

A NOTE ON THE CORRELATION BETWEEN RESULTS IN THE COLLEGE AND UNIVERSITY EXAMINATIONS.

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INTRODUCTION.

In the University of Calcutta, students after passing the Matriculation examination are required to study for two years in an affiliated college before sitting for the Intermediate examination of the University. In most colleges the students take a number of college examinations in between the Matriculation and the Intermediate examinations of the University. Of these college examinations two are considered particularly important;—the Annual and the Test. Promotion from the first year to the second year is usually determined by the results in the Annual examination taken at the end of the first year of study; while students are sent up for the University Examination or detained in the second year on the results of the Test examination held at the end of the second year course two or three months before the University examination.

Students who pass the Intermediate examination are placed in the three divisions, and the University office supplies each college with what is called a "cross list" showing the result for each student in an abstract form as having passed in the first, second or third division or having been unsuccessful in a particular subject marked with a cross. Actual marks are not however given in the "cross-list".

Students who take their admission in the Intermediate class may therefore be classified into six groups:—

- (I) Students who are detained in the first year on the results of the Annual examination.
- (II) Students who are detained in the second year on the results of the Test examination.
- (III) Students who are sent up but who are unsuccessful in the University examination.
- (IV) Students passing the Intermediate examination of the University in the third division.
- (V) Students passing the Intermediate examination in the second division.
- (VI) Students passing the Intermediate examination in the first division.

An attempt has been made in this note to study how far marks in the College Annual and Test examinations are correlated with the University results.

MATERIAL FOR THE STUDY.

The material for the present note consists of the marks in the Annual and the Test examinations for five years (1928-29 to 1932-33) in the Intermediate Arts and Intermediate Science classes of the Hooghly College. This is a "first grade" college affiliated up to the honours B.A. and B.Sc. standard in a number of subjects, and is one of the oldest colleges in Bengal having been founded in 1836. Marks obtained by the students in different subjects at the college examinations were collected (by one of us, D. P. A.) from old mark registers. As the subjects for the examinations were not identical for all the students, it was decided to work with the total mark obtained by each student expressed as a percentage of the total obtainable. This percentage mark is clearly a good index of the success achieved by the student in the college examinations.

The actual number of students in each group is shown in Table 1.

TABLE 1. NUMBER OF STUDENTS IN DIFFERENT GROUPS.

Group	Intermediate Arts						Intermediate Science					
	1928-30	1929-31	1930-32	1931-33	1932-34	Total	1928-30	1929-31	1930-32	1931-33	1932-34	Total
Detained in the First Year	5	7	3	3	11	29	4	2	8	2	11	27
Detained in the Second Year	4	6	12	12	7	41	6	13	14	17	17	67
Failed in the University Examination	14	18	12	8	6	53	12	26	17	18	5	78
Passed in the Third Division	2	6	4	2	5	19	2	3	6	2	3	16
Passed in the Second Division	16	6	7	14	8	51	18	10	11	14	16	69
Passed in the First Division	6	8	4	10	5	33	21	8	12	17	8	66
Total	47	46	42	49	42	226	63	62	68	70	60	323

The first thing to be noticed is the large wastage. Out of 226 who completed the first year Arts course, 29 were detained in the first year and 41 in the second year, so that 70 out of 226 or 31 per cent. were weeded out before the University examination; of those sent up, 53 failed to pass, so that the total wastage is as high as 54 per cent. The position is equally unsatisfactory in the Science course. Out of 323 no less than 94 or about 29 per cent. were detained in the first or the second year and 78 failed in the University examination giving a total wastage of about 53 per cent. It will also be noticed that only 29 out of 226 (or 13 per cent.) in the Arts Course, and 27 out of 323 (or 9 per cent.) in the Science Course were detained at the end of the first year. In other words, the greater part of the wastage (42 and 45 per cent. in the Arts and Science courses respectively) occurred at the end of two years of college work.

CORRELATION BETWEEN ANNUAL AND TEST MARKS.

The coefficients of correlation between the marks in the Annual and the Test examinations were worked out separately for the students who were sent up for the University examination and for those who were detained on the result of the Test examination at the end of the second year. The actual coefficients of correlation are given in Table 2.

TABLE 2. COEFFICIENT OF CORRELATION BETWEEN ANNUAL AND TEST MARKS.

