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ABSTRACT

Primary validation of the Nor Cal questionnaire was accomplished in Phase 2 of the Nor Cal Attrition Study. The results of the primary validation were reported in the document entitled, "Phase 2 Final Report," (ED 039 879). The primary validation showed that the consortium-wide empirical validity varied from .65 to .67 depending upon whether or not the ACT aptitude test scores were incorporated into the predictive equation. In terms of the primary validation the research question was, "What proportion of first-time, full-time freshmen were correctly identified by the Nor Cal questionnaire predictive equation as either potential dropouts or potential persisters?" For the secondary evaluation, another research question also dealing with the predictive validity of the instrument emerged: "Are there significant differences between the subsequent performance levels of these groups?" This secondary validation is therefore concerned with comparing attrition rates, units completed, and grade point averages between groups of entering freshmen for whom appropriate scores were known. The results of this validation study show that when performance levels of students who are designated as potential dropouts by the Nor Cal questionnaire are compared with the levels of other students, it is clear that potential dropouts do: (1) have a significantly higher dropout rate, (2) complete fewer units, and (3) have lower grades. (Author/AL)

FURTHER VALIDATION OF THE NOR CAL QUESTIONNAIRE:

SECONDARY VALIDATION

by

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FURTHER VALIDATION OF THE NOR CAL QUESTIONNAIRE SECONDARY VALIDATION[1]

Primary validation of the Nor Cal Questionnaire was accomplished in Phase 2 of the Nor Cal Attrition Study. The results of the primary validation were reported in the document entitled, "Phase 2 Final Report," (MacMillan, 1970). The primary validation showed that the consortium-wide empirical validity varied from .65 to .67 depending upon whether or not the ACT aptitude test scores were incorporated into the predictive equation. In terms of the primary validation the research question was, "What proportion of first-time, full-time freshmen were correctly identified by the Nor Cal questionnaire predictive equation as either potential dropouts or potential persisters?" In this validation study the operational definitions were as follows: "Given that the Sum-1 scores range from +45 to -45, a 'potential dropout' is one who has a Sum-1 discriminant score of above 0, a 'potential persister' is one who has a Sum-1 discriminant score of below 0." Thus a fairly high level of predictive validity was attained even when a "cutting score" of zero (0) was used.

As Phase 3 was being planned in detail, another research question emerged. The second question also dealt with the predictive validity of the instrument. Given initial categorization of first-time, full-time freshmen on the basis of their Nor Cal

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[1]Primary validation was done with a data base that included twenty-two Northern California Community Colleges and 16,488 students. By contrast this secondary validation was done with a data base that included five colleges and 5612 students.

Sum-1 scores, the second research question was: "Are there significant differences between the subsequent performance levels of these groups?" Using a Sum-1 score of +10 or higher to designate a potential dropout[2] the question became: "Do students who have Sum-1 scores of +10 or higher differ in their performance levels from other students?" At first the question centered on the differences in attrition rates between identified potential dropouts and other groups. But when five college representatives indicated their willingness to investigate units completed and grade point average in addition to attrition, the research question was broadened to include comparisons using all three criteria.

The secondary validation would, therefore, be concerned with comparing attrition rates, units completed, and grade point averages between groups of entering freshmen for whom Sum-1 scores were known. These comparisons would be made between potential dropouts, those having Sum-1 scores of +10 or higher, and other groups.

Of half-a-dozen nearby colleges that were contacted, five responded in the affirmative; five would gather the additional data necessary to do the secondary validation. The Nor Cal college representative at each of these five community colleges must be commended for successfully directing the data collection. Each representative collected data on attrition rate and units completed for their college's Fall 1969 Nor Cal sample. Where possible data from more than the fall quarter or semester was obtained. Also where possible data on grade point averages were also collected. The following people deserve credit for seeing

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[2]The "plus-ten or higher" Sum-1 score range was recommended by Dr. MacMillan for use as the operational definition of a potential dropout. (MacMillan, 1970).

that this data was collected and made available for statistical analysis: Dr. Donald Denevi, Merritt College; Dr. Paul Preising, San Jose City College; Mr. David Shaw, De Anza College; Mr. Irel Lowe, Foothill College; and Dr. William Wenrich, College of San Mateo. Needless to say without the efforts of these representatives the secondary validation which follows could not have been done.

