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ACADEMIC DESCRIPTION AND PREDICTION IN JUNIOR COLLEGES

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Summary

This investigation of the junior college examines the academic potential and college grades of junior college freshmen, reports the predictive validity of ACT data for junior colleges, and compares the results for 85 junior colleges with those for 205 four-year colleges. Junior college students were found to be somewhat less able academically than their peers in four-year colleges. Their average ACT scores differed by about one-half a standard deviation, while their high school grades were about one-third of a grade point apart. However, differences among junior colleges in academic potential were so great that the least able students in one junior college would be well above average in another. Similarly, the average academic potential at several junior colleges was well above the average in typical four-year institutions.

Students within individual junior colleges had more diverse academic talents than was typical of students in four-year institutions. College grades for junior college students were also more variable than those found in four-year colleges. However, grade point averages in both junior colleges and four-year colleges were quite similar (about a "C").

For the junior colleges in this study, ACT data possessed a very satisfactory degree of predictive validity. The median correlation with overall freshman grades was .64. In specific courses in English, mathematics, social studies, and natural science, median correlations were

.62, .57, .61, and .61, respectively. Junior colleges for which high correlations were obtained differed in two dimensions--"Conventionalism" and "High Cost"--from those for which the correlations were relatively low.

Implications of these findings for pre-college guidance, academic programming, and educational planning were discussed.

Academic Description and Prediction in Junior Colleges

Donald P. Hoyt and Leo Munday[1]

The junior college represents one of the most important solutions to America's need for post-high school educational opportunities. Long a factor in American higher education, the junior college has only recently assumed its key role. Some of the forces producing this new importance are reviewed in the synthesis by Blocker, Plummer, and Richardson (1965).

The heavy responsibilities that junior colleges carry require that they have a thorough understanding of their students, goals, methods, and outcomes. Because they have only recently emerged as a major element in higher education, a limited amount of research data has been accumulated to foster these understandings. This report, which seeks to provide some additional information gathered through the Research Services of the American College Testing Program, explores the following questions:

1. How do the academic potentials of junior college freshmen compare with those of freshmen attending four-year colleges?
2. How much diversity in academic potential is there among junior colleges compared with four-year colleges?
3. What grading practices characterize junior colleges?

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[1]The assistance of Larry Braskamp is gratefully acknowledged.

4. How useful are ACT data in predicting junior college grades?

5. Are junior colleges for which ACT data predict relatively well different from those for which they predict less well?

Sample

The 85 junior colleges which participated in the 1964 ACT Research Service[2] comprised the junior college sample, while the comparison sample consisted of the 205 four-year colleges and universities participating in the same service.[3] Students from these colleges were all freshmen in 1963-64 and had all taken the ACT examination during the 1962-63 school year. A total of 24,549 students were included in the 85 junior colleges and 101,634 students in the 205 four-year colleges.

Table 1 describes the junior colleges according to their location and type of control.

Measures

Measures of both academic potential and college achievement were available for all students. These are described below.

Academic potential. Standard ACT data were used to measure academic potential. These included four scores on the ACT tests of

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[2]The ACT Research Service is provided at no cost to colleges participating in the American College Testing Program. See the General Information Bulletin (American College Testing Program, 1965b).

[3]A few colleges were eliminated because they were known to have submitted biased samples, used the Research Service to investigate an atypical problem (e.g., to predict scores on other standardized tests), or provided fewer than 100 student records.

Table 1

Description of Junior Colleges Studied

Geographic Region	Number of Schools
West Coast (Cal., Ore., Wash.)	4
South (Ala., Ark., Fla., Ky., Miss., Tenn.)	11
Midwest (Ill., Ia., Minn., Ohio, Wis.)	27
Rocky Mountain (Colo., Idaho, Kans., Mont., Nebr., N.Dak., S.Dak., Utah)	13
Southwest (Ariz., N.Mex., Okla., Tex.)	22
Northeast (Conn., Md., W.Va.)	8
(Total)	(85)

Institutional Control	Number of Schools
Public (State)	7
Public (District)	59
Private (Religious)	14
Private (Independent)	5
(Total)	(85)

educational development and four self-reported high school grades.

