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WILLIAM K. PAYNE, President

Contributors

Arthur L. Brentson, Assistant Professor of English
T. T. Chao, Professor of Chemistry, Fayetteville State Teachers College, North Carolina
James A. Eaton, Professor of Education
Dorothy C. Hamilton, Assistant Professor of Education
Phillip J. Hampton, Assistant Professor of Fine Arts
Thelma Moore Harmond, Associate Professor of Education
Elonnie J. Josey, Librarian and Associate Professor
Walter A. Mercer, Professor of Education and Director of Internship Teaching, Florida A.&M. University, Tallahassee, Florida
Luetta C. Milledge, Assistant Professor of English
Malvin E. Moore, Professor of Education, and Dean, Fayetteville State Teachers College, North Carolina
Louise Lautier Owens, Associate Professor of English
Evanel Renfrow Terrell, Associate Professor of Home Economics
Willie G. Tucker, Associate Professor of Chemistry
Nazir A. Warsi, Associate Professor of Mathematics
W. Virgil Winters, Professor of Mathematics and Physics

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A Correlation Study on Grades Between High Schools and Fayetteville State Teachers College

by

T. T. Chao and Malvin E. Moore, Jr.

Introduction

Fayetteville State Teachers College is the oldest teacher-training institution in the South. It receives financial support from the State of North Carolina and the majority of its student population is composed of residents of the State. Very recently, its curriculum has been extended from an emphasis on teacher education so as to embrace the liberal arts, natural sciences, social sciences, humanities and modern foreign languages. During the past fifteen years, its student population has doubled and its administration has congealed plans for presentation to its Board for meeting the student population increase which was the highest among all Negro colleges in the State during September, 1962.

Fayetteville State Teachers College has a highly-trained faculty, many of whom are holders of the doctorate. Its faculty is continuously engaged in active research to improve the curricular-offerings of the Department of Education whose chief function is to produce quality teachers. Some members of its science faculty are participating in research programs at the University of North Carolina.

Since the College has a well-trained faculty and modern facilities, the questions are asked: (1) how can the College best use the talent of its faculty and its facilities most efficiently? and (2) how can its students benefit most from this unusual combination? In reply to these questions, it is imperative that the interrogator know the needs of the students.

Purpose

The purpose of this investigation is to ascertain if there is any relationship between the grades which entering freshman students at Fayetteville State Teachers College make during the freshman year and the grades which they made in their high schools. The investigation seeks to discover the quality of preparation high school graduates have made to enter Fayetteville State Teachers College.

Hypothesis

The investigators hypothesize that: (1) the majority of the 548 entering freshman students at Fayetteville State Teachers College are good college risks; and (2) the percentage of failures would not be exceedingly high because of previous training.

Method of the Study

Fifty students' grades of the entering Freshman Class, 1961-62, Fayetteville State Teachers College, were used in this investigation. The samples were taken alphabetically from the Registrar's office. Since the samples were arranged in alphabetical order, it was presumed by the investigators that the sampling was random. This sampling has been tested and follows the normal distribution curve closely. The correlation coefficients were calculated by using the method for analyzing grouped data.

Findings

There is a significant correlation between the grades students make in high school and in college. The correlation, however, varies in different colleges, and it varies because students came from different high schools. The correlation coefficients between students' grades from various high schools and Fayetteville State Teachers College have been calculated and reported.

