

An Analysis of Teacher Assigned Grades
At Nova and Three Control Schools

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The data reported in this study serve two purposes, the first being the analysis of teacher assigned grades as complex indicators of the environmental press (including explicit school objectives) and the second being an application of such an analysis to the evaluation of Nova, an experimental school program, in terms of its stated objectives. The notion of analyzing grades as indicators of school press is based largely on the work of Stern (1965) who has provided an excellent review of the literature in his chapter on "Measuring Noncognitive Variables in Research in Teaching" in the Handbook on Research on Teaching.

No less important is the recent work of Carson McGuire and others at the Human Talent Research Laboratory at the University of Texas. In brief, McGuire's research clearly indicates that the correlates of teacher assigned grades vary significantly in terms of academic subject, sex, and community (McGuire and Associates, 1960). For instance, while a Divergent Thinking factor was unrelated to grades in two schools, it was related to grades in a third school and, in a fourth school divergent thinking was correlated with grades in a positive direction for girls and in a negative direction for boys. Another factor, Socially Oriented Achievement Motivation, was a positive predictor of grades in two schools, a negative predictor in one and unrelated in a fourth.

One possible interpretation of these data is that the differences in the values and objectives of these schools led them to encourage and/or discourage different behaviors in students. Furthermore, a double standard in a given school may penalize boys for a particular type of behavior which is typically rewarded in girls.

In this study, an effort was made to select predictors of grades which were also criterion measures for the stated objectives of Nova High School. The rationale for this study is simply that students who achieve in terms of the stated objectives and values of a given school program will be favorably evaluated by their teachers. This should be reflected in significant correlations between measures of specific Nova objectives and global assessments of student progress, i.e. grades. For example, the Nova Plan stresses student initiative and independent learning as contrasted

with marked dependency on teachers or on other students. One would expect, therefore, that students who achieve an independent orientation in their work would tend to receive higher grades than students of comparable abilities who remain dependent. While this result may obtain to some extent in other schools, such predicted relationships should appear more strongly and more consistently at Nova where a deliberate and concerted effort, in terms of the stated objectives, is expected on the part of both students and teachers.

Procedures

Statements of objectives judged to be related to the overall objectives of academic achievement were obtained from the Nova Plan (Wolfe, 1962-1963), and a Student Data Collection Battery (see Instruments) with several criterion measures for each of these objectives was administered to students at Nova and three other county high schools in early December. English, Math, Science and Social Studies grades covering the following six to eight-week period were collected in February, and letter grades from the control schools were converted to numerical grades. Since Nova uses a nine-point scale with 5 as a theoretical average, the letter grades F, D, C, B, A were given numerical values of 2, 3.5, 5, 6.5, and 8 respectively. As can be seen in Table 1, the means and standard deviations of these converted scores were quite similar for all schools. The lack of exact correspondence between the grade scales for the various schools has relatively little bearing on this study since separate analyses of grades were run for each school. Total Grade Points (TGP) for each student was determined by summing the converted grades for the four subjects.

Samples of approximately one hundred seventh grade boys and one hundred seventh grade girls with complete data (including grades in all four subjects) were selected from each school. The means and standard deviations for each sample on the teacher assigned grades and on the School and College Ability Test (SCAT) are presented in Table 1. The stratified (over levels of ability) random sampling procedure used to minimize group differences in ability was not entirely successful, since the School Y sample scored approximately 15 points below the other groups on SCAT and received somewhat lower grades.

