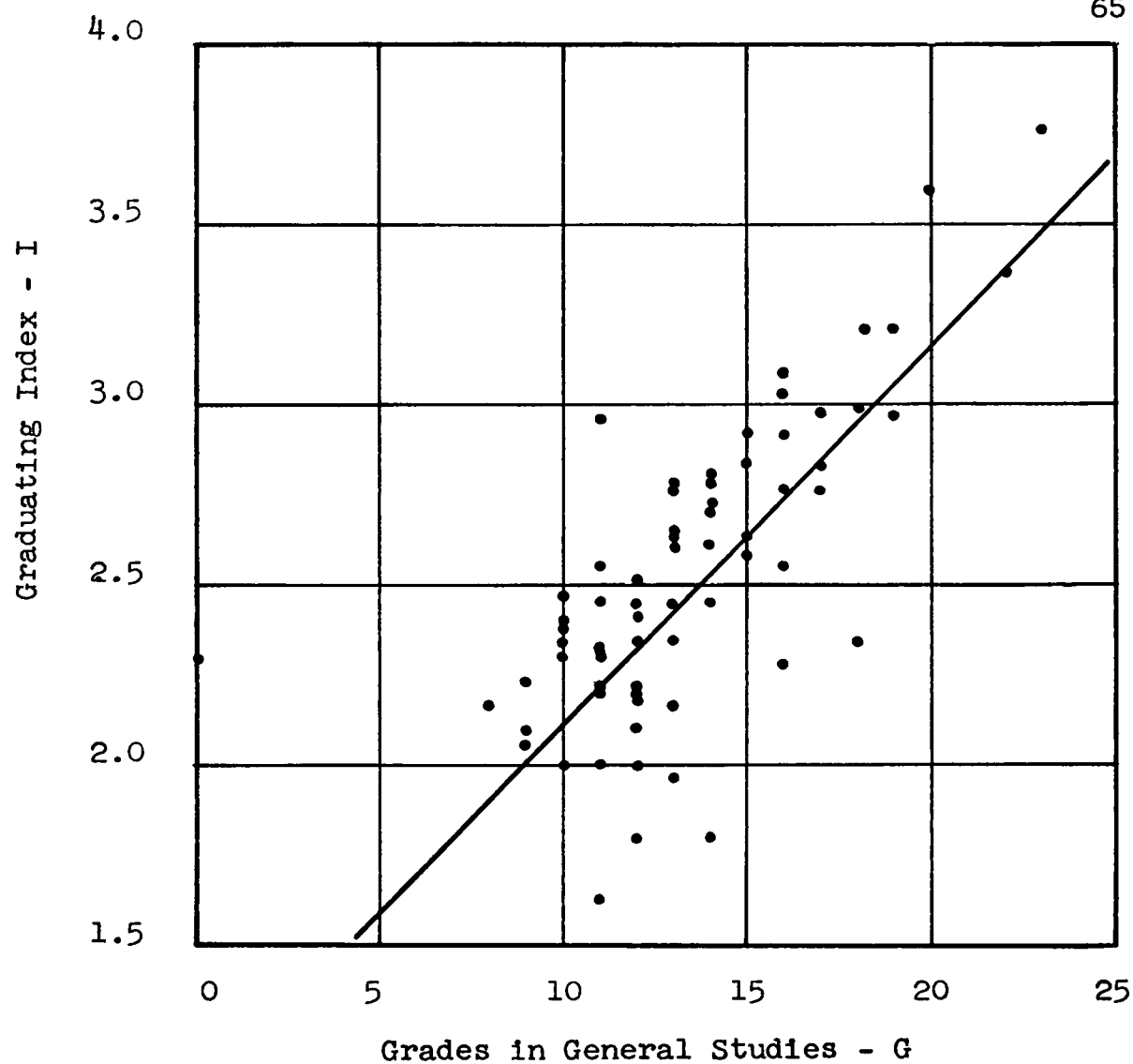


FIGURE 20

RELATIONSHIP BETWEEN GRADUATING INDEX AND
GRADES IN GENERAL STUDIES FOR THE
VALIDATION OF THE SCALE

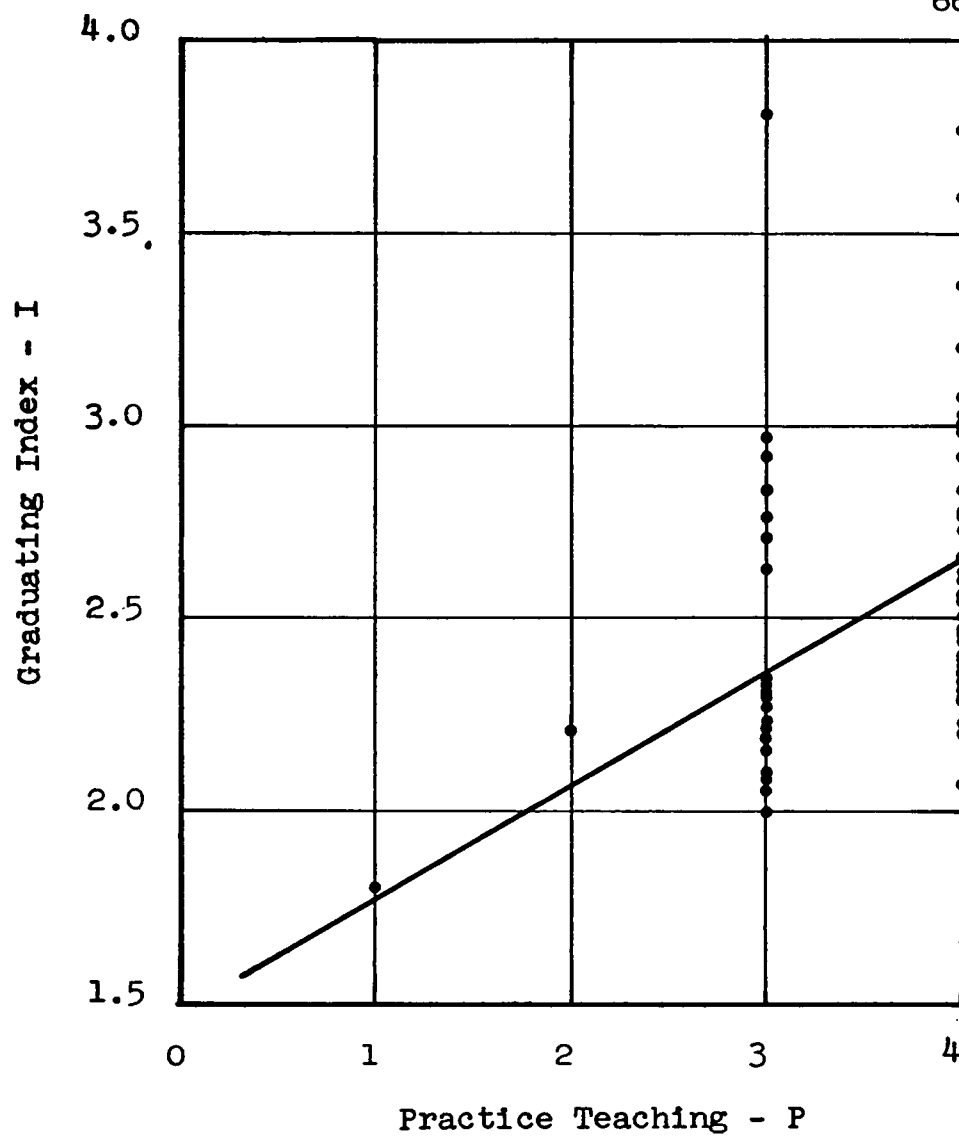


FIGURE 21

RELATIONSHIP BETWEEN GRADUATING INDEX AND PRACTICE
TEACHING FOR THE VALIDATION OF THE SCALE

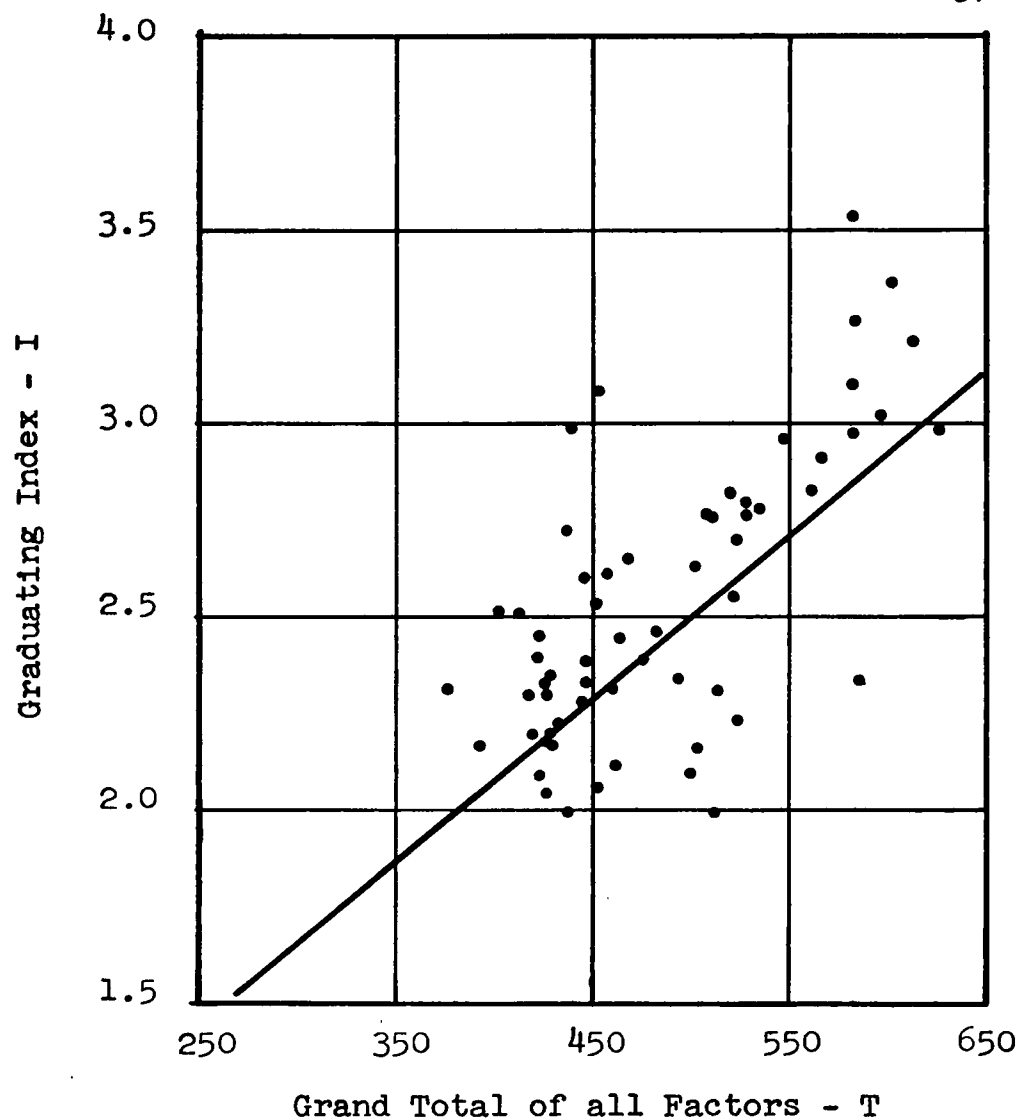


FIGURE 22

RELATIONSHIP BETWEEN GRADUATING INDEX AND
THE GRAND TOTAL OF ALL FACTORS FOR THE
VALIDATION OF THE SCALE

TABLE X
RELATIONSHIP BETWEEN FACTORS FOR THE VALIDATION OF THE
PREDICTIVE SCALE

PREDICTING FACTOR	FUNCTIONAL RELATIONSHIP				COEFFICIENT OF CORRELATION	COEFFICIENT OF DETERMINATION	STANDARD ERROR OF ESTIMATE	
UPR Entrance Examination Test Scores	U ¹	= 128.03	plus	2.42	H ¹	plus 0.03	0.001	30.32
Grades in General Studies	G	3.75	"	2.77	H	" 0.37 ^a	0.137	2.91
Practice Teaching	P	2.57	"	0.29	H	" 0.20 ^b	0.040	0.62
Graduating Index	I	1.12	"	0.39	H	" 0.39 ^a	0.152	0.39
Grades in General Studies	G	5.86	"	0.051	U	" 0.50 ^a	0.250	2.72
Practice Teaching	P	3.46	"	0.001	U	" 0.03	0.001	0.63
Graduating Index	I	1.76	"	0.005	U	" 0.35 ^a	0.122	0.39