While the representatives began collecting the additional data, a start was made in the direction of the secondary validation study. An attrition rate comparison could be made by abstracting data from the Phase 2 Final Report. It should be kept in mind that zero (0) was used as the cutting score. Table 1 shows the first step in gaining the necessary information. This table shows the determination of the attrition rates at each college and for the consortium as a whole.

Table 1 on Page 4

The second step in gaining the required information came from the results of Table 2. Table 2 shows the attrition rate of the group of students who had Sum-1 scores at or above zero (0).

Table 2 on Page 5

After these calculations were accomplished, it was simple to compare the attrition rate of students who had positive Sum-1 scores against those who had negative Sum-1 scores. A statistically significant difference was found as is shown in Table 3.

Table 1

Attrition Rate by College and for the Consortium as a Whole

Data from Fall, 1969

College	Number of Students That Actually Withdrew (WD-yes, Plus WD-No)	Total Number of Students	Attrition Rate
A	71	470	.1510
B	40	442	.0904
C	24	900	.0266
D	174	1787	.0973
E	34	305	.1114
F	94	977	.0962
G	78	1640	.0475
H	46	295	.1559
I	1	289	.0034
J	15	229	.0655
K	38	786	.0483
L	62	1005	.0616
M	73	997	.0732
N	47	300	.1566
O	64	627	.1020
P	24	377	.0636
Q	129	1060	.1216
R	28	150	.1866
S	158	1006	.1570
T	7	131	.0534
U	57	2248	.0253
V	60	467	.1284
TOTALS	1324	16488	.0803

Table 2

Attrition Rate of Students Having Sum-1 Scores
That Were Above Zero (0)

By College and for the Consortium as a Whole

College	Number of Students Who Were Predicted to Withdraw (WD-Yes Plus Pers-No)	Number Who Did Withdraw
A	199	34
B	149	19
C	298	11
D	557	79
E	93	13
F	270	27
G	532	40
H	121	17
I	62	0
J	116	13
K	217	18
L	340	26
M	319	33
N	61	16
O	240	36
P	153	14
Q	440	55
R	59	15
S	360	78
T	38	4
U	749	27
V	229	38
TOTALS	5602	613

Table 3

Nor Cal Consortium Level Validation Using Zero (0) As Cutting Score

	Sum-1 Scores	
	Below 0	Above 0
Withdrew	711	613
Persisted	10175	4989
Total	10886	5602
Attrition Rate	6.53%	10.94%

$Z = 9.87$

$p < .0001$

Since using zero (0) as a cutting score had resulted in a significant difference, it was hoped that a cutting score of plus ten (+10) would do the same for the smaller individual college samples. This hope was realized as Tables 4 through 12 clearly indicate.

Table 4

Comparison of Attrition Rates for Secondary Validation Study Data From Foothill College, Fall Quarter, 1969

	Sum-1 Score	
	-10 and Below	+10 and Above
Withdrew	25	32
Persisted	185	96
Total	210	128
Attrition Rate	11.9%	25.0%

$Z = 3.12$

$p < .001$

Table 5

Comparison of Attrition Rates for Secondary Validation Study Data From Foothill College, Spring Quarter, 1970

	Sum-1 Score	
	-10 and Below	+10 and Above
Withdrew	78	60
Persisted	132	68
Total	210	128
Attrition Rate	37.1%	46.9%

$Z = 1.77$

$p < .14$

Table 6

Comparison of Attrition Rates for Secondary Validation Study
Data From De Anza College, Fall Quarter, 1969

