THE RELIABILITY AND VALIDITY OF THE PUBLIC SCHOOL ATTAINMENT TESTS FOR HIGH SCHOOL ENTRANCE

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In April 1941, the Public School Attainment Test for High School Entrance[1] was given to 100 students from grades 7 to 12 of Central State High School of Central State College and to 81 ninth grade students of the Edmond High School. In September, 1941, the same test was given to 100 students from grades 7 to 12 of Central State High School.

Usable data for 65 students of Central State High School who took the test in April and also in September were available. The coefficient of reliability of the test (.899± .0160) and other data are given in table I.

TABLE I

The coefficient of reliability, standard deviations, means, and number of cases for the Public School Attainment Test for High School Entrance for students from grades 7 to 12 of Central State High School of Central State College

	r_{12}		$P.E._r$	1st $S.D.$	2nd $S.D.$	M_1	M_2	N
Total Test	.899	±	.0160	46.51	42.73	126.89	142.83	65

This coefficient of reliability was affected by the amount learned between April and September and by the apparent indifference of some students or by the amount forgotten during this period. Some students gained more on the second test than twice the average gain for the group (15.94), and some students lost more on the second test than the average gain for the group. The attitude of students who have taken the same tests before perhaps plays a greater part in the reliability of tests than is commonly believed.

Even-odd reliabilities for the test and for each part of the test based on data from tests given in September to 100 Central State High School students are presented in table II. By combining the two parts of the English test, each part of the attainment test has a reliability of .90 or above. Although the reliabilities of the parts of the total test do not meet Kelley's criteria for individual diagnosis (.94), they are high enough for survey purposes or for classification.

If a test has sufficient reliability for individual diagnosis it must be dependable enough that the student may be given remedial work on the basis of the test results. A test may be used for survey purposes or for classification even though it is not reliable enough for individual diagnosis, because the student is grouped or compared with national norms

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or standards. By a survey test a student may be said to be in the upper fourth, the lower fourth, the middle fifty per cent, etc.

TABLE II

Coefficients of validity, standard deviations, means, and number of cases for the Public School Attainment Test for High School Entrance for students from grades 7 to 12 of Central State High School of Central State College

Part	r	*S.D.* Even	*S.D.* Odd	M_{even}	M_{odd}	r_x	$P.E._r$	N
Traxler Reading	.864	9.03	10.66	23.54	23.32	.927	± .0095	100
Tressler Reading	.741	8.79	3.45	6.08	6.47	.851	± .0186	100
Rinsland-Beck Eng.	.750	4.76	5.10	12.93	14.36	.857	± .0179	100
Lee-Alg. Ability	.816	9.67	10.30	21.53	24.57	.898	± .0130	100
Total Test	.917	22.58	23.87	63.07	67.71	.956	± .0058	100

The coefficient of reliability (.956) is 81 per cent better than guess in the prediction of students' grades from a regression equation. The coefficient of alienation ($k = \sqrt{1 - r^2}$) is .29. By subtracting the coefficient of alienation from 1.000, the percent better than guess can be determined. A coefficient or reliability of .956 is not 95 percent better than guess but only 81 percent better than guess. The total test is diagnostic, and the

TABLE III

Coefficients of validity, standard deviations, means, and number of cases between test scores indicated and the first semester grade averages of ninth grade students of (1) *Edmond High School and* (2) *Central State High School*

School	Variables		r		$P.E._r$	1st *S.D.*	2nd *S.D.*	1st *M*	2nd *M*[a]	N
1, 2 Grade Av.	Reading	Test	.626	±	.0414	1.83	17.90	4.47	50.15	98
1, 2 Grade Av.	Eng.	Test	.623	±	.0416	1.83	11.17	4.47	46.29	98
1, 2 Grade Av.	Algebraic Ability	Test	.590	±	.0443	1.83	16.42	4.47	58.50	98
1, 2 Grade Av.	Total	Test	.697	±	.0350	1.83	39.77	4.47	154.43	98
1 Grade Av.	Total	Test	.741	±	.0337	1.83	35.46	4.39	159.46	81

(1) Edmond High School						(2) Central State High School					
A	8	B	5	C	2	A	8	B—	5	D	2
A—	7	B—	4	C—	1	A—	7	C	4	D—	1
B+	6	C+	3	F	0	B	6	C—	3	F	0

[a] 0.5 or more of a score was counted as 1 and less than 0.5 was dropped. This explains why the sum of the means for the parts does not equal the means for the total test.

correlation between the two halves of the test (.917) is higher than the coefficient of reliability (.899) which was obtained by repeating the test after a period of five months.