If the coefficient, r, is close to 0, the fit of the regression line is poor and the high school grades are of little significance in predicting success or failure in college. Figures 1, 2, 3, 4, and 5 show that when high school grades in each subject matter were plotted against their grades in college, great variations existed in the same subject matter. It shows further that only 5 per cent of high school grades in mathematics may be used in relationship with college grades, when the correlation coefficients are expressed in terms of per cent by using the equation of $100Xr^2$.
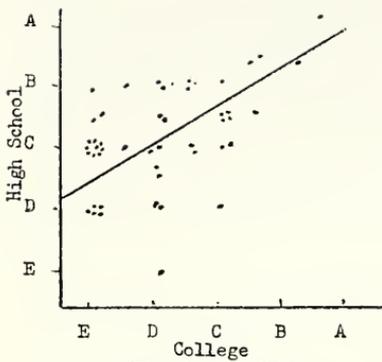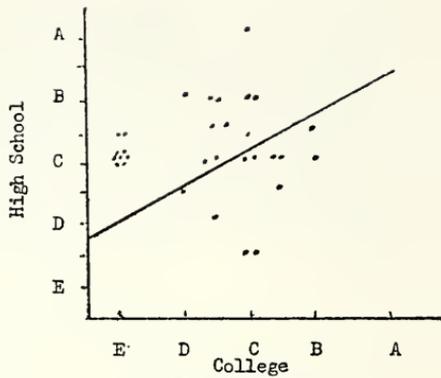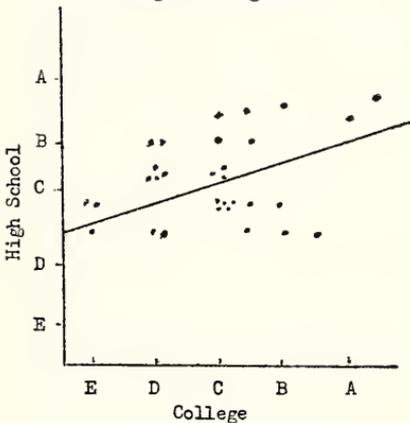
Fig. 1. English

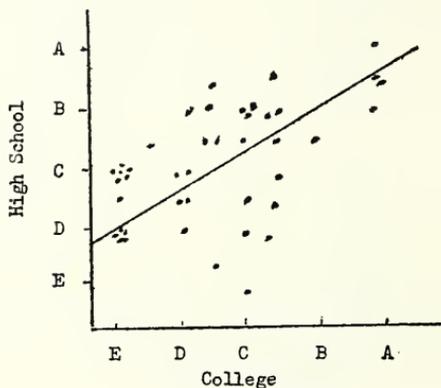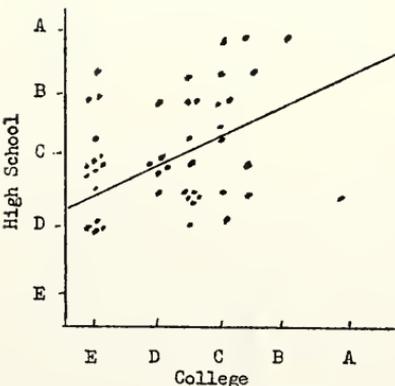Fig. 2. Science

Fig. 3. Mathematics

Fig. 4. History

Fig. 5. Biology

The correlation coefficients between the grades of high school and college students are shown in Table 1. The table reveals the fact that these relationships are far less than 1, especially in mathematics.

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Table 1. Correlation Coefficients Between the Grades of High School and College

Courses	Biology	English	History	Mathematics	Science
Coefficients	0.48	0.57	0.58	0.23	0.54
$100r^2$	23.0	32.5	33.5	5.3	29.0

The highest correlation between high school and college grades in the courses studied was only 34 per cent. Therefore, using linear regression, limits of prediction will fall into a very wide range and will not be too satisfactory in making predictions. The following questions arise: (1) how can predictions be made which will determine whether students admitted to the College will fail or succeed? (2) which course and what grade in high school will determine either success or failure? and (3) what grade in high school is preferable to the College? In reply to these questions, further analysis was made and presented in Table 2.

