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ABSTRACT

The predictive ability of required tests as to grade point averages (GPA) and a survey of students' socio-economic characteristics are reported on in two separate studies from Lake Land College (Illinois). In the first paper a comparative study of required reading and mathematics tests and the American College Test (ACT) as to their ability to predict GPA, was conducted. The general method was to compare scores obtained on each of the tests by a student with his GPA at the end of the term. Analysis included computing means, standard deviations, simple correlations, multiple correlations, and multiple stepwise regression for appropriate test scores, GPA's, and other variables for different programs. Results showed that no test was a good predictor of GPA. The second report concerned itself with collecting socio-economic data for the student body. A family information form was designed for optional completion by parents of day students. Sixty-four percent of the total day enrollment returned the form. Different color forms allowed for a comparison between transfer and vocational students. Results of that comparison on all data items are reported. (AL)

[THE PREDICTIVE ABILITY OF ENTRANCE TESTING AND A SURVEY OF SOCIO-ECONOMIC CHARACTERISTICS AT LAKE LAND COLLEGE]

by

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1971

A Study of the Predictive Ability of Required Tests at Lake Land College

(A report prepared for the ad hoc committee on testing at Lake Land College. Committee members are Doug Bonewitz, Joyce Guckert, George Lackey and Ivan Lach.)

Introduction

This study was conducted as one phase of a broad evaluation effort of the testing program at Lake Land College. This general evaluation of the testing program was initiated in the Spring of 1971 by an ad hoc committee on testing chaired by Mr. Doug Bonewitz. Other members of the committee were Mrs. Joyce Guckert, Mr. George Lackey and Mr. Ivan Lach. The committee decided that the first order of business was to determine how effective the ACT (American College Test) was at predicting grades in the various programs at Lake Land College. This type of data would then be used in judging proposed alternative tests. A study of the ACT tests was completed by Ivan Lach on May 4, 1971. A report of this study "Correlation Study of ACT Scores with Grade Point Average in Vocational-Technical Programs at Lake Land College" was distributed to all Lake Land College administrators and faculty at this time.

The ad hoc committee on testing then recommended that a diagnostic reading test and a mathematics test be used as additional entrance tests on a trial basis with the 1971-72 new students. The committee proposed that a comparative study of these two tests and the ACT test be conducted during the 1971-72 academic year. Results of the study would be used in deciding which of the tests should be continued as required tests at Lake Land in the future. The present study is an attempt to compare the ability of the ACT test with the Kansas Mathematics test and the Reading Diagnostic

test in predicting grade point average of Lake Land College students in various programs.

Method of Analysis

The method of the study was to compare the scores obtained on each of the tests by a student with his grade point average at the end of the term. The analysis was performed for each of the programs at Lake Land College. A further analysis for each of the curriculums within the Applied Science Program and the Certificate Program was also made. Each analysis included computing a mean and a standard deviation for each test score used in each program, a simple correlation of each test score with grade point average, a multiple correlation of the test scores with grade point average, and a multiple stepwise regression using each of the test scores and the control variable sex as independent variables and grade point average as the dependent variable.

Results

The analysis by the various programs revealed that no test score correlated very highly with grade point average and that the best predictors varied considerably from one program to the next. To illustrate this point the test score with the highest correlation with GPA in the College Transfer programs was the Kansas Math Test Part 1, however, the correlation coefficient was only .187. The multiple correlation of all ten test scores with GPA in the College Transfer program was only .271. In the General Studies program the variable sex correlated with GPA better than any of the test scores with a correlation coefficient of .295. Hence, knowing whether the student was a male or a female was a better predictor of GPA than any

of the test scores. The three reading test score correlated with GPA as well or better than any other scores in all programs except the Certificate Program where the mathematics scores had the highest correlations.

A summary of the results of the above analysis is contained in Appendix A of this report for each program analyzed.