Practice Teaching	P	2.95	"	0.045	G	" 0.24 ^b	0.058	0.61
Graduating Index	I	1.07	"	0.105	G	" 0.78 ^a	0.608	0.26
Graduating Index	I	1.47	"	0.296	P	" 0.46 ^a	0.212	0.35
Graduating Index	I	0.37	"	0.004	T	" 0.55 ^a	0.302	0.35

- 1 U = UPR Entrance Examination Test Scores
H = High School Average
G = Grades in General Studies
P = Grade in Practice Teaching
I = Graduating Index
T = Grand Total of all Factors (UPR Entrance Examination Test Scores, High School Average, and Grades in General Studies)

Sample Size = 100

- a 0.254 Coefficient of correlation at the 1% level of significance (Fisher's Statistical Tables).
- b 0.195 Coefficient of correlation at the 5% level of significance (Fisher's Statistical Tables).

TABLE XI

SUMMARY OF AVERAGE VALUES AND STANDARD DEVIATIONS
FOR THE VALIDATION OF THE PREDICTIVE SCALE

FACTORS	AVERAGE VALUE	STANDARD DEVIATION	COEFFICIENT OF VARIATION ²
H ¹	3.28	0.42	12.8
U ¹	135.99	30.32	22.3
U	3.28	0.42	12.8
G	12.84	3.13	24.4
H	3.29	0.43	13.1
P	3.53	0.63	17.8
H	3.28	0.42	12.8
I	2.41	0.42	17.4
U	135.99	30.32	22.3
G	12.84	3.13	24.4
U	135.92	31.26	23.0