Correlations between grades and hypothesized predictors of grades can often be explained by an over-riding relationship between a general ability measure and both the grades and the predictors. In order to find correlates of grades which were independent of general ability, the

TABLE 1

Means and Standard Deviations for SCAT and Teacher Assigned Grades

Variable	Nova		School X		School Y		School Z		
	M	F	M	F	M	F	M	F	
SCAT	M	68.13	66.04	68.60	65.99	53.27	53.10	70.32	69.39
	SD	13.25	22.26	16.75	17.52	14.75	17.40	18.67	14.16
English	M	4.88	5.44	4.97	5.55	4.39	5.29	5.40	6.09
	SD	1.41	1.48	1.20	1.48	1.61	1.41	1.52	1.37
Math	M	4.36	4.81	5.44	5.28	3.84	4.34	5.05	5.40
	SD	1.32	1.49	1.61	1.67	1.74	1.45	1.90	1.79
Science	M	5.05	5.24	5.39	5.68	4.37	4.62	5.38	5.54
	SD	1.64	1.56	1.32	1.49	1.40	1.46	1.70	1.43
Social Studies	M	4.79	4.85	5.10	5.44	4.24	4.38	5.52	5.57
	SD	1.10	1.24	1.28	1.23	1.42	1.39	1.86	1.67
Total	M	19.08	20.30	20.90	21.94	16.83	18.62	21.36	22.61
Grade Points	SD	4.32	4.64	4.30	5.02	4.75	4.42	5.87	5.37

influence of SCAT was partialled out of the correlations between grades and criterion measures.

In addition to these partial correlations, multiple correlations between grades and the significant predictors were obtained for each grade using the Stepwise Linear Regression Program, BMD R-02. In order to identify the relatively stable predictors of grades in each school, only variables which made contributions to the R^2 significant at the .01 level were included in the multiple correlations.

Instruments

The Student Data Collection Battery included the following seven instruments. Several of the Student Attitude Inventory scales were modified on the basis of factor analyses of data collected on the local population of Junior High School students.

I. Student Attitude Inventory

- A. Survey of Study Habits and Attitudes (SSHA): Scholastic Motivation - 55 items such as "Whether I like a subject or not, I still work hard to make a good grade" and "Unless I really like a subject, I believe in only doing enough to get a passing grade," odd-even reliability .95, with Spearman-Brown correction in Grade 8; postulated to be a measure of academic attitude or motivational orientation towards scholastic achievement (Brown, McGuire and Holtzman, 1955; Holtzman, Brown and Farquhar, 1954; McBee and Duke, 1960).

Ten positive (e.g. "Whether I like a subject or not, I still work hard to make a good grade") and ten negative (e.g. "My dislike for certain teachers causes me to neglect my school work") items were selected for administration to a local sample. Nine of the ten positive items factored out with six positive Need Achievement items, and the ten negative items came out as a separate factor. The 15 positive items were scored as an index of Positive Attitude Toward School and the ten negative items were scored as Negative Attitude Toward School.

- B. Texas Cooperative Youth Study (CYS): Authoritarian Discipline - Nine items such as "Strict discipline develops a fine strong character" and "A person my age should take the school subjects which his parents decide would be best for him," average

item-test reliability .77 in Grade 7; postulated to be a measure of a set to accept authoritarian beliefs and the control of authority figures (Frenkel-Brunswick, 1951; Moore and Holtzman, 1958).

All nine items, plus a tenth added by the present author, met or exceeded the cutoff point of a .30 factor loading.

- C. CYS: Social Inadequacy - Twelve items such as "I have trouble making friends easily" and "I don't feel sure how to act on dates," average item-test reliability .93 in Grade 7; postulated to measure an aspect of inter-personal competence in terms of a lack of ability to interpret the intentions of others and an inability to form person-to-person relationships (Foote and Cottrell, 1955; Moore and Holtzman, 1958).

Eight of the ten items administered met or exceeded the cutoff point of a .30 factor loading.

- D. Need-Need Anxiety Scales (NNAS): Need Achievement - Ten items such as "I set very high goals for myself which I try to reach," average item-test reliability .69; postulated to be a motivational measure indicative of competitive striving for excellence. (Child, Frank and Storm, 1956; Galliani, 1960; Storm, Rosenwald and Child, 1958).

Six of the ten items factored out on the Positive Attitude Toward School factor.