	Sum-1 Score	
	-10 and Below	+10 and Above
Withdrew	56	69
Persisted	244	201
Total	300	270
Attrition Rate	18.7%	25.6%

$Z = 1.98$

$p < .024$

Table 7

Comparison of Attrition Rates for Secondary Validation Study
Data From De Anza College, Spring Quarter, 1970

	Sum-1 Score	
	-10 and Below	+10 and Above
Withdrew	102	149
Persisted	198	121
Total	300	270
Attrition Rate	34.0%	55.2%

$Z = 5.09$

$p < .001$

Table 8

Comparison of Attrition Rates for Secondary Validation Study
Data from San Jose City College, Fall Semester, 1969

	Sum-1 Score	
	-10 and Below	+10 and Above
Withdrew	149	58
Persisted	569	128
Total	718	186
Attrition Rate	20.8%	31.2%

$Z = 2.97$

$p < .015$

Table 9

Comparison of Attrition Rates for Secondary Validation Study Data From San Jose City College for the Entire Academic School Year, 1969-70
(Three Groups)

	Sum-1 Score		
	-10 and Below	Between	+10 and Above
Withdrew	40	166	84
Persisted	130	382	102
Total	170	548	186
Attrition Rate	23.5%	30.3%	45.2%

$X^2 = 21.12$

$p < .001$

Table 10

Comparison of Attrition Rates for Secondary Validation Study Data From San Jose City College for the Entire Academic School Year, 1969-70
(Two Groups)

	Sum-1 Score	
	-10 and Below	+10 and Above
Withdrew	40	84
Persisted	130	102
Total	170	186
Attrition Rate	23.5%	45.2%

$Z = 4.28$

$p < .001$

Table 11

Comparison of Attrition Rates for Secondary Validation Study Data From College of San Mateo, Fall Semester, 1969

	Sum-1 Score	
	-10 and Below	+10 and Above
Withdrew	17	76
Persisted	400	619
Total	417	695
Attrition Rate	4.1%	10.9%

$Z = 4.00$

$p < .001$

Table 12

Comparison of Attrition Rates for Secondary Validation Study
Data From Merritt College, Fall Semester, 1969

	Sum-1 Score	
	-10 and Below	+10 and Above
Withdrew	12	13
Persisted	181	80
Total	193	93
Attrition Rate	6.2%	14.0%

$Z = 2.18$

$p < .015$

The Nor Cal questionnaire thus demonstrated high predictive validity. Seven of eight tests resulted in significance levels of .03 or better. It was clear that students having Sum-1 scores of plus-ten (+10) or greater did have high attrition rates.

The next variable to be investigated was number of units completed in a given semester or quarter. For this investigation entering freshmen were divided into three groups based on their Sum-1 scores. One group was the potential drop-outs, those whose Sum-1 score was at or above "plus-ten" (+10). Another group included students whose Sum-1 score was at or below "minus-ten" (-10). The third group included those whose Sum-1 score was between "minus-ten" (-10), and "plus-ten" (+10). Statistically significant differences exist between the three groups of students on the variable of number of units completed, as Tables 13 through 36 show.

Table 13

Descriptive Statistics for Validation Study of Data
From Foothill College, Fall Quarter, 1969

Variable is Units Completed

Group	-10 and Below	Between	+10 and Above
Sample Size	210	487	128
Mean	10.4857	10.2115	7.6992
Standard Deviation	5.4192	5.6195	6.1161

Table 14

Analysis of Variance for Validation Study of Data
From Foothill College, Fall Quarter, 1969

Variable is Units Completed

	Sum of Squares	DF	Mean Square	F Ratio
Between Groups	739.1975	2	369.5986	11.5801
Within Groups	26235.4492	822	31.9166	
Total	26974.6445	824		

$p < .0005$

Table 15

Descriptive Statistics for Validation Study of Data
From Foothill College, Winter Quarter, 1970