Table 2. Grade Change in Per Cent from High School to College

Courses	High School Grade	College Grade (%) A	B	C	D	E	Failed % D & E
Biology	A	0	50	50	0	0	0
	B	0	8.3	58.4	8.3	25.0	33.3
	C	0	0	50.0	16.4	23.4	50.0
	D	0	0	33.0	—	67.0	67.0
English	A	100	0	0	0	0	0
	B	0	16.7	50.0	22.2	11.1	33.3
	C	0	0	31.8	22.7	45.5	68.2
	D	0	0	14.3	14.3	71.4	85.7
History	A	100	0	0	0	0	0
	B	6.2	18.8	50.0	25.0	0	25.0
	C	0	10.0	20.0	30.0	40.0	70.0
	D	0	0	25.0	12.5	62.5	75.0
Mathematics	A	—	100*	0	0	0	0
	B	9.1	18.2	36.4	36.4	0	36.4
	C	5.3	21.0	31.6	26.3	15.8	42.1
	D	0	0	0	—	100	100
Science	A	—	—	—		—	—
	B	0	12.5	75.0	12.5	0	12.5
	C	0	28.6	57.2	14.3	0	14.3
	D	0	10.5	26.3	10.5	52.6	63.1

*Only one student was observed.

Table 2 shows that 50 per cent of the students who earned A's in biology while in high school will earn B's while in college and another

50 per cent will earn C's during their stay in college. Further, students who earned A's in both English and history while in high school will have a very good chance of earning A's in college history courses. Great variations, however, were found in science and mathematics.

Students who earned C's in high school have a good chance to earn A's in mathematics and high grades in science courses. Table 2 also indicates that if grades of D's and E's in college are regarded as failing, the highest per cent of failure is among students earning D's in high school; students earning grades of C's and B's have less opportunity to fail in college. No student who earned A in any high school course failed the same course in college.

Additional analysis reported in Table 3 shows that about 50 per cent of the students used in the sampling earned grades of C, 31 per cent earned B's, and 15 per cent earned D's. The remainder earned A's. Of this number 49 per cent of C's, 28 per cent of B's and 78 per cent of D's will fail because of poor scholarship and this indicates that the Fayetteville State Teachers College maintains high academic standards by eliminating almost half of the freshman students admitted to the College each year. It appears that poor grades earned in high schools affect adversely the possibility of success in college. Since the College withholds credit for D and E grades, both grades are considered failing grades. By adding D's and E's together, one can find that 81 per cent of the failing students were those who had earned C's or below C's in high school.

Table 3. Per Cent of Students Admitted to the College and Per Cent Failed

| Grade | Per cent admitted from high school | | | | | | % failed | |
	Biology	English	History	Math	Science	Average	from each grade	from total
A	8.7	2.0	6.3	2.0	2.8	4.4	0.0	0.0
B	26.1	36.7	33.4	28.6	27.8	30.5	28.1	8.6
C	52.2	47.0	41.7	59.2	52.8	50.6	48.9	24.7
D	13.0	14.3	18.8	10.2	16.6	14.5	78.2	11.4

On plotting the number of students failed in college against the number of C's and D's in high school, Figure 6 shows the existence of a linear relationship.

For the purpose of the prediction, the following formula is suggested: Total per cent failed = per cent admitted in B's × 28.1% + C's × 48.9% + D's × 78.2%.

By using this equation, the calculation is greatly simplified. The equation indicates that the failing per cent of the last year would be 48.0%. The actual figure from the Registrar's office is 47.0% The per cent of error introduced from this prediction is 1%.