P	3.53	0.63	17.8
U	135.99	30.32	22.3
I	2.41	0.42	17.4
G	13.16	3.32	25.2
P	3.53	0.63	17.8
G	12.84	3.13	24.4
I	2.41	0.42	17.4
P	3.53	0.63	17.8
I	2.51	0.40	15.9
T	479.35	54.76	11.4
I	2.41	0.42	17.4

- 1 U = UPR Entrance Examination Test Scores
 H = High School Average
 G = Grades in General Studies
 P = Grade in Practice Teaching
 I = Graduating Index
 T = Grand Total of all Factors (UPR Entrance Examination Test Scores, High School Average, and Grades in General Studies).

- 2 Coefficient of variation = standard deviation divided by the average value and expressed in percentage.

CHAPTER VI

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to construct and validate a scale for predicting academic success in the College of Education of the University of Puerto Rico. The basis for prediction was the Senior High School Average; the University of Puerto Rico Entrance Examination Test Scores; grades obtained in the first year of the College of General Studies; and the grade obtained in Practice Teaching. The University of Puerto Rico Entrance Examination includes scores in English, Spanish, Numerical Reasoning, Mathematics, and General Information. The subjects included in General Studies are English, Spanish, Physical Sciences, Biological Sciences, Social Sciences and Humanities.

The sample group used for the construction of the predictive scale were students who entered the University of Puerto Rico in the fall of 1957. They were students with no previous college training. Their academic classification after the first year of the College of General Studies was that of secondary education in the College of Education. This classification included the areas of English, Spanish, Social Sciences, History, Science and Mathematics, Industrial Arts, Commercial Education, Physical Education, Home Economics

and Mathematics. The subjects were regular students with a program of twelve or more semester hours. The sample included all students who graduated in the normal four-year period as well as those who for various reasons did not graduate. The number who met this criteria was 68 males and 86 females. Of this total 104 students graduated and 50 did not.