Variable is Units Completed

Group	-10 and Below	Between	+10 and Above
Sample Size	210	487	128
Mean	8.8024	8.8788	6.5352
Standard Deviation	6.4635	6.7185	6.0484

Table 16

Analysis of Variance for Validation Study of Data
From Foothill College, Winter Quarter, 1970

Variable is Units Completed

	Sum of Squares	DF	Mean Square	F Ratio
Between Groups	583.2417	2	291.6208	6.7879
Within Groups	35314.7070	822	42.9619	
Total	35897.9453	824		

$p < .005$

Table 17

Descriptive Statistics for Validation Study of Data From Foothill College, Spring Quarter, 1970

Variable is Units Completed

Group	-10 and Below	Between	+10 and Above
Sample Size	210	487	128
Mean	7.4667	7.0708	5.0000
Standard Deviation	6.8856	6.7427	5.9631

Table 18

Analysis of Variance for Validation Study of Data From Foothill College, Spring Quarter, 1970

Variable is Units Completed

	Sum of Squares	DF	Mean Square	F Ratio
Between Groups	541.6895	2	270.8447	6.0961
Within Groups	36520.7344	822	44.4291	
Total	37062.4219	824		

$p < .005$

Table 19

Descriptive Statistics for Validation Study of Data From Foothill College for the Entire Academic School Year, 1969-70

Variable is Units Completed

Group	-10 and Below	Between	+10 and Above
Sample Size	210	487	128
Mean	26.7548	26.1807	19.2344
Standard Deviation	15.9702	16.6055	16.2306

Table 20

Analysis of Variance for Validation Study of Data From Foothill College for the Entire Academic School Year, 1969-70

Variable is Units Completed

	Sum of Squares	DF	Mean Square	F Ratio
Between Groups	5529.3516	2	2764.6758	10.2938

Table 21

Descriptive Statistics for Validation Study of Data
From De Anza College, Fall, 1969

Variable is Units Completed

Group	-10 and Below	Between	+10 and Above
Sample Size	300	705	270
Mean	10.2867	9.4355	7.8611
Standard Deviation	6.0382	6.0332	6.0114

Table 22

Analysis of Variance for Validation Study of Data
From De Anza College, Fall, 1969

Variable is Units Completed

	Sum of Squares	DF	Mean Square	F Ratio
Between Groups	863.9924	2	431.9961	11.8818
Within Groups	46247.2930	1272	36.3579	
Total	47111.2852	1274		

$p < .0005$

Table 23

Descriptive Statistics for Validation Study of Data
From De Anza College, Winter, 1970

Variable is Units Completed

Group	-10 and Below	Between	+10 and Above
Sample Size	300	705	270
Mean	9.1250	8.0567	5.8889
Standard Deviation	6.5269	6.7855	6.4272

Table 24

Analysis of Variance for Validation Study of Data
From De Anza College, Winter, 1970

Variable is Units Completed

	Sum of Squares	DF	Mean Square	F Ratio
Between Groups	1556.2268	2	778.1133	17.5912
Within Groups	56264.5234	1272	44.2331	
Total	57820.7500	1274		

$p < .0005$

Table 25

Descriptive Statistics for Validation Study of Data From De Anza College, Spring, 1970

Variable is Units Completed

Group	-10 and Below	Between	+10 and Above
Sample Size	300	705	270
Mean	8.2333	6.8433	4.8333
Standard Deviation	6.7751	6.8277	6.1652

Table 26

Analysis of Variance for Validation Study of Data From De Anza College, Spring, 1970

Variable is Units Completed

	Sum of Squares	DF	Mean Square	F Ratio
Between Groups	1658.0508	2	829.0254	18.5758
Within Groups	56768.5234	1272	44.6293	
Total	58426.5742	1274		

$p < .0005$

Table 27

Descriptive Statistics for Validation Study of Data From De Anza College for the Entire Academic School Year, 1969-70