Year	Intermediate Arts		Intermediate Science	
	Allowed	Detained	Allowed	Detained
1928-30	+ 0.82	+ 0.82	+ 0.78	+ 0.80
1929-31	+ 0.93	+ 0.87	+ 0.89	+ 0.88
1930-32	+ 0.90	+ 0.80	+ 0.82	+ 0.86
1931-33	+ 0.74	+ 0.74	+ 0.74	+ 0.79
1932-34	+ 0.50	+ 0.58	+ 0.82	+ 0.85

With one or two exceptions, the coefficients of correlation are high and of the order of +0.85. This shows that there was a close relation between the marks in the two examinations. Students who secured high (or low) marks in the Annual examination also secured on an average high (or low) marks in the Test examination. The teaching given in the interval thus appears to have made little difference in the *relative position* of the students.

CORRELATION BETWEEN COLLEGE & UNIVERSITY EXAMINATION RESULTS

COLLEGE EXAMINATIONS AND UNIVERSITY RESULTS.

We have already mentioned that the actual marks in the University examination were not available. We therefore used the method of correlation ratio based on the six broad categories mentioned in the introduction. The results are shown in Table 3.

TABLE 3. CORRELATION RATIO OF COLLEGE MARKS AND UNIVERSITY RESULTS.

Year	Intermediate Arts		Intermediate Science	
	Annual	Test	Annual	Test
1928-30	0.46	0.67	0.77	0.56
1929-31	0.69	0.67	0.69	0.77
1930-32	0.75	0.77	0.84	0.76
1931-33	0.67	0.67	0.69	0.62
1932-34	0.70	0.58	0.82	0.66

All the values of the correlation ratio are statistically significant. This shows that, on the whole, marks obtained by the different groups of students are appreciably different. The fairly high values of the correlation ratio show that the college examination, on the whole, test much the same qualities as the University examinations. Success in the college examinations is therefore a fairly reliable criterion of success in the University examination.

It will be noticed however that there is practically no difference between the values of the correlation ratio for the Annual and the Test marks. In other words, it is possible to forecast the result of the University examination with as much accuracy from the Annual marks as from the Test marks. The results of the Test examination thus do not appear to give any additional information regarding the chance of success of the candidate. This is of course just what is to be expected from the high correlation between the marks in the Annual and the Test examinations noticed before.

AVERAGE MARKS FOR DIFFERENT GROUPS.

The average marks for each group of students taken over five years are shown in Table 4.

TABLE 4. MEAN MARKS AND STANDARD ERRORS IN DIFFERENT GROUPS.

Group	Intermediate Arts		Intermediate Science	
	Annual	Test	Annual	Test
Detained in the First Year	20.86 ± 0.69	21.74 ± 0.59
Detained in the Second Year	32.90 ± 0.99	26.25 ± 0.66	29.62 ± 0.57	26.35 ± 0.52
Failed in the University Exam.	32.26 ± 0.86	32.65 ± 0.55	33.10 ± 0.69	34.38 ± 0.39
Passed in the Third Division	33.00 ± 1.13	33.91 ± 0.76	35.91 ± 1.07	33.20 ± 0.72
Passed in the Second Division	40.47 ± 1.27	38.06 ± 0.68	39.70 ± 0.81	37.82 ± 0.78
Passed in the First Division	51.62 ± 2.31	49.38 ± 1.49	53.10 ± 1.03	49.97 ± 0.98

It appears from the above table that students who succeeded in passing the University examination in the first division had secured distinctly higher marks (about 50 per cent. or more) in the college examinations. This is also generally true for the second division students who obtain from 38 to 40 per cent. marks. The differences between those who pass in the third division, those who fail in the University examination, and those who are detained in the Test examination are however inappreciable. It is therefore to some extent a matter of chance how the students in these three groups (who receive from 26 to 33 per cent. of total marks) will do in the final examination. The marks of those who

were detained in the first year were however naturally appreciably lower (about 21 per cent.) than the marks in the other groups.

DETAILED ANALYSIS.

The mean marks were further analysed with the help of Fisher's t-test, and the results are given in Table 5.

In the Arts course the students who were detained in the first year (Group I) received from 11 per cent. to 31 per cent. less marks than the students in the other groups, and observed values of "t" ranged from 9.33 to 12.51 against one per cent. expected values of 2.75 or less. They are therefore sharply differentiated from the rest.