The ACT battery consists of tests in English, mathematics, social studies, and natural science. The tests are intended to measure general educational development, not specific subject matter mastery. Scores are adjusted to a common reference month (November of grade 12) so that there is no systematic advantage to taking the test early or late in

the year.[4]

At the time the student writes the examination, he is asked to report his most recent high school grade in four subjects--English, mathematics, social studies, and natural science. To make these reports more comparable, grade 12 courses are not considered. These grades are reported with accuracy and have been found to be as predictive of college grades as high school rank (American College Testing Program, 1965a).

College achievement. Colleges participating in the Research Service are asked to report first-year grades to the ACT research division. Overall grade point average (GPA) is reported for nearly every student. In addition, colleges usually report GPA's for courses in English, mathematics, social science, and natural science. Occasionally, grades are reported in other more specific courses (e.g., religion, Latin, shop, etc.). Since not all students take the same courses, the number of cases fluctuates from one area to the next.

Results

Question 1. How do the academic potentials of junior college freshmen compare with those of freshmen attending four-year colleges?

Table 2 gives means and standard deviations of ACT test scores and high school grades for the junior college and four-year college samples.

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[4]For additional details, refer to the ACT Technical Report (American College Testing Program, 1965a).

Table 2

Academic Potentials of Junior College

and Four-Year College Samples

	85 Junior Colleges[1]		205 Four-Year Colleges[2]		"t"[3]
	Mean	S.D.	Mean	S.D.	
ACT English	17.6	5.2	19.8	4.9	59.25
ACT Math	17.4	6.2	20.0	6.2	58.69
ACT Social Studies	18.2	5.9	20.7	5.7	59.52
ACT Natural Science	18.5	6.1	20.8	6.0	53.12
ACT Composite	18.0	4.9	20.5	4.8	71.43
H.S. English	2.39	.90	2.75	.86	56.25
H.S. Math	2.15	1.00	2.45	.98	42.25
H.S. Social Studies	2.49	.91	2.85	.88	56.25
H.S. Natural Science	2.25	.93	2.54	.92	43.94
H.S. Average of Four Grades	2.32	.73	2.65	.71	63.46

[1]Total number of students = 24,549
[2]Total number of students = 101,634
[3]All differences significant beyond .01 level

For the colleges in these samples, the four-year colleges attracted students whose academic potential averaged higher than that of junior college freshmen. Mean differences tended to be between one-third and one-half of a standard deviation. The extraordinarily large "t" values are a function of the large number of cases; with so many students in each sample, even trivial mean differences might be statistically significant.

Question 2. How much diversity is there among junior colleges compared with four-year colleges?

Table 2 shows that, as a whole, students enrolled in two-year and

four-year colleges were about equally variable in their academic potentials. These results are difficult to interpret since they reflect variability which arises from two sources--differences among colleges of a given type and differences within individual colleges.

Simple analyses of variance were performed so that the total variability in each type of college could be assigned to one of these two sources. Computations were made only for the ACT tests, and results are shown in Table 3. The amount of variability due to differences among colleges of a given type is shown in the first two columns; the last two columns describe the typical variability within individual junior colleges and individual four-year colleges.

Table 3

Diversity of ACT Scores Within and Among

Junior Colleges and Four-Year Colleges

Test Scores	Standard Deviation Among Colleges		Standard Deviation Within Colleges	
	Jr. Coll.	4-Yr. Coll.	Jr. Coll.	4-Yr. Coll.
ACT English	1.78	2.03	4.92	4.42
ACT Math	1.99	2.89	5.90	5.54
ACT Social Studies	1.97	2.40	5.61	5.22
ACT Natural Science	2.13	2.51	5.74	5.40
ACT Composite	1.91	2.33	4.53	4.17

Table 3 suggests two generalizations. First, the ACT mean scores were somewhat more homogeneous among junior colleges than among four-year institutions. Second, the typical variability within two-year colleges

was somewhat greater than the typical variability within four-year colleges; that is, the typical junior college contends with a somewhat greater range of academic talent than does the typical four-year institution.