Variable is Units Completed

Group	-10 and Below	Between	+10 and Above
Sample Size	300	705	270
Mean	27.6450	24.3354	18.5833
Standard Deviation	17.4912	17.6092	16.4752

Table 28

Analysis of Variance for Validation Study of Data From De Anza College for the Entire Academic School Year, 1969-70

Variable is Units Completed

	Sum of Squares	DF	Mean Square	F Ratio
Between Groups	11973.2695	2	5986.6328	19.8933
Within Groups	382791.6875	1272	300.9368	
Total	394764.9375	1274		

$p < .0005$

Table 29

Descriptive Statistics for Validation Study of Data From San Jose City College, Fall, 1969

Variable is Units Completed

Group	-10 and Below	Between	+10 and Above
Sample Size	170	548	186
Mean	9.1382	8.1679	5.7984
Standard Deviation	5.3557	5.9188	5.3226

Table 30

Analysis of Variance for Validation Study of Data From San Jose City College, Fall, 1969

Variable is Units Completed

	Sum of Squares	DF	Mean Square	F Ratio
Between Groups	1120.2451	2	560.1226	17.2530
Within Groups	29251.2266	901	32.4653	
Total	30371.4687	903		

$p < .0005$

Table 31

Descriptive Statistics for Validation Study of Data From San Jose City College for the Entire Academic School Year, 1969-70

Variable is Units Completed

Group	-10 and Below	Between	+10 and Above
Sample Size	170	547	185
Mean	16.4441	14.0722	9.1919
Standard Deviation	11.3082	11.7467	10.0881

Table 32

Analysis of Variance for Validation Study of Data From San Jose City College for the Entire Academic School Year, 1969-70

Variable is Units Completed

	Sum of Squares	DF	Mean Square	F Ratio
Between Groups	5085.8945	2	2542.9473	19.7631
Within Groups	115675.8750	899	128.6717	
Total	120761.7500	901		

$p < .0005$

Table 33

Descriptive Statistics for Validation Study of Data From San Jose City College for the Entire Academic

Variable is Units Completed

Group	-10 and Below	Between	+10 and Above
Sample Size	130	379	103
Mean	21.4115	20.1280	16.0728
Standard Deviation	7.8234	8.8036	8.5035

Table 34

Analysis of Variance for Validation Study of Data From San Jose City College for the Entire Academic

Variable is Units Completed

	Sum of Squares	DF	Mean Square	F Ratio
Between Groups	1805.1292	2	902.5645	12.3332
Within Groups	44567.6992	609	73.1818	
Total	46372.8281	611		

$p < .0005$

Table 35

Descriptive Statistics for Validation Study of Data From College of San Mateo, Fall, 1969

Variable is Units Completed

Group	-10 and Below	Between	+10 and Above
Sample Size	417	553	695
Mean	13.1511	11.6094	11.4095
Standard Deviation	10.1796	8.7977	9.9796

Table 36

Analysis of Variance for Validation Study of Data From College of San Mateo, Fall, 1969

Variable is Units Completed

	Sum of Squares	DF	Mean Square	F Ratio
Between Groups	866.3604	2	433.1802	4.6463
Within Groups	154949.1875	1662	93.2305	
Total	155815.5000	1664		

$p < .025$

Similarly, as Tables 37 and 38 illustrate, the potential dropouts as a group do attain lower grade point averages as well.

Table 37

Descriptive Statistics for Validation Study of Data From San Jose City College for the Entire Academic School Year, 1969-70

Variable is Grade Point Average (Including Dropouts)

Group	-10 and Below	Between	+10 and Above
Sample Size	170	547	185
Mean	1.6842	1.5790	1.1941
Standard Deviation	1.0288	1.1546	1.1446

Table 38

Analysis of Variance for Validation Study of Data From San Jose City College for the Entire Academic School Year, 1969-70

Variable is Grade Point Average (Including Dropouts)