The results for the various curriculums within the Applied Science Program and the Certificate Program seemed to indicate that selected test scores correlated much higher with GPA within a specific curriculum than within a program and that the predictive ability of these selected variables was rather high for certain curriculums. To illustrate this point, in the Drafting Curriculums the correlation between Math ACT and GPA was .391 and between Kansas Math Part 2 and GPA the correlation was .342. The multiple correlation between all the test scores and the GPA was .8304 in this curriculum. The multiple correlations between the test scores and GPA in other curriculums were also rather high. The analysis by curriculums was severely limited, however, because of the small sample sizes of these groups. Hence, the results obtained indicate only that these areas need further study with larger samples.

Results of the analysis of a few selected curriculums are contained in Appendix B of this report.

Summary

This comparative study of the ACT test with the Reading Diagnostic Test and the Kansas Math Test was based on the criteria of ability to predict grade point average. The results showed that none of these tests were good predictors of grade point average in any of the programs at Lake Land College. Although there are other justifications for a college wide testing program, the results of this study show that none of these tests

could be justified on the basis of being able to predict success in various programs (as based on grade point average obtained in the program).

The results obtained from an analysis of the various curriculums seemed to suggest that further study in this area might be fruitful. However, due to the small sample sizes in these groups no conclusions which have statistical significance can be obtained.

APPENDIX A

Analysis by Program

PROGRAM: All College Transfer: Associate in Arts and Associate in Science

Number of Students Enrolled _____ Number of Students Used in Study 141

Summary of Input Data

Variable	Mean	Standard Diviation	Correlation with GPA
Grade Point Average	2.02	1.28	1.000
English ACT	17.6	4.6	.133
Math ACT	20.6	8.6	.074
Social Science ACT	18.6	6.2	.081
Natural Science ACT	20.2	5.3	.100
Composite ACT	19.1	4.5	.093
Reading Vocabulary	41.5	8.0	.175
Reading Comprehension	14.0	2.8	.086
Reading Composite	69.9	12.1	.172
Kansas Math Pt. 1	13.1	4.4	.187
Kansas Math Pt. 2	10.2	5.1	.063

Summary of Multiple Stepwise Regression

Step Number	Variable Entered	Multiple Correlation	Multiple Correlation Squared
1.	Kansas Math Pt. 1	.1871	.0350
2.	Reading vocabulary	.2167	.0469
3.	Kansas Math Pt. 2	.2292	.0525
4.	Composite ACT	.2335	.0545
5.	English ACT	.2423	.0587
6.	Natural Science ACt	.2544	.0647
7.	Social Science ACT	.2645	.0700
8.	Reading comprehension	.2696	.0727
9.	Sex	.2707	.0733
10.	Math ACT	.2710	.0735
11.			

PROGRAM: General Studies

Number of Students Enrolled _____ Number of Students Used in Study 52

Summary of Input Data

Variable	Mean	Standard Diviation	Correlation with GPA
Grade Point Average	1.88	1.23	1.000
English ACT	15.2	4.9	.060
Math ACT	20.1	6.8	.038
Social Science ACT	16.9	6.3	.037
Natural Science ACT	18.4	6.2	.075
Composite ACT	17.5	5.0	.098
Reading Vocabulary	39.9	8.1	.156
Reading Comprehension	13.3	2.7	.214
Reading Composite	67.1	11.5	.209
Kansas Math Pt. 1	13.0	4.3	.008
Kansas Math Pt. 2	10.0	5.1	.137

Summary of Multiple Stepwise Regression

Step Number	Variable Entered	Multiple Correlation	Multiple Correlatio Squared
1.	Sex	.2954	.0873
2.	Reading comprehension	.3710	.1377
3.	English ACT	.3862	.1492
4.	Reading composite	.4010	.1608
5.	Reading vocabulary	.4239	.1797
6.	Math ACT	.4344	.1887
7.	Kansas Math Pt. 2	.4701	.2210
8.	Social Science ACT	.4895	.2396
9.	Composite ACT	.5060	.2560
10.	Natural Science ACT	.5305	.2815
11.	Kansas Math Pt. 1	.5377	.2891