Question 3. What grading practices characterize junior colleges?

We have previously pointed out that colleges participating in the ACT Research Services typically report overall GPA's and first-year grades in English, mathematics, social studies, and natural science. Since ACT routinely collects the most recent high school grade[5] in these same areas, it was possible to compare high school and college grades. The results for both junior colleges and four-year colleges are shown in Table 4. Differences between the two types of colleges were tested for statistical significance.

Table 4

High School and College Grades at Two- and Four-Year Colleges

	Junior Colleges[1]		Four-Year Colleges[2]		"t"[3]
	Mean	(S.D.)	Mean	(S.D.)	
H.S. English grade	2.39	(.90)	2.75	(.86)	52.17
Coll. English grade	1.98	(.98)	2.03	(.96)	6.62
H.S. Math grade	2.15	(1.00)	2.45	(.98)	26.32
Coll. Math grade	1.93	(1.12)	2.04	(1.15)	8.54
H.S. Soc.Studies grade	2.49	(.91)	2.85	(.88)	43.88
Coll. Soc.Studies grade	1.92	(.99)	2.00	(.91)	9.04
H.S. Nat.Sci. grade	2.25	(.93)	2.54	(.92)	30.90
Coll. Nat.Sci. grade	1.90	(1.06)	1.96	(1.05)	5.61
Average 4 H.S. grades	2.32	(.73)	2.65	(.71)	65.14
Coll. Overall grades	2.05	(.81)	2.11	(.79)	10.47

[1]N varies from 9,204 (Mathematics) to 24,549 (Overall)
[2]N varies from 44,523 (Mathematics) to 101,634 (Overall)
[3]All differences significant beyond .01 level

[5]Senior grades are not used.

Table 4 indicates that junior college grades average about the same as four-year college grades. The slight differences, while generally less than 0.1 of a grade point, were, however, statistically significant, with the junior college averages being lower. These differences were much smaller than differences between high school grades for students enrolled in the two types of colleges. We probably can conclude, therefore, that had the junior college students in this sample attended a four-year institution, their first-year grades would have been lower.

Question 4. How useful are ACT data in predicting junior college grades?

To answer this question, multiple correlations were computed between scores on the four ACT tests and each criterion (college GPA) submitted by colleges in this study. Predictions made from the resulting multiple regression equations are referred to as the "T Index." Similarly, multiple correlations were computed between the four high school grades and each criterion; predictions made from the resulting regression equations are called the "H Index." Finally, the T and H Indices were averaged for each student; this average is called the "TH Index." The TH Index was then correlated with each criterion.[6]

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[6]The results resemble those obtained in a straightforward 8-variable multiple regression analysis. See the ACT Technical Report (American College Testing Program, 1965a). Naturally, the correlations will be subject to some shrinkage when applied to new samples. That this shrinkage is slight is suggested by a large scale study reported in the ACT Technical Report (American College Testing Program, 1965a).

Table 5 summarizes the predictive validity of ACT data for the criteria which colleges most typically use. Results are reported separately for junior colleges and four-year colleges.