The above results give the following suggestions. Since the per cent of failing is high, most students will be weak in one or more subject matter areas. This weakness can be strengthened through the means
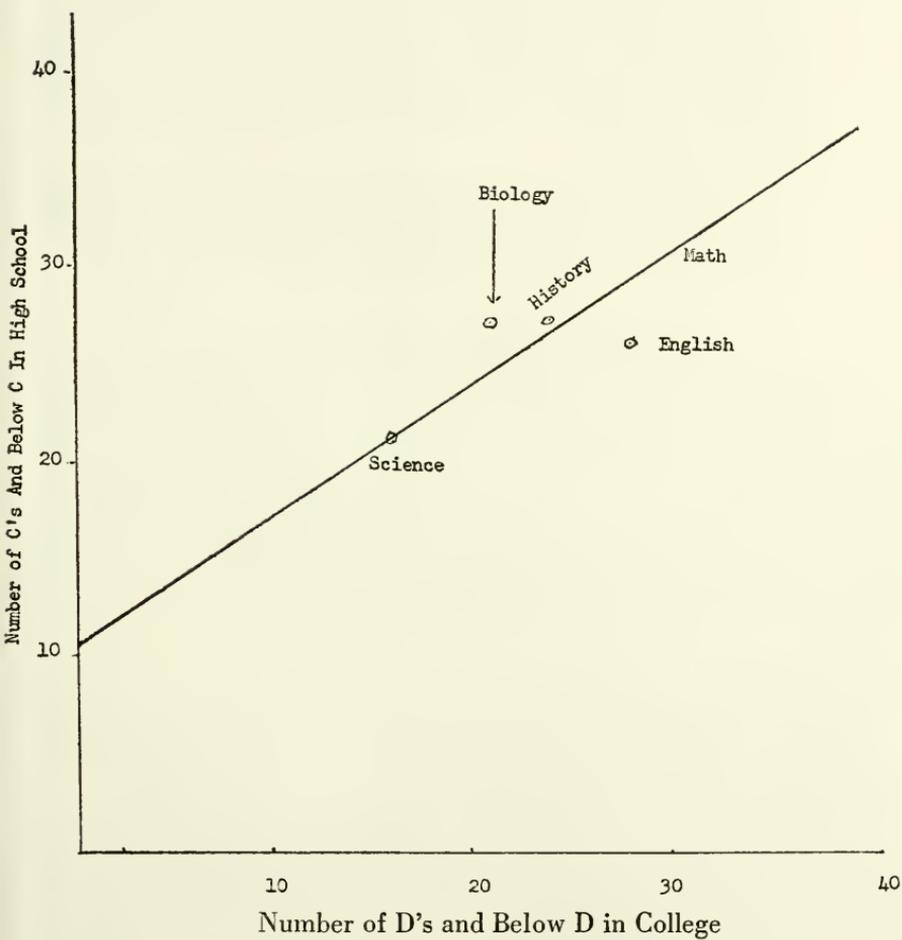
Fig. 6. Number of C's and Below C's is Plotted Against Failed Grade in College.

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of supplementary courses. Pre-college classes, summer school, and night classes are recommended.

1. For those students who are poor in three or more subjects, such as English, mathematics and science, the College should request their entering a pre-college class for one year. There is no short cut for bringing their people up in college without a fairly good foundation.

2. For those students who are poor in one or two subjects, such as English and mathematics, the College should request their going to summer school first. Courses like remedial mathematics should be offered in summer school in order to meet such a demand. By taking such courses the students may prepare themselves for college and may also shorten their time for graduation.

3. For those students who are generally weak but not very poor, a night class during the regular season is recommended. The courses offered in the class should be supplementary in nature and should include how to solve problems.

Summary and Conclusions

A correlation between high school and college grades of students was studied and reported. The results show that the strongest correlation is in history, whereas only 34 per cent of the high school grades had any direct observable relationship with college grades. In English the correlation was 33 per cent; in science 29 per cent; and in biology 23 per cent. In mathematics only 5 per cent of the high school grades had any relationship with the college grades. For simplicity, the authors suggest the following formula may be used for the purpose of prediction.

Total % failed $= \%$ admitted in B's $\times$ 28.1% $+$ C's $\times$ 48.9% $+$ D's $\times$ 78.2%.

The error introduced by using the formula for last year's prediction was 1%.

The results suggest that the following efforts should be made:

1. A pre-college class may be helpful for those students who earned very poor grades (below college requirements) in high school. The time spent in the class will depend upon the students' backgrounds.

2. Under certain circumstances, the pre-college class may not be suitable because some students may be weak not only in one course but in several. By enrolling in the pre-college class, one course may hold students one year late for graduation. If this happens, the College needs to request students who have earned one or two poor grades in high school to come to the summer school before taking any regular college course. The courses offered in summer school under such requests should be in the nature of preparation for college, such as remedial mathematics.

3. For those students who are weak in certain courses but not so poor as E-grade students, a supplementary class may be helpful. The time for such class or classes may be evenings during the regular session. The subject matter for such classes should be closely associated with college subject matter. The instructor for such classes may be the same one the student has in his regular course or his assistant.