	Sum of Squares	DF	Mean Square	F Ratio
Between Groups	26.1361	2	13.0681	10.2362
Within Groups	1147.7153	899	1.2767	
Total	1173.8513	901		

$p < .0005$

Summary

Comparisons of attrition rates are summarized in Table 39. Those students who have Sum-1 score at or above plus ten (+10) and are therefore identified by the Nor Cal questionnaire as being potential dropouts do in fact drop out at rates statistically above those students in the other group. Seven out of eight analyses have significance levels beyond .03 and three have significant levels beyond the .001 level. As the table shows, the students with Sum-1 scores of plus ten (+10) or higher are in fact potential dropouts. In fact these students drop out at a rate

Table 39

Summary of "Attrition Rate" Comparisons for Secondary Validation Study and Display of Ratio of Attrition Rate for the Two Groups

College	Measurement Taken After	Attrition Rates: Group A - Sum-1 +10 or Above	Attrition Rates: Group B - Sum-1 Below -10	Z Value	Significance Level p	Ratio of Attrition Rates, A/B
Foothill	Fall Quarter, 1969	25.0%	11.9%	3.12	.001	2.10
Foothill	Spring Quarter, 1970	46.9%	37.1%	1.77	.140	1.26
De Anza	Fall Quarter, 1969	25.6%	18.7%	1.98	.024	1.37
De Anza	Spring Quarter, 1970	55.2%	34.0%	5.09	.001	1.62
San Jose	Fall Semester, 1969	31.2%	20.8%	2.97	.015	1.50
San Mateo	Fall Semester, 1969	10.9%	4.1%	4.00	.001	2.66
Merritt	Fall Quarter, 1969	14.0%	6.2%	2.18	.015	2.26
San Jose	Academic Year 1969-70	45.2%	23.5%	4.28	.001	1.92

Mean ratio of attrition rates for all comparisons shown above = 1.87

Ratio of attrition rate for the one entire academic year = 1.92

Table 40

Summary of "Units Completed" Comparisons for Secondary Validation Study and Display of Difference in Units Completed for the Two Groups

College	Measurement Taken After	Means: Group A - Sum-1 +10 or Above	Means: Group B - Sum-1 Below -10	Value F Ratio of Anova Test	Significance Level p	Difference in Units Completed B - A
Foothill	Fall Quarter	7.70	10.49	11.58	.0005	2.79
	Winter Quarter	6.53	8.80	6.79	.005	2.27
	Spring Quarter	5.00	7.47	6.10	.005	2.47
	Academic Year	19.23	26.75	10.29	.0005	7.52
De Anza	Fall Quarter	7.86	10.29	11.88	.0005	2.43
	Winter Quarter	5.89	9.13	17.59	.0005	3.24
	Spring Quarter	4.83	8.23	18.58	.0005	3.40
	Academic Year	1858	27.65	19.89	.0005	9.06
San Jose	Fall Semester	5.80	9.14	17.25	.0005	3.34
	Academic Year	9.19	16.44	19.76	.0005	7.25
San Mateo	Fall Semester	11.41	13.15	4.65	.025	1.74

Mean difference in units completed for Fall = 2.58

Mean difference in units completed for academic year = 7.94

almost double the others.

Table 39 on Page 17

Comparisons based on number of units completed in a given quarter or semester indicate the potential dropouts complete fewer units than do the other students. On the average if they do not entirely drop-out, they do drop about one course during their first semester or quarter they attend. Over the year the drop in units completed is greater, about eight units are dropped. It can be said that potential dropouts do complete significantly fewer units than do other students. Of eleven comparisons ten have significance levels of .005 or greater as shown in Table 40.

Table 40 on Page 18

Conclusion

When performance levels of students who are designated as potential drop-outs by the Nor Cal questionnaire are compared with the levels of other students, it is clear that potential dropouts: do have a significantly higher dropout rate, do complete fewer units, and do have lower grades. Thus the Nor Cal questionnaire is shown to be valid.

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