- E. Need-Need Anxiety Scales (NNAS): Need Aggression - Ten items such as "I like lively discussion with people whose opinions differ from mine because it gives me a chance to tell them just what I think of their ideas," average item-test reliability .63; postulated to be a measure of aggressiveness and indicative of hostility and willingness to coerce others when threatened or frustrated. (Child, Frank and Storm, 1956; Galliani, 1960; Storm, Rosenwald and Child, 1958).

Nine of the ten items administered met or exceeded the cutoff point of a .30 factor loading.

- F. Test Anxiety Scale for Children (TASC): Kenneth S. Davidson and Seymour B. Sarason, 1961. Forty items such as "Do you worry a lot while taking a test?" and "When you are taking a test, does your hand

shake a little?"; postulated by classroom experiences, especially test-taking experience. TASC has been found to be an effective predictor of boys' not girls' school behavior (Sarason, et al., 1958).

Seventeen of the 20 items administered met or exceeded the cutoff point of a .30 factor loading.

- G. Defensiveness Scale for Children (DSC): Kenneth S. Davidson and Seymour B. Sarason, 1961. Forty items such as "Do you every worry?" and "Have you ever been afraid of getting hurt?"; postulated to be a measure of unwillingness to express feelings of anxiety, shame, aggression and social rejection when such expression is appropriate. DSC has been found to be an effective predictor of girls', but not boys' school behavior (Davidson and Sarason, 1961).

Only nine of the 20 items administered met or exceeded the cutoff point of a .30 factor loading. More items might have been selected on the basis of a separate analysis for girls.

- II. Adjective Check List - A set of adjectives postulated to indicate student reaction to the classroom environment in various subject areas. Students were asked to check three items from a list of nine positive and nine negative adjectives for each of four subjects.
- A. English
 - B. Mathematics
 - C. Science
 - D. Social Studies
- III. Guilford's Consequences Test - Directions are to list different consequences or possible results of changes in human or natural situations; postulated to be a measure of an aspect of conceptual foresight, ability to go beyond what is given and extrapolate outcomes, and an element of originality (Guilford, 1957; Wilson et al., 1954).
- A. Quantitative Score - total number of different responses on four consequences items.
 - B. Qualitative Score - total of the four independently derived originality scores, one for each consequences item.
- IV. School and College Aptitude Test (SCAT) - This test, published by Educational Testing Service, 1955, provides an estimate of a pupil's capacity for achieving successfully

in a school program. Scores were available through Broward County Test Program and the Florida State-Wide Ninth Grade Testing Program.

V. Metropolitan Achievement Test (MAT) - These tests, published by Harcourt, Brace and World, Inc. 1959, comprise measures of achievement in important skill and content areas in the junior high school curriculum. Scores were available through the Broward County Test Program and the Florida State-Wide Ninth Grade Testing Program.

- A. Reading
- B. Language
- C. Arithmetic Computation
- D. Arithmetic Problem Solving and Concepts
- E. Social Studies
- F. Science

VI. Nominations - A sociometric technique which is used in this instance to provide an index of a person's reputation among his peers (McGuire, 1960; Galliani, 1960; Coleman, 1961).

- A. "Best Friends" - Name two persons in your grade that you go around with most of the time, your best friends.
- B. "Best Student" - Name two persons in your grade who are the best students. They always get good grades.
- C. "Best Athlete" - Name two boys in your grade who are the best at sports such as football and basketball.
- D. "Activities Leaders" - Name two persons in your grade who are very active in school activities such as Student Council, club work, dance committee, etc.
- E. "Study Partner" - Name two persons in your grade you could study with, or ask for help on a school problem.
- F. "Party Pal" - Name two persons in your grade you would like to have along if you were going to a game or party this weekend. They are the ones to be with.