Distribution of the scores was made for each of the four factors in relation to successful or unsuccessful from the College of Education of the University of Puerto Rico. Success implied actual graduation from the College of Education. Letter grades were given numerical value as follows: A, four points; B, three; C, two; D, one; and F, zero. A score sheet was then prepared for each factor by calculating the percentage of successful students in each of the class intervals. Test scores or grades obtained by each of the 154 students were located on the score sheet and converted into point scores. The point scores for each student on each of the predictive factors were then summed to obtain the "Total Predictive Score." "Total Predictive Scores" were then tabulated on the basis of success in graduating from the College of Education. The percentage of successful individuals in each class interval was computed. This distribution was used as the predictive scale.

The validation sample consisted of 100 students randomly chosen who met the same criteria as the original sample,

except that they enrolled in the fall semester of 1958. Test scores and grades obtained by these students were converted into points by using the score sheets and summed to obtain a "Total Predictive Score." This score was then located in the appropriate interval of the predictive scale. If in the interval indicated 50 per cent or more of the people whose score fell within this interval graduated from the College of Education, it was predicted that this person would also be successful. Inversely, if the percentage was 49 per cent or less, it was predicted that this individual would be unsuccessful in the College of Education. These predictions were accurate in 78 per cent of the cases.

Conclusions

In the light of the foregoing study, the following conclusions could be reached:

1. The use of this predictive scale technique provides a simple method for predicting success at the College of Education of the University of Puerto Rico. The method is not complicated and can be easily understood and administered since predictions are made on the basis of "odds" or chances in 100.

2. Predictions based on the "Predictive Scale" are more accurate for the extremes, when very high or very low "Total Predictive Scores" are under consideration and when

predicting for groups, but the accuracy of prediction for individuals is also high. The validation study showed 78 per cent accuracy when predicting for individuals.

3. Prediction on the basis of "odds" or chances gives the counselor an opportunity to make practical use of information available on each student admitted into the College of Education.

4. The best single predictor of success seemed to be the grades obtained in the first year of General Studies.

5. The High School Average did not seem to have much validity as a factor for predicting success.

6. The total scores of High School Average, University of Puerto Rico Entrance Examination Test Scores and Grades in General Studies seemed to have a high predictive value.

7. No single factor can be used to predict with any degree of accuracy the grade to be obtained in Practice Teaching.

8. There seemed to be a high degree of correlation between the University of Puerto Rico Entrance Examination Test Scores and grades obtained in General Studies.

9. It would seem that the purpose of the present study was accomplished and also, that there is some validity in the instrument to be used when counseling students who enter the College of Education of the University of Puerto Rico.

Recommendations

It is recommended that the present scale be used with caution and on an experimental basis making a "Validation Scale" every year. This validation should be made with each graduating class.

It is further recommended that a different "Predictive Scale" be constructed using as predictive factors the University of Puerto Rico Entrance Examination and the grades obtained in General Studies. The prediction should be made upon entering the College of Education. It is hoped that the true value of both factors as predictors of success may thereby be found.

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APPENDIXES

APPENDIX A

UNIVERSITY OF PUERTO RICO
 Rio Piedras, Puerto Rico
 Office of the Dean of Studies

TOTAL ENROLLMENT BY SEX
 First Semester 1941-1942 to 1962-1963

Academic Year	Total	Enrollment for the First Semester	
		Male	Female
1941-42	5441	2224	3197
1942-43	5720	2353	3367
1943-44	6083	2208	3875
1944-45	7300	2616	4684
1945-46	7807	2863	4944
1946-47	9582	4534	5048
1947-48	10651	5431	5220
1948-49	11024	5791	5233
1949-50	11348	6132	5216
1950-51	11343	5800	5543
1951-52	10890	5231	5659
1952-53	10579	4999	5580
1953-54	12151	6192	5959
1954-55	13232	7069	6163
1955-56	14268	7888	6380
1956-57	15176	8638	6538
1957-58	16753	9889	7755
1959-60	18223	9429	8794
1960-61	18893	9921	8972
1961-62	21262	11028	10234
1962-63	21892	11014	10878

Source of Information: Office of the Registrar,
 University of Puerto Rico
 October 11, 1962