PROGRAM: All Applied Science Programs

Number of Students Enrolled _____ Number of Students Used in Study 164

Summary of Input Data

Variable	Mean	Standard Diviation	Correlation with GPA
Grade Point Average	2.15	1.24	1.000
English ACT	16.2	5.3	.192
Math ACT	17.8	6.5	.273
Social Science ACT	17.5	6.2	.167
Natural Science ACT	18.5	5.1	.177
Composite ACT	17.7	4.5	.268
Reading Vocabulary	40.0	7.1	.308
Reading Comprehension	13.2	3.0	.105
Reading Composite	70.0	11.7	.261
Kansas Math Pt. 1	11.7	4.1	.233
Kansas Math Pt. 2	9.5	4.3	.172

Summary of Multiple Stepwise Regression

Step Number	Variable Entered	Multiple Correlation	Multiple Correlation Squared
1.	Reading vocabulary	.3083	.0950
2.	Math ACT	.3422	.1171
3.	Reading comprehension	.3543	.1255
4.	Sex	.3621	.1311
5.	Kansas Math Pt. 1	.3695	.1366
6.	Kansas Math Pt. 2	.3736	.1396
7.	Composite ACT	.3771	.1422
8.	Social Science ACT	.3787	.1434
9.	Reading composite	.3804	.1447
10.	Natural Science ACT	.3810	.1451
11.	English ACT	.3859	.1489

Socio-Economic Characteristics of Lake Land College Students

Introduction

Information about the socio-economic backgrounds of students has been shown to be a very relevant factor in determining the educational motivation and success of college students. Often educational institutions do not have programs or services which are designed for students from certain socio-economic backgrounds. Hence, socio-economic data is essential for planning programs and services that are appropriate for the particular needs of the students. This data is also necessary in the evaluation of present programs and services. In addition, the data is used for the preparation of financial-aid grant requests from state and federal agencies.

Method

To obtain the necessary data a family information form was designed to be completed by the parents and either mailed in or brought in by the student at registration. In order to assure the parents that the information would not be missused, an anonymous questionnaire was used. Secondly, since the completing of the questionnaire was optional a strong appeal was made to the parents requesting their complience. 1248 of these socio-economic questionnaires were turned in during the fall registration held in September 1971. The 1,248 forms represented 64% of the 1,955 day students enrolled for the fall quarter. However, since most married students did not comply with the questionnaire the 1,248 forms represent 78% of the 1,605 single day students. Either percentage represents an adequate sample of the student body for the purposes of this study.

Analysis of the Data

The first item that was analyzed was the net family income reported. A comparison between college transfer students and vocational-technical students was made possible by the use of a different color form for each group. Table 1 shows the response to this item for each group and for both groups combined. The table shows the number of families and the percentage within each income bracket.

Table 1

Family Net Income of
Lake Land College Students

	College Transfer		Vocation-Technical		All Lake Land Students	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Less Than $3,000	23	4	30	5	53	5
$3,000-$5,999	77	13	93	16	170	14
$6,000-$7,499	67	11	74	13	141	12
$7,500-$8,999	76	12	81	14	157	13
$9,000-$11,999	157	26	157	27	314	26
$12,000-$14,999	108	18	98	16	206	17
$15,000-$19,999	55	9	29	5	84	7
$20,000 & Above	42	7	27	4	69	6

A comparison of the family incomes of college transfer students and vocational-technical students shows that the family incomes of vocational-technical students was slightly lower than that of college transfer students. To illustrate

this, 21 per cent of the vocational-technical students come from families with an income of less than $6,000 as compared to 17 per cent of the college transfer students from this same level. Using a test of significance for two independent proportions (1,2) the difference of 4 per cent between these two groups was statistically significant (3) at the .05 level.

In comparing the percentage of students who come from families with incomes of $15,000 or more we see that 9 per cent of the vocational-technical students come from this area while 16 per cent of the college transfer students fit this category. The 7 per cent difference between these two groups is statistically significant (4) and represents a sizable numerical difference.