TABLE 2

Frequencies of Partial Correlates of Grades in Four Schools

Objective	Criteria	Number of significant (.05) correlations between grades and criteria											
		Nova		School X		School Y		School Z		Total			
		M	F	M	F	M	F	M	F	M	F		
I	1. "Peer Oriented"	2	5	1	4	1	1	0	0	4	10		
	2. "Adult Oriented"	0	2	0	1*	0	1*	0	0	0	4*		
	3. "Independent in school activities"	0	0	0	1	1	3	0	0	1	4		
	4. Authoritarian Discipline	1*	0	1	0	0	0	0	0	2*	0		
II	1. Re-emphasis on academics in the school program and on positive attitude toward learning in the student	1	0	0	4	5	1	4	4	10	9		
	2. Negative Attitude School and Test Anxiety	1	5	3	5	5	1	4	4	13	15		
	4. ACL English	0	3	1	1	0	2	1*	0	2*	6		
	5. ACL Math	1	0	0	4	1	0	1	2	4	6		
	6. ACL Science	3	1	0	0	1	3	1	2	5	6		
	7. ACL Social Studies	0	0	0	1	0	1	0	0	0	2		
	8. ACL Total	0	1	0	2	1	0	1	0	2	3		
	0	0	0	0	2	0	0	0	0	2	0		
III	1. Authoritarian Discipline	1*	0	1	0	0	0	0	0	2*	0		
	2. Need Aggression	1	3	0	0	3	0	0	3	4	6		
	3. "Wild One" in school	5	1	0	0	2	5	1	3	8	9		

TABLE 2 (continued)

Objective	Criteria	Number of significant (.05) correlations between grades and criteria												
		Nova		School X		School Y		School Z		Total				
		M	F	M	F	M	F	M	F	M	F			
IV De-emphasis on rote learning of facts as measured by standardized tests; a greater emphasis on creativity, originality, problem solving, divergent thinking, etc.	1. MAT Reading	0	1	0	1*	0	5	0	0	0	0	0	7*	
	2. MAT Language	5	5	0	0	3	5	5	4	13	14			
	3. MAT Arithmetic	4	5	0	5	3	5	3	0	10	15			
	4. MAT Arithmetic	4	5	1*	4	4	5	0	1	9*	15			
	5. MAT Social Studies	1	2	1	3	3	4	0	3	5	12			
	6. MAT Science	3	3	0	0	0	4	0	1	3	8			
	7. Consequences	0	1	1*	0	2	0	1*	0	4*	1			
	8. Consequences	1	0	0	2	0	0	1	0	2	2			
	9. Defensive	0	0	1*	0	0	0	0	0	0	1*	0		
	10. "Defensive"	4	1	1	0	0	0	0	0	2	5	3		

^aMetropolitan Achievement Test Scores were expected to be less highly correlated with Nova grades than with grades from other schools.

*Direction of relationship not always consistent with expectation for Nova.

TABLE 3

Independent Predictors of Grades for Boys and Girls in Four Schools

	School X	School Y	School Z
		<u>Boys' Total Grade Points</u>	
1. SCAT		1. Positive Attitude	1. SCAT
2. "Wild Ones" (-)	1. SCAT	2. Negative Attitude	2. Positive Attitude
3. MAT Arithmetic Computation	2. "Best Students"	(-)	3. MAT Language
.....	3. "Peer Oriented"	3. "Best Student"	
.....	(-)	4. MAT Arithmetic Computation	
.....
		<u>Girls' Total Grade Points</u>	
1. Need Aggression (-)	1. SCAT	1. ACL Math	1. SCAT
2. "Best Student"	2. Negative Attitude (-)	2. "Best Student"	2. "Best Student"
3. "Peer Oriented"	3. "Best Student"	3. "Wild Ones" (-)	3. "Defensive" (-)
4. MAT Arithmetic Problem Solving	4. MAT Arithmetic Computation	4. "Independent Oriented"	4. MAT Language
	5. MAT Language		

TABLE 3 (continued)