Table 5

Predictive Validity of ACT Data:

Median Correlations and Standard Errors of Estimate for

Junior Colleges and Four-Year Colleges

Criterion	No. of Colleges	T Index		H Index		TH Index	
		R	(SE)	R	(SE)	r	(SE)
Coll. Eng. grades							
Jr. Colleges	82	.51	(.80)	.54	(.79)	.62	(.73)
4-Yr. Colleges	197	.54	(.72)	.51	(.75)	.61	(.68)
Coll. Math grades							
Jr. Colleges	48	.44	(1.01)	.48	(.99)	.57	(.94)
4-Yr. Colleges	119	.44	(1.00)	.44	(.99)	.53	(.94)
Coll. Soc. St. grades							
Jr. Colleges	72	.51	(.82)	.51	(.84)	.61	(.78)
4-Yr. Colleges	168	.51	(.82)	.49	(.82)	.59	(.76)
Coll. Nat. Sci. grades							
Jr. Colleges	60	.51	(.92)	.52	(.90)	.61	(.83)
4-Yr. Colleges	157	.49	(.88)	.51	(.87)	.59	(.81)
Coll. Overall GPA							
Jr. Colleges	85	.51	(.67)	.58	(.65)	.64	(.61)
4-Yr. Colleges	205	.55	(.62)	.58	(.60)	.65	(.56)

Table 5 shows that test scores and high school grades have highly acceptable predictive validity in both junior colleges and four-year institutions. While the correlations obtained for the two types of colleges are of a similar magnitude, the junior college standard error of estimate

tends to be slightly larger because college grades are typically more variable in junior colleges than in four-year institutions. Since the TH-r is noticeably above both the T Index R and the H Index R, we can conclude that the two types of predictive data supplement each other usefully. For most criteria, the T and H Indices are of about equal validity. However, in predicting overall GPA, the H Index appears to have a slight advantage, particularly in the junior college sample.

In addition to the criteria reported in Table 5, a few junior colleges reported grades in other courses. Results for these specific courses are given in Table 6.

Table 6

Predictive Validity of ACT Data for Specific Courses

Criterion	TH-r	N
Foreign Language	.53	137
Religion	.75, .51, .61	122, 174, 115
Speech	.65	117
Humanities	.34	169
History	.54, .65, .68	182, 127, 174
Government	.62	178
Economics	.44	307
Biology	.53	190
Chemistry	.64	108
Remedial Algebra	.50	106
College Algebra	.70	107
Accounting	.47, .37	299, 107
Shorthand	.39	311
Shop	.52	107

The median TH-r in these specific courses was .54, somewhat lower than that normally obtained in predicting grades in the areas of the

ACT tests. We need additional research experience with such specific courses as these to determine the courses for which ACT data have useful validity.

Question 5. Are junior colleges for which ACT data predict relatively well different from those for which they predict less well?

Richards, Rand, and Rand (1965b) recently reported that the major institutional characteristics of junior colleges could be described by six independent factors. They labeled the factors: Private Control, Technological Specialization, Size, Conventionalism, Transfer Emphasis, and High Cost.[7] Junior colleges for which grades were relatively predictable and unpredictable were compared on these six dimensions.

In 13 colleges the TH correlation was below .55. Scores for these 13 colleges on six factors were compared with the factor scores for the 20 colleges for which this correlation was above .70. Differences between means were tested by the conventional "t" test. Results are summarized in Table 7.

Table 7

Comparison of Junior Colleges for which Predictive Accuracy Was Relatively Low and Relatively High

Factor	Pred. Accuracy High (N=20)		Pred. Accuracy Low (N=13)		"t"
	Mean	S.D.	Mean	S.D.	
Private Control	4.85	1.5	4.31	2.1	.87
Tech. Spec.	4.85	1.5	5.46	1.3	- .30

[7]In an earlier study, Richards, Rand, and Rand (1965a) labeled the Private Control factor as Cultural Affluence, Conventionalism as Age, and High Cost as Business Orientation.

Table 7 (cont.)