Coefficients of validity for each part of the test and the total test between test scores and first semester grade averages of ninth grade students are given in table III. An interesting point to observe is that test scores correlate more highly with grades in a single school than in the two schools combined, although the same point scale was used for both schools.

In table IV, coefficients of validity for each of the grades from 7 to 12 between total test scores and first semester averages are presented. One will observe that the coefficients of validity with the exception of the one for the eleventh grade (.679) range from .839 to .879. This point will appear to be of greater significance by study of data given in table V.

TABLE IV

Coefficients of validity, standard deviations, means, and number of cases between grade averages and total test scores of Central State High School students

Gr.	Variables	r	$P.E._r$	1st *S.D.*	2nd *S.D.*	1st *M*	2nd *M*	*N*
7	Grade Av. Total Test	.845	± .0440	1.26	38.16	5.36	95.36	19
8	Grade Av. Total Test	.879	± .0395	1.64	30.38	5.80	123.33	15
9	Grade Av. Total Test	.849	± .0455	1.81	49.32	4.88	130.47	17
10	Grade Av. Total Test	.839	± .0516	1.80	37.46	4.73	143.86	15
11	Grade Av. Total Test	.679	± .0970	1.56	42.04	4.78	151.71	14
12	Grade Av. Total Test	.866	± .0436	1.49	34.77	5.60	167.93	15

In calculating the data for table V the scores on the test of each grade were converted in sigma scores. The standard deviation of the scores for all grades combined was used in each part and for the total test. The coefficient of validity for the total test (.779) for grades 7 to 12 is almost as high as the coefficients of validity for each grade separately. From the data of table V one will observe that the coefficient of validity for the reading test is as high as the one for all parts of the test combined. In both cases the test scores are correlated with grade averages.

By comparing data of table V and table III one will note that coefficients of validity between each part of the test and grade averages are not greatly separated. These data seem to indicate that reading, English, or algebraic ability will predict grade averages equally well. The data in table III indicate the three tests combined have a higher validity than any part alone, at least, for the one grade.

Perhaps any one of the parts of the total test, and certainly the total test, is as valid a measure of what it is supposed to measure as grade averages are reliable in predicting other grade averages of the same students, and there is no doubt the tests are more reliable. These validity coefficients are as high as can be expected when the criterion for the validity of the test is semester grades or grade averages. The fact that these

tests were taken from tests already in use with published reliabilities and validities is not sufficient proof to justify their validity. However, a test constructed from reliable and valid material has more data in its favor than one taken from material which has no data to justify its selection. This study was made to give evidence of the above assumption. Common sense would indicate that parts of reliable and valid tests would be fairly reliable and valid. However, the reliability and validity of a test can be determined only by the calculation of the data for the test itself.

TABLE V

Coefficients of validity, standard deviations, means, and number of cases between test scores and grades[a] of Central State High School students

Grades	Variables		r		*P.E.* r	*S.D.* Grades	*S.D.* Test	*M* Grade	*M* Test	*N*
7-12	Traxler Reading	Gr. Av.	.781	±	.0271	1.63	.91	5.17	50.02	94
7-12	Tressler Eng.	Eng. Gr.	.654	±	.0398	1.89	.95	5.12	49.97	94
7-12	Rinsland-Beck Eng.	Eng. Gr.	.663	±	.0390	1.89	.90	5.12	50.30	94
7-12	Lee Alg. Ability	Math. Gr.	.667	±	.0386	1.86	.99	5.07	50.31	94
7-12	Total Test	Gr. Av.	.779	±	.0273	1.63	.99	5.17	50.19	94

[a]See footnote to table III for conversion values of letter grades.

These data give only a statistical treatment of the reliability and validity of the tests. A further study of the validity of the tests could include the psychology or nature of the test items, and an evaluation of the curricular content of the tests.