	School X	School Y	School Z
Nova			
		<u>Boys' Science Grades</u>	
1. MAT Arithmetic Computation	1. SCAT	1. SCAT 2. "Wild Ones" (-) 3. "Independent Oriented"	1. SCAT 2. Positive Attitude
.....
		<u>Girls' Science Grades</u>	
1. "Peer Oriented" (-)	1. SCAT	1. "Wild Ones" (-)	1. SCAT
2. Arithmetic Computation	2. Negative Attitude (-)	2. "Adult Oriented"	2. "Best Student"
	3. ACL Science		3. "Best Athlete" (-)
	4. "Best Student"		4. MAT Language
.....
		<u>Boys' Math Grades</u>	
1. "Wild Ones" (-)	1. SCAT	1. Positive Attitude	1. ACL Math
2. MAT Arithmetic Computation	2. Social Inadequacy (-)	2. Need Aggression (-)	2. MAT Language
		3. MAT Arithmetic Computation	
.....

Girls' Math Grades

- | | | | |
|-----------------------------------|-------------------------------|-------------------|-------------------|
| 1. SCAT | 1. SCAT | 1. ACL Math | 1. SCAT |
| 2. Negative Attitude (-) | 2. Negative Attitude (-) | 2. "Best Student" | 2. "Best Student" |
| 3. "Best Student" | 3. MAT Reading (-) | 3. "Wild Ones" | 3. "Wild Ones" |
| 4. MAT Arithmetic Problem Solving | 4. MAT Arithmetic Computation | 4. MAT Language | 4. MAT Language |

Boys' Social Studies Grades

- | | | | |
|-----------------|-------------------|-----------------------|--------------------------|
| 1. "Wheels" (-) | 1. SCAT | 1. SCAT | 1. SCAT |
| 2. MAT Language | 2. "Best Student" | 2. ACL Social Studies | 2. Negative Attitude (-) |
| | | 3. ACL Total | |
| | | 4. "Best Student" | |

Girls' Social Studies Grades

- | | | | |
|-----------------------------------|-------------------------------|-------------------|--------------------------|
| 1. MAT Arithmetic Problem Solving | 1. "Best Student" | 1. "Best Student" | 1. SCAT |
| | 2. MAT Arithmetic Computation | 2. MAT Reading | 2. Negative Attitude (-) |
| | | | 3. Social Inadequacy |
| | | | 4. MAT Science |

TABLE 3 (continued)

	School X	School Y	School Z
Nova			
		<u>Boys' English Grades</u>	
1. SCAT	1. SCAT	1. Positive Attitude	1. Negative Attitude
2. "Wild Ones"	2. Quantitative Consequences (-)	2. "Best Student"	2. ACL English
		3. MAT Arithmetic Computation	3. MAT Language
		<u>Girls' English Grades</u>	
1. Need Aggression (-)	1. ACL English	1. SCAT	1. ACL English
2. MAT Arithmetic Computation	2. MAT Arithmetic Computation	2. "Wild Ones" (-)	2. "Left Out" (-)
		3. "Independent Oriented"	3. MAT Arithmetic Problem Solving
		4. MAT Language	

TABLE 4

Multiple Correlations Between Grades and Ability, Achievement, Attitude, and Sociometric Predictors Which Contribute at the .01 Level of Significance

Subject	Nova		School X		School Y		School Z	
	M	F	M	F	M	F	M	F
English	.45	.52	.54	.66	.67	.62	.77	.69
Math	.66	.72	.63	.63	.68	.63	.74	.75
Science	.61	.72	.52	.61	.63	.50	.62	.74
Social Studies	.60	.64	.61	.65	.56	.49	.78	.78
Total Grade Point	.70	.76	.74	.72	.74	.74	.84	.84

a great variety of combinations of predictors of grades for different sexes, schools, and subjects. For instance, SCAT was the only significant predictor of Science grades for School X boys, while Science grades for School X girls were independent of SCAT but predictable on the basis of the students peer reputation as a trouble maker or "Wild One" on the one hand, or as one who seeks adult approval on the other.