APPENDIX B

UNIVERSITY OF PUERTO RICO
Rio Piedras, Puerto Rico
Office of the Dean of Studies

TOTAL ENROLLMENT OF REGULAR¹ STUDENTS AT THE UNIVERSITY OF
PUERTO RICO BY CAMPUSES
First Semester 1953-1954 to 1961-1962

Year First Semester	CAMPUSES					
	All Campuses		Rio Piedras		Mayaguez	
	Total	Regular	Total	Regular	Total	Regular
1953-54	12151	7504	8469	5701	1614	1561
1954-55	13158	8319	9193	6355	1856	1727
1955-56	14268	9179	9922	6991	2042	1940
1956-57	15176	9947	10307	7425	2381	2215
1957-58	16753	11124	11576	8410	2606	2385
1958-59	17644	11260	11654	8385	2793	2473
1959-60	18223	11628	12082	8723	2755	2464
1960-61	18893	11848	12443	8885	2825	2493
1961-62	21262	13160	14048	9818	3275	2906

Year First Semester	San Juan		Extension ²	
	Total	Regular	Total	Regular
1953-54	275	242	1793	-
1954-55	273	237	1836	-
1955-56	279	248	2025	-
1956-57	341	307	2147	-
1957-58	354	329	2217	-
1958-59	422	402	2775	-
1959-60	506	425	2880	16
1960-61	523	470	3102	-
1961-62	547	436	3392	-

Notes: 1. Regular students are all students who are registered for 12 or more credit-hours during the semester. The percentage of regular students was as follows:

1953-54 = 61.8%	1958-59 = 63.8%
1954-55 = 62.9	1959-60 = 63.8
1955-56 = 64.3	1960-61 = 62.7
1956-57 = 65.5	1961-62 = 61.9
1957-58 = 66.4	

2. Includes all students who attended the extension program on Saturday at Rio Piedras and Mayaguez and also those who attended the extramural centers located in different cities of Puerto Rico.

October 16, 1961.

APPENDIX C

UNIVERSITY OF PUERTO RICO
Rio Piedras, Puerto Rico
Office of the Dean of Studies

COLLEGE OF EDUCATION, TOTAL ENROLLMENT, SECONDARY EDUCATION
First Semester 1955-1956 to 1962-1963

First Semester Year	Total Enrollment by Year of Classification					Regular Enrollment ¹ by Year and Classification				
	Total	II	III	IV	Others ²	Total	II	III	IV	Others ²
1955-56	1022	432	326	199	65	767	406	205	152	4
1956-57	948	378	282	233	55	797	360	257	174	6
1957-58	1049	413	275	283	78	850	380	241	221	8
1958-59	1069	406	304	276	83	876	380	266	214	16
1959-60	1093	367	315	315	96	874	351	261	249	13
1960-61	1286	442	339	341	84	962	429	261	270	2
1961-62	1370	464	443	376	87	1083	442	345	281	15
1962-63 ^a	1037	372	314	290	61	821	360	248	212	1

Notes: 1 Regular enrollment implies 12 credit-hours or more per semester.

2 Includes all students who cannot be otherwise classified.

a Reduction in enrollment is due to the initiation of the new program in the College of Education by which students enter the college of General Studies.

Source of Information: Office of the Registrar - University of Puerto Rico.

February 8, 1963.

APPENDIX D

UNIVERSITY OF PUERTO RICO
Rio Piedras, Puerto Rico
Office of the Dean of Studies

COLLEGE OF EDUCATION, TOTAL ENROLLMENT, ELEMENTARY EDUCATION
First Semester 1955-1956 to 1962-1963

First Semester Year	Total Enrollment by year of Classification						Regular Enrollment ¹ by year and Classification					
	Total	I	II	III	IV	Others ²	Total	I	II	III	IV	Others ²
1955-56	2041	514	626	396	397	108	1187	477	550	89	64	7
1956-57	2159	698	507	454	363	137	1260	665	412	98	66	19
1957-58	2526	1006	706	387	333	94	1761	961	628	77	80	15
1958-59	2251	855	818	247	220	111	1686	772	754	89	53	18
1959-60	2216	766	797	307	211	135	1698	749	744	141	51	13
1960-61	2134	727	789	271	236	111	1616	705	723	116	58	14
1961-62	1566	61	866	341	223	75	1076	48	774	171	77	6
1962-63 ^a	1317	-	577	425	250	65	913	-	530	282	98	3

Notes: 1 Regular enrollment implies 12 credit-hours or more per semester.