A comparison of family incomes of Lake Land College students with family incomes of students enrolled in all Illinois junior colleges (5) shows that the family income of Lake Land College students is significantly lower than the state averages. Table 2 shows the percentages of junior college students with family incomes in each of the categories listed. Although some of the categories have

Table 2

Family Income of Students
Enrolled in Illinois Junior Colleges

$0,000 - $2,999	3 Per Cent
$3,000 - $4,999	7 Per Cent
$5,000 - $7,499	17 Per Cent
$7,500 - $9,999	23 Per Cent
$10,000 - $14,999	31 Per Cent
$15,000 - $19,999	10 Per Cent
$20,000 and above	9 Per Cent

Median Income - $10,000

different limits, the lowest category and the highest category are the same as those used by Lake Land College. Using these two categories we see that Lake Land has 5 per cent of the students with family incomes below $3,000, as compared to 3 per cent on a state average and 6 per cent of Lake Land students with family incomes of $20,000 or more as compared to 9 per cent in the entire state. A test of significance revealed that each difference was statistically significant. (6,7)

Table 3 shows the comparison of median family incomes of college transfer students, vocational-technical students, and both groups combined. The median family income of $9,400 for Lake Land College students is somewhat lower than the median family income of approximately $10,000 for all Illinois junior college students.

Table 3

Median Income of Parents of
Lake Land College Students

College Transfer	Vocational-Technical	All Lake Land College Students
$9,770	$9,150	$9,400

Table 4 shows the percentage of families in which both parents work.

Table 4

Per Cent of Families in
Which Both Parents Work

College Transfer	Vocational-Technical	All Lake Land College Students
41%	40%	40.5%

Table 5 shows the percentage of families in which the mothers reported they were working primarily to pay college expenses.

Table 5

Per Cent of Families in
Which Mothers are Working

College Transfer	Vocational-Technical	All Lake Land College Students
14%	14%	14%

In attempting to determine the educational background of parents of Lake Land College students the questionnaire asked for an indication of the number of years of education completed by the mother and by the father of each student. Table 6 shows the results of the responses to this item. The comparison shows

Table 6

Years of Education Completed by
Parents of Lake Land College Students

	College Transfer				Vocational-Technical				Total			
	Mother		Father		Mother		Father		Mother		Father	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
7 or less	5	1	17	3	10	2	18	3	15	1	35	3
8	62	10	83	14	90	15	133	23	152	13	216	18
9-11	88	15	79	13	92	16	91	16	180	15	170	15
12	330	55	262	45	300	52	246	43	630	54	508	44
13-15	76	13	91	15	68	12	48	9	144	12	139	12
16	21	4	27	5	15	2	17	3	36	3	44	4
17 or more	14	2	28	5	7	1	18	3	21	2	46	4
	596		587		582		571		1178	100	1158	100

that the educational background of parents of college transfer students is slightly higher than that of parents of vocational-technical students. This can be illustrated by comparing the proportion of parents with eight years of education or less and also the proportion of parents with more than a high school education for the college transfer students and for the vocational-technical students. This comparing is illustrated in Table 7. A test of significance (8) shows that the difference in the proportion of parents of college transfer students and the proportion of

Table 7

Comparison of Educational Level of Parents of College Transfer Student with Parents of Vocational-Technical Students at Lake Land College

Education in Years	Mothers			Fathers		
	College Transfer	Vo-Tech	Difference	College Transfer	Vo-Tech	Difference
8 or less	11%	17%	6% *	17%	26%	9% *
13 or more	19%	15%	4% *	25%	15%	10% *

* Differences are statistically significant at the .05 level

parents of vocational-technical students in each category is statistically significant. The data shows a larger proportion of parents of the vocational-technical students who completed eight or less years of formal education. It also shows that a much smaller proportion of parents from vocational-technical students have had more than a high school education.

Although an item on the questionnaire requested information on the number of persons who currently live in the family unit, this item was broken up into several categories which were required for state reports and this made getting an exact

family size average impossible. An approximation of the family unit size seems to show that the average family was composed of 3 to 4 children and two parents for a total of 5 to 6 in the family unit.