It is also interesting to note that in no instance did MAT Science predict science grades, nor did MAT Social Studies predict social studies grades, nor was MAT Reading an independent predictor of any set of grades. The most consistent predictor of Grade Point Total was the student's reputation as being a good student, and this was often true regardless of his or her scholastic ability, achievement, or attitudes.

While it is true that many of these specific predictor sets would not be found upon replication of the analysis with another group of students or teachers, these results reveal the kinds of things that predicted, and possibly influenced, 40 sets of teacher's grades in these four schools. Moreover, while changes in specific predictor sets would be expected, the general pattern or results would probably remain the same. The pattern that emerges from Table 3 is one in which a verbal and/or quantitative predictor (e.g. SCAT, MAT Language, MAT Arithmetic Computation) combines with one or two nomination items and one or two self report attitudinal items. Except in the prediction of Mathematics grades, there were very few instances where a test specifically

designed to measure achievement (the MAT) or attitudes (ACL) in a given subject matter area predicted grades in that subject.

The possibility exists, of course, that the number of significant contributors to the prediction of grades reflects not the many factors which may influence grades, but simply the great number of correlation run, some of which would be significant by chance alone. Therefore, these analyses were repeated using the six MAT test scores in place of the subject matter grades.

The results were strikingly different, for in only eight of the forty eight analyses did a single variable (usually Test Anxiety) contribute to the prediction of the MAT scores independently of SCAT. Obviously, teacher assigned grades are more complex assessments than standardized achievement tests, and are more sensitive to the kinds of student attitudes and behaviors measured by the predictors in this study. The next question investigated, therefore, was the extent to which the grades assigned by Nova teachers were consistent with certain attitudinal and behavioral measures selected as criteria for the Nova educational objectives.

One of the most frequently stated objectives of the Nova Plan is to encourage student initiative and independence in school activities. This is to be accomplished in the academic program by requiring of the students a certain amount of independent study and self pacing in an ungraded program. It was therefore hypothesized that a positive relationship would be found between grades and peer nominations for "Independent Orientation." As can be seen in Table 2, this relationship was not found for either boys or girls in any of the four subjects or TGP at Nova, but it did obtain for School Y girls in three of five possible correlations.

Negative correlations between grades and two measures of dependency on adults ("Adult Orientation" and Authoritarian Discipline) were also expected for the Nova Samples. Significant negative correlations with "Adult Orientation" were found for Nova girls in Math and Social Studies; significant positive correlations, however, were found for School Y girls in Science and School X girls in Math. Contrary to expectations, Authoritarian Discipline correlated positively with Math grades for Nova boys and negatively for School X boys.

Finally, excessive dependency on peers, "Peer Orientation," was hypothesized to be contrary to Nova's emphasis on student independence and initiative and this hypothesis was

well supported by the results. "Peer Orientation" was negatively correlated with grades for Nova girls in all five analyses, and significant negative correlations with GPA and Math grades were found for Nova boys. Similar results were found in School X.

The second Nova objective expected to have an indirect bearing on student achievement was the emphasis on academics in the school program and on positive attitudes toward learning on the part of students. In other words, learning at Nova is to be not just a task or challenge, but an exciting, gratifying experience in meeting challenges. It was therefore hypothesized that those students with strong positive feelings toward the academic program would receive higher grades and vice versa.

Contrary to expectations, Positive Attitude Toward School, a general measure of scholastic motivation, was less frequently related to grades at Nova (1 out of 10) than at the other schools (4 to 8 out of 10). Negative Attitudes Toward School did prove to be significantly related to girls' grades in all four subjects at Nova and Schools X and Z. Negative Attitudes reported by Nova boys, however, were correlated only with science grades in contrast to Schools X, Y and Z, where the number of correlations ranged from 3 to 5.

Adjective Check List (ACL) data pertinent to the attitudes of students toward specific academic subjects (English, Math, Science and Social Studies) were also hypothesized to be correlated with grades at Nova. This instrument seldom predicted grades, except for the Mathematics grades, of Nova boys and School Y girls.