2 Includes all students who cannot be otherwise classified.

a Reduction in enrollment is due to the initiation of the new program in the College of Education by which students enter the College of General Studies.

Source of Information: Office of the Registrar - University of Puerto Rico.

February 8, 1963.

APPENDIX E

UNIVERSITY OF PUERTO RICO
 Rio Piedras, Puerto Rico
 Office of the Dean of Studies

PROGRAM LEADING TO THE DEGREE OF BACHELOR OF ARTS IN
 EDUCATION FOR TEACHERS OF ACADEMIC SUBJECTS IN THE
 SECONDARY SCHOOL

Requirements:

1. A minimum of 129 credits¹
2. Sixty credits in general education,
 including a six credit hour course
 in Mathematics 60 credits
3. Twenty credits in professional
 courses in education distributed as
 follows:

Social Foundations of Education	3 credits
Philosophical Foundations of Education	3 credits
Human Growth and Development	6 credits
Student Teaching	5 credits
Seminar on Curriculum and Teaching in the Secondary School	3 credits

Students will practice three hours daily, five days a week, for a semester and will attend a five hour weekly seminar where they will study the curriculum of the secondary school and teaching methods related to their field of specialization. The seminar will be held concurrently with student teaching.

¹ Excluding Military Science and Tactics 101-102- 201-202, for men, 8 credits, or their equivalent in other electives and Physical Education 1-2, 103-104, (for women) 4 credits.

4. Thirty six credits in a specialization
which can be taken in one or two disciplines related to the program of the
secondary school 36 credits

Students will select their specialization under the guidance of Faculty Advisors. They will select the courses to be taken in the same way. Not less than 15 credits in the field of specialization must be taken in courses of third and fourth year level. The specialization may include more than two disciplines in those cases in which the curriculum offerings of a Department or Faculty so require.

5. History of Puerto Rico (History 253) 3 credits
6. Fine Arts 104 2 credits
7. Music 104 2 credits
8. Electives 6 credits
9. Military Science and Tactics 101-102;
201-202 8 credits (for men) or their
equivalent in other electives.
10. Physical Education 1-2, 103-104; (for women) 4 credits

PROGRAM LEADING TO THE DEGREE OF BACHELOR OF ARTS IN EDUCATION
FOR ELEMENTARY SCHOOL TEACHERS

Requirements:

1. A minimum of 129 credits.¹

¹ Excluding Military Science and Tactics 101-102. 201-202, (for men) 8 credits, or their equivalent in other electives and Physical Education 1-2. N1-N2 (for women) 4 credits.

2. Sixty credits in general education,
including a six credit hour course in
Mathematics 60 credits
3. Twenty six credits in professional
courses in education distributed as
follows:

Social Foundations of Education	3 credits
Philosophical Foundations of Education	3 credits
Human Growth and Development	6 credits
Language Arts in the Elementary School	3 credits
The Teaching of English as a Second Lanuage	3 credits
Student Teaching	5 credits
Seminar on Curriculum and Teaching in the Elementary School	3 credits

Students will practice three hours
daily, five days a week, for a
semester and will attend a five hour
weekly seminar where they will study
the curriculum and teaching methods
of the elementary school. The seminar
will be held concurrently with student
teaching.
4. Thirty six credits in a specialization
which can be taken in one or two disci-
plines related to the program in the
elementary school 36 credits

Students will select their specialization under the guidance of Faculty advisors. They will select the courses to be taken in the same way. Not less than 15 credits in the field of specialization must be taken in courses of third and fourth year level.

The specialization may include more than two disciplines in those cases in which the curricular offerings of a Department or Faculty so require.

English 105 (English for Normals) will be required for the specialization in English.

Education 111 (Science for the Elementary School) and Education 115 (Health Education) can be accredited for the specialization in Science.

- | | |
|---|-----------|
| 5. History of Puerto Rico (History 253) | 3 credits |
| 6. Fine Arts 104 | 2 credits |
| 7. Music 104 | 2 credits |
| 8. Military Science and Tactics 101-102;
201-202 (for men) or their equivalent
in other electives | |
| 9. Physical Education 1-2; N1-N2, 4 credits
(for women). | |