Factor	Pred. Accuracy High (N=20)		Pred. Accuracy Low (N=13)		"t"
	Mean	S.D.	Mean	S.D.	
Size	4.70	1.3	5.62	2.0	-1.57
Conventionalism	5.95	1.8	4.31	2.1	2.45*
Transfer Emphasis	5.25	0.9	5.38	1.5	- .32
High Cost	4.25	1.4	6.31	1.8	-3.73**

* $P < .05$
** $P < .01$

Mean scores on the "Conventionalism" and "High Cost" factors were significantly different for the two groups; the "accurate" group was higher on the Conventionalism factor and lower on the High Cost factor. Inspection of the score distribution emphasized the differences; only 2 of the 20 "accurate" colleges scored above 5 on the High Cost factor, while 9 of the 13 "low accurate" colleges scored above 5. On the Conventionalism factor, 18 of the 20 "accurate" colleges scored 5 or higher, while only 5 of the 13 "low accurate" colleges obtained scores of 5 or higher.

Richards et al., described a junior college high on the Conventionalism factor as a small, academically-oriented college with many traditions, a residential student body, and an administration that provided close supervision of its students. Colleges low on this factor would be characterized by large enrollments, few traditions, a student body which lived off campus and which was more vocationally than academically oriented, and an administration which did not exercise much supervision over students.

The High Cost factor was described by Richards et al., as follows. Junior colleges which are low on this factor would have relatively few students majoring in such business curricula as sales, retailing, and management; low tuition; and few faculty members with the Ph.D. degree. Junior colleges which are high on this factor would have more students in business fields, a high tuition, and a higher proportion of faculty members with the Ph.D. degree.

Discussion and Implications

The nature of the samples limits the interpretation of these findings. Lacking comparison with random samples from the national population, we must be cautious in generalizing these results to all colleges.

A further limitation concerns the criteria. Colleges participating in the ACT Research Service report overall GPA for every student, but they are free to report any specific course grades as additional criteria. While these specific grades are usually in freshman English, mathematics, social studies, and natural science, these groupings are too broad to ensure comparability. Thus, one college may report grades in remedial algebra as a criterion in the mathematics area, while another may report grades in calculus in the same area. It is necessary to assume that, as a group, junior colleges and four-year colleges reported grades from similar courses in each of the categories.

Academic potential. Findings concerning the academic potential of junior college students are not surprising. The "open door" admissions

policy of most junior colleges could be expected to result in a lower average level of academic ability than that of four-year colleges. In overall academic potential, junior college students in this study averaged about one-half a standard deviation below four-year college freshmen; the average junior college freshman would rank at about the 30th percentile of the four-year college group.

No doubt these differences in the academic potential of students at the two types of colleges reflect some basic philosophical differences. Four-year colleges characteristically emphasize intellectual development as a major objective; junior colleges more often embrace a very broad range of objectives which may include intellectual development but which frequently focus on the development of vocational skills and competencies or other types of personal development. The findings of this study support the common contention that junior colleges should not try to imitate four-year colleges. The two kinds of colleges have different kinds of students, and institutional objectives appropriate for students of four-year colleges are not necessarily suitable for students of junior colleges.

Diversity. As important as the findings on the level of academic potential are those regarding diversity. Although mean ability scores for these 85 junior colleges were somewhat more homogeneous than for the 205 four-year colleges, there was substantial variation among them. The highest ACT-Composite mean obtained at any junior college was 23.3; the lowest was 8.3. Seven junior colleges averaged above 21, while five

averaged below 15. When one considers that the standard deviation of the Composite score for college-bound students nationally is approximately 5, it is obvious that there was little overlap in the academic talents of students enrolled in junior colleges at the extremes of this distribution. It is also obvious that mean scores at some junior colleges exceed those at the typical four-year institution. Because of these differences, individual colleges will need to use extreme caution in generalizing from summary statistics to their local situation.

While diversity among junior colleges was considerable, diversity within these colleges was even more noteworthy. This study provided empirical support to the commonly held belief that junior colleges must contend with the entire range of academic talent--from the most gifted to the student of borderline intelligence. To provide academic programs which are appropriately stimulating to students of all academic levels is an immense challenge. Especially important are the needs to provide effective guidance to junior college students and to offer several levels of instruction in common subject matter areas such as English and mathematics.