A third Nova objective dealt with in this study was greater self-discipline on the part of the students with regard to proper personal and social conduct in school. In addition to the Authoritarian Discipline scale, the results of which have been discussed above, Need Aggression and peer nominations, "Wild Ones," were used as measures of self-discipline or the lack of it. The number of peer nominations for "Wild Ones" was a highly consistent predictor of boys' grades at Nova and girls' grades at School Y. Need Aggression predicted girls' TGP, Science grades and English grades at Nova, and it predicted equally well for boys at School Y and girls at School Z.

The fourth and last objective considered in relation to teacher assigned grades at Nova related to the de-emphasis on rote learning of facts as measured by many commercial achievement tests, and a greater emphasis on concept formation,

inquiry, and discovery. The Nova faculty felt that the Metropolitan Achievement Test (1959 Edition) was developed along guide lines for conventional school programs and was inappropriate, if not irrelevant, as a measure of the Nova teaching objectives. According to the data, however, the Metropolitan tests generally were more consistently and highly related to grades assigned by Nova teachers than to grades assigned by teachers in Schools X and Z.

Unfortunately, only one measure, Consequences, was immediately available which could be contrasted with the MAT as a more relevant measure of Nova's process oriented program. As indicated in Table 2, the quantitative score for this divergent thinking test correlated with Social Studies grades for girls and the qualitative score correlated with Social Studies grades for boys at Nova. This amounted to only two out of ten possible correlations, however, and was about the same as the results for the other schools.

It was also hypothesized that defensive students, i.e. students who could not readily admit weakness, especially being wrong, would be particularly inept in a concept oriented program. Although this hypothesis was not borne out in terms of the self-report Defensiveness data, it was confirmed in all cases except English for Nova boys who were identified by peers as persons "who can never admit they're wrong."

The second aspect of this study was the identification of those measures which best predict each set of grades for each group of students. The entire set of predictor variables described in the Instruments section (including some not discussed above) was used in this analysis and those variables which contribute to the multiple prediction of grades at the .01 level of significance are included in Table 3. The rather conservative .01 level of significance was used to identify grade predictors because the large number of variables used in this analysis could result in a number of purely chance relationships at lower levels of statistical significance. The various sets of independent predictors summarized in Table 2 can therefore be considered fairly stable.

As can be seen in Table 3, peer nominations for "Wild Ones" and MAT Arithmetic Computation scores were the most consistent predictors of boys' grades at Nova. Only MAT Arithmetic Problem Solving predicted as many as three of the five grades for girls at Nova. Other significant predictors of Nova girls' grades included MAT Arithmetic Computation, CYS Need Aggression (-), and nominations for "Best Student" and "Peer Orientation" (-).

While only SCAT and peer nominations for "Best Student" consistently predicted boys' grades at School X, teacher assigned grades for School X girls were found to be related to MAT Arithmetic Computation and Negative Attitudes (-) as well as SCAT and "Best Student."

Two or more sets of grades for boys in School Y were related to Arithmetic Computation, Positive Attitude Toward School and "Best Student." Grades for School Y girls were generally related to nominations for "Wild Ones" (-), MAT Language and "Best Student."

The variables which proved to be significant, independent predictors of boys' grades at School Z include SCAT, MAT Language, and to a lesser extent Positive and Negative Attitudes (-) Toward School. The Adjective Check List, Metropolitan Language, SCAT, and "Best Student" were consistent predictors of girls' grades at School Z.

The strength of the relationships between grades and these variables for each group of students is indicated by the multiple correlations reported in Table 4. It is interesting to note that these variables were much more effective predictors of subject matter grades at School Z where the multiple correlations range between .62 and .78. These are rather high correlations considering the fact that the criterion measures were six-weeks grades rather than final or averaged grades. The multiple correlation of .84 for Total Grade Points are also unusually high and indicates that 70% of the variance in teacher assigned grades at School Z was accounted for by SCAT, Positive Attitudes and MAT Language for boys and by SCAT, MAT Language, and nominations for "Best Student" and "Defensive" for girls.