APPENDIX

LAKE
LAND
COLLEGE
MATTOON, ILLINOIS 61938 PHONE (217) 235-3131

Dear College Parents:

We need your assistance.

In order to continue to receive federal educational funds, and to improve services provided to students attending Lake Land College, I am asking all college parents to complete the attached, anonymous questionnaire.

I realize some of the information requested is very personal, but I do hope you will help us to assist our students at LLC. Your identity need not be indicated in any way because the information will be analyzed only as a part of the total group.

After completing the questionnaire, have your son or daughter return it during registration for the fall term.

If you have any questions or concerns about the questionnaire, feel free to call for assistance. Your cooperation will be greatly appreciated.

Sincerely,

Richard DeVecchio
Dean of Student Services

RD:ad

FAMILY INFORMATION FORM

1. Indicate the number of persons who currently live in the family unit.

Number of Parents	_____	Children in education beyond high school	_____
Number of Pre-Schoolers	_____		
Children in grade or high school	_____	Dependents other than above such as: aunts, nieces, etc.	_____

2. Indicate the number of family members no longer living with the family unit. _____

3. How many of your children have already completed some education beyond high school? _____

4. Circle the years of education completed by parents of the student.

Mother	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17 or more
Father	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17 or more

5. Indicate the total (gross) income earned by all working parents for 1970. (Self-employed persons use income after tax deductible items.)

a. Less than $3000	_____	e. $ 9000 - $11,999	_____
b. $3000 - $5999	_____	f. $12,000 - $14,999	_____
c. $6000 - $7499	_____	g. $15,000 - $19,999	_____
d. $7500 - $8999	_____	h. $20,000 - above	_____

6. Are both parents employed to earn the above income? _____ Yes _____ No

7. If you answered "Yes" to question 6, has the student's mother gone to work as a direct result of the need to pay for his college education?

_____ Yes _____ No

8. Indicate all sources being used to finance the student's college education in 1971-72.

a. Parents' income	_____	f. College Financial Assistance	_____
b. Parents' savings or investments	_____	g. Illinois State Scholarship	_____
c. Contributions from friends and relations	_____	h. Commercial loan to parents	_____
d. Student's savings	_____	i. Commercial loan to students	_____
e. Student's earnings	_____	j. Other (Soc. Security, Veterans, etc.)	_____

9. Estimate the amount you will spend during the 1971-72 school year for all your children to obtain some form of education beyond high school. _____

FOOTNOTES

[1] Gene V. Glass and Julian C. Stanley, Statistical Methods in Education and Psychology, Englewood Cliffs, N.J.: Prentice-Hall, Inc. 1970.

[2] To test for a significant difference between two independent proportions the following statistical formula was used:

$$z = \frac{P_1 \quad P_2}{P_1 - P_2 \quad \sqrt{\left(\frac{f_1 + f_2}{n_1 + n_2}\right)\left(1 - \frac{f_1 + f_2}{n_1 + n_2}\right)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

[3] In comparing the proportion of college transfer students and vocational-technical students with family incomes of less than $6,000:

Z= 2.00 which is significant at the .05 level

[4] In comparing the proportion of college transfer students and vocational-technical students with family incomes of $15,000 or more:

Z= 4.12 which is significant beyond the .01 level

[5] Illinois Junior College Board, "Junior College Student Characteristics Research Report for 1970-71." November 1971.

[6] Using the test for significance between a given proportion (the state results) and an obtained proportion (Lake Land College results) the following value of z was obtained:

$$\text{formula } z = \frac{P - a}{\sqrt{a\ (1 - a)\ /\ n}}$$

z= 4.00 (significant at the .01 level)

7 Using the same test as in #5, a value for z was calculated.

$z = 4.41$ (significant at the .01 level)

8 Comparing the educational level achieved by parents of college transfer students with that of parents of vocational-technical students the following z scores were obtained for each comparison:

	Mothers	Fathers
Completed eight grade or less	$z=3.00$	$z=4.50$
Completed thirteen years or more	$z=2.00$	$z=4.55$

All comparisons are significantly different at the .05 level