An obvious implication of this diversity is that college-bound students should have more information about colleges, whether junior or four-year, to enable them to select appropriate institutions. It is through their high school counselors that this information can be dispensed and applied. Colleges differ in many ways other than academic potential,[10]

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[10]See ACT Research Reports, No. 1, 3, 4, 5, and 9.

and information about some of these differences might usefully be supplied to guidance workers. In spite of the reluctance of institutions to provide objective descriptions of their students and environments, college-bound students frequently employ stereotypes of institutions in choosing a college. The high school counselor could act more constructively to improve the student's choice of a college by substituting facts for rumors about institutional differences.

Grading practices. This study lends support to the belief that grading standards at a given institution reflect only the relative abilities within that institution. For example, freshman grades in junior colleges and four-year colleges tended to be about the same despite the clearly established differences in academic potential. This finding confirms earlier reports (e.g., Knoell and Medsker, 1964; Hoyt, 1960) and suggests that normally a student will make higher grades in a junior college than in a four-year college. Of course, there are numerous exceptions to this generalization; differences among colleges are so great that there are many junior colleges in which grading standards are more strict than in the typical four-year college.

This situation, however, is no cause for concern. While the layman may still worry about whether a student is "really college material," the American society has profited immensely from its diverse system of higher education. Wide differences in grading practices within a given institution are generally considered undesirable; but, unless there are

wide differences among colleges, higher education will be able to serve only a select few.

Colleges and universities considering junior year applicants should recognize that junior college and four-year college grades are not comparable, and that, when academic potential is held constant, junior college grades are higher than four-year college grades. Because of the diversity among junior colleges, however, generalization is hazardous, and college and university officials who evaluate junior college student records should have information about the grading practices of specific junior colleges. Thus, information about diversity in higher education would be useful to college and university admissions personnel, as well as to junior college educators and high school counselors.

Predictive validity. This review suggests that ACT data have highly acceptable validity for predicting academic success in junior colleges. This is especially reassuring in view of the needs of junior colleges to section students and to provide educational guidance. Such functions can be done well only when reasonably high correlations are found between predictors and criteria.

Grades were not equally predictable at all colleges. When extreme groups were compared, the junior colleges for which grades were highly predictable were characterized as high on the "Conventionalism" factor and low on the "High Cost" factor, while those colleges for which grades were least predictable obtained a reverse pattern on these two factors.

Results on the "Conventionalism" factor suggest that predictable colleges tend to have high proportions of full-time students and faculty members; they have probably been established longer, also. If this interpretation is correct, it is not surprising that high scoring colleges were more predictable. These colleges would presumably include a higher proportion of students and faculty whose major commitment is to education; in short, these colleges have an academic orientation. Academic potential and academic achievement should correspond more closely in such colleges than in others where there is less of a traditional academic atmosphere.

The "High Cost" factor primarily reflects colleges with high tuition charges, a high proportion of faculty with Ph.D. degrees, and many students enrolled in business-oriented courses. It is not clear why scores on this factor should differentiate predictable from unpredictable colleges. Perhaps the academic motivations of students in "High Cost" colleges are unusually diverse; this might be the case if such colleges enrolled a number of students whose economic and vocational futures were assured by virtue of family ties. Further study should be made of the personal characteristics of students in these colleges to check this or other hypotheses.

These factor scores differentiated those colleges for which ACT data had high predictive validity from those for which the validity was marginal. Combining the two factor scores produced even more effective differentiation. Thus, 11 of the 13 "low predictable" colleges had a

"Conventional" score below 5 or a "High Cost" score above 5; this same pattern occurred in only 4 of the 20 "high predictable" colleges.

This finding adds to the literature on predictability; prediction of junior college grades appears to be systematic. If prediction is systematic, then there is a possibility it can be manipulated, and educational purposes for which prediction is devised may eventually be more nearly realized by such manipulation.

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ACT Research Reports

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