Students who were detained at the end of the second year (Group II) did not differ appreciably from the students who were sent up but failed (Group III) or those who passed in the third division (Group IV) so far as marks in the Annual examination are concerned (t less than one), but received 6 per cent. or 7 per cent. less marks in the Test examination (observed t about 7 against one per cent. value of 2.75). They were also clearly distinguished from the students who passed the University examination in the first or second division in having received from 5% to 19% less marks (with observed values of t from 5 to 12) in the college examinations.

Students who were sent up but failed (Group III) and who passed in third division (Group IV) did not however differ appreciably in the marks secured by them in the college examinations, as the mean difference was the order of only one per cent. with an observed value, 1.22 or less. These two groups however received from 4% to 8% lower marks than the 'second division', and from 16% to 19% less marks than the 'first division' students.

Students who passed in the second division (Group V) received about 11 per cent. lower marks in the college examinations and were thus distinctly less able than students who passed in the first division (4.37 and 7.32). They received however appreciably higher marks than the other students. The 'first division' boys received from 11% to 30% higher marks than all the other groups (with observed values of t ranging from 4.37 to 12.51 against one per cent. expected values of 2.977 and less). They were thus distinctly more able than the rest.

The results are quite similar in the case of the Science students. Students detained in the first year received from 8% to 32% lower marks and were clearly less able than the rest. Students detained in the second year (Group II) received slightly lower marks than those who were sent up but failed, and from 6% to 24% lower marks than others. There was however no appreciable difference between the students who were sent up and failed and those who passed in the third division. The 'second division' boys received from 12% to 18%, or appreciably lower marks than the 'first division' students, but secured distinctly higher marks than the rest. The 'first division' was distinctly more able and received from 11% to 32% or significantly higher marks than all the others.

THE GENERAL POSITION.

The use of t-test gives a detailed picture of the actual situation. The 'first division' boys are clearly distinguished from the 'second division', and also naturally from all the other groups. The 'second division' boys are quite clearly differentiated from the boys who are successful in the examination, and are also on the whole differentiated from the 'third division' students. So far as marks in the college examinations are concerned there is however nothing to choose between the boys who pass the University examination in the third division and those who fail. The difference between the third division boys and those who are not sent up for the University examination is also not always statistically significant. Boys in the first group are naturally very sharply

TABLE 5. MEAN DIFFERENCE AND VALUES OF t.

Group	N	(I) Detained in 1st Year		(II) Detained in 2nd Year		(III) Failed in University Exam.		(IV) Passed in 3rd Division		(V) Passed in 2nd Division		(VI) Passed in 1st Division	
		Mean Difference	t	Mean Difference	t	Mean Difference	t	Mean Difference	t	Mean Difference	t	Mean Difference	t
Intermediate Arts : Annual Examination.													
Detained in the 1st Year	29	—	—	+ 12'04	9'55	+ 11'40	10'03	+ 12'14	9'88	+ 19'61	11'77	+ 30'76	12'51
Detained in the 2nd Year	30	- 12'04	9'55	—	—	- 0'64	0'48	+ 0'10	0'06	+ 7'57	4'50	+ 18'72	7'40
Failed in the University Exam.	31	- 11'40	10'03	+ 0'64	0'48	—	—	+ 0'74	0'43	+ 8'21	5'09	+ 19'86	7'90
Passed in the 3rd Division	14	- 12'14	9'33	+ 0'10	0'06	- 0'74	0'43	—	—	+ 7'47	3'17	+ 18'62	5'81
Passed in the 2nd Division	36	- 19'61	11'77	- 7'57	4'50	- 8'21	5'09	- 7'47	3'17	—	—	+ 11'15	4'87
Passed in the 1st Division	29	- 30'76	12'51	- 18'72	7'40	- 19'36	7'90	- 18'62	5'31	- 11'15	4'87	—	—
Intermediate Arts : Test Examination.													
Detained in the 2nd Year	36	—	—	+ 6'40	7'39	+ 7'69	6'88	+ 11'32	12'07	+ 23'28	14'60	—	—
Failed in the University Exam.	51	—	—	- 6'40	7'39	—	—	+ 1'29	1'22	- 5'40	6'98	+ 16'88	12'21
Passed in the 3rd Division	17	—	—	- 7'69	6'88	- 1'29	1'22	—	—	+ 4'18	3'45	+ 15'59	7'22
Passed in the 2nd Division	46	—	—	- 11'32	12'07	- 5'40	6'98	- 4'18	3'45	—	—	+ 11'46	7'52
Passed in the 1st Division	32	—	—	- 23'28	14'60	- 16'88	12'21	- 15'59	7'22	- 11'46	7'52	—	—
Intermediate Science : Annual Examination.													
Detained in the 1st Year	27	—	—	+ 7'88	8'88	+ 11'36	10'95	+ 14'17	12'00	+ 17'94	14'18	+ 31'66	20'11
Detained in the 2nd Year	48	- 7'88	8'88	—	—	+ 3'48	3'85	+ 6'29	4'96	+ 10'06	9'43	+ 23'78	19'00
Failed in the University Exam.	48	- 11'36	10'95	- 3'48	3'85	—	—	+ 2'81	1'80	+ 6'58	6'07	+ 20'30	15'56
Passed in the 3rd Division	11	- 14'17	12'00	- 6'29	4'96	- 2'81	1'80	—	—	+ 3'77	2'01	+ 17'49	7'19
Passed in the 2nd Division	53	- 17'94	14'18	- 10'06	9'48	- 6'58	6'07	- 3'77	2'01	—	—	+ 13'72	10'26
Passed in the 1st Division	57	- 31'66	20'11	- 23'78	19'00	- 20'30	15'56	- 17'49	7'19	- 13'72	10'26	—	—
Intermediate Science : Test Examination.													
Detained in the 2nd Year	65	—	—	+ 8'03	12'51	+ 6'85	6'02	+ 11'47	12'38	+ 23'62	21'38	—	—
Failed in the University Exam.	78	—	—	- 8'03	12'51	—	—	- 1'18	1'29	+ 3'44	4'15	+ 15'59	15'46
Passed in the 3rd Division	15	—	—	- 6'85	6'02	+ 1'18	1'29	—	—	+ 4'62	2'87	+ 16'77	8'16
Passed in the 2nd Division	61	—	—	- 11'47	12'38	- 3'44	4'15	- 4'62	2'87	—	—	+ 12'15	9'64
Passed in the 1st Division	64	—	—	- 23'62	21'38	- 15'59	15'46	- 16'77	8'16	- 12'15	9'64	—	—

differentiated from the others as they are detained in the first year because of their very low marks in the Annual examination.

On the available evidence unfortunately it is not possible to say anything definite as regards the usefulness (or otherwise) of the teaching given in our colleges. The mediocre students who secure low marks in the Annual examination do not improve their relative position on the whole in the Test examination, and either fail in the University examination, or pass in the third division. The teaching given does not either make any appreciable difference in their case, or just enable them to maintain their relative position. The abler students who secure high marks in the Annual examination also succeed in securing high marks on the whole in the Test examination, and usually pass the University examination in the first or second division. This success in maintaining their position may be the result of the teaching given. On the other hand this may also be explained on the hypothesis that the abler students do well in all the examinations simply because of their ability and not because of the teaching given to them.

SUMMARY OF CONCLUSIONS.

The present paper discusses the correlation between the results of the Intermediate examination in Arts and in Science of the Calcutta University and the marks obtained in the college examinations for five batches of students of an affiliated college for the five academic sessions 1928-30 to 1932-34.

(1) There is great wastage in the intermediate stage of college teaching as only 46 per cent. of students who completed the first year course succeeded in passing the University examination. Out of the total wastage of about 54 per cent. no less than 44 per cent. occurred after the completion of two years' college work.

(2) There is a high correlation (of the order of $+0.85$) between marks in the Annual examination taken at the end of the first year, and the Test examination taken at the end of the second year.

(3) The correlation ratio for marks in the college examinations and results in the University examination is statistically significant in every case. This shows that success in the college examinations is a fairly reliable criterion of results in the University examination.

(4) Marks in both the Annual and the Test examinations show about the same degree of association with results in the University examination. The Test examination thus does not supply any additional information in regard to the chance of success in the final examination.

(5) There is a small group of boys, about 18 per cent. of the total, who are distinctly above the other in ability. They do well in the college examinations and succeed in passing the University examination in the first division. There is another group of boys of lower ability (about 22 per cent. of the total) who also do fairly well in the college examinations and pass in the second division in the final examination. At the bottom there is a group of students (about 10 per cent.) who are eliminated at the end of the first year. In the middle there is a large number of boys, about half of the whole group, who probably differ little in ability; some of them are detained at the end of the second year; some are sent up but fail in the University examination; and some succeed in passing it in the third division.

(6) Natural ability is important in determining success in the University examination. The teaching given either makes no appreciable difference, or has just about the same effect on all the students whether they are able or mediocre.

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