In some instances the greater magnitude of the multiple correlations for School Z can be explained by a correspondingly high correlation between grades and SCAT at School Z (see Table 5). For example, the zero order correlations of .74 and .66 between SCAT and Social Studies grades for boys and girls at School Z were higher than the multiple correlations of several predictors with Social Studies grades in the other schools.

The marked differences in the correlations of scholastic ability (SCAT) with grades at the various schools have several implications worth exploring. The high correlations obtained for SCAT and grades at School Y and especially School Z suggest that a single standard of achievement was used for assigning grades to students at all levels of ability. Allowing for some variation as a result of other factors, the more scholastically capable students consistently

TABLE 5

Correlations Between SCAT and Grades

Subject	Nova		School X		School Y		School Z	
	M	F	M	F	M	F	M	F
English	.36	.32	.40	.47	.29	.08	.55	.54
Math	.35	.18	.57	.43	.23	.10	.62	.59
Science	.39	.31	.52	.38	.49	.27	.55	.60
Social Studies	.47	.40	.52	.49	.32	.14	.74	.66
Total Grade Point	.42	.37	.64	.52	.42	.19	.74	.70

got higher grades than less scholastically capable students. By contrast, the extremely low correlation of SCAT and grades assigned at School X suggests the possibility that students were grouped on the basis of ability, and that teachers used different standards of achievement when assigning grades to students in different ability groups. Thus, a student who ranked high in an advanced group, even though the achievement of the latter was quite superior to that of the former. This explanation, however, is strictly post hoc and cannot be validated by the present data.

The very low correlations between SCAT and grades at School Y also indicate that SCAT operated as a suppressor variable in some cases. For instance, the inclusion of SCAT in the predictor set actually increased the correlations between MAT scores and grades at School Y. This is a reversal of the typical result in the other schools where partialing out the influence of SCAT consistently reduced the correlation between MAT scores and grades.

Summary and Conclusions

The general problem under investigation is that of identifying measures of student characteristics and behaviors which predict, and possibly influence, teacher assigned grades in English, Science, Mathematics, and Social Studies. Correlations of attitude, personality, achievement, and peer nominations data with subsequent six week grades were obtained on samples of 100 boys and 100 girls in grade seven of each of 4 schools. Because apparent relationships between grades and predictors are often found to be confounded with the measures of general ability, the influence of SCAT was

partialled out of these correlations. These analyses were then repeated with six Metropolitan Achievement Test scores as criteria and grades as predictor variables along with attitude, ability, and sociometric measures. The major findings of these analyses are summarized below.

1. The attitude and sociometric variables plus grades accounted for little or no variance in addition to SCAT scores in predicting achievement test scores.
2. Sociometric, attitude and standardized achievement scores, on the other hand, accounted for as much as 50% of the variance in grades independently of SCAT.
3. Typically, the amount of variance accounted for in grades was increased significantly by the addition of a different type of variable - sociometric, attitudinal, ability, or achievement - to the predictor set.
4. Different variables were required in the prediction of grades for different subject matter areas. Seldom, with the exception of SCAT, did the same variable consistently enter into the prediction of grades in a given subject for different sexes and for different schools.

To the extent that the empirically demonstrated statistical relationships reflect underlying functional relationships between grades and measures of student cognitive, social, and personality attributes, grades may be viewed as complex indicators of school press. If one can assume that measures which predict teacher assigned grades should indicate the kinds of student behaviors expected by teachers, then the grading process of teachers can be evaluated in terms of the extent to which criterion measures of the objectives for a given school do indeed predict grades assigned in that school.

The results summarized in Table 2 indicate that grades assigned by Nova teachers in 1964 did not relate to or (by inference) reinforce such Nova objectives as student initiative and independence, positive attitudes toward learning, or student self-discipline more consistently than did grades assigned by teachers in the control schools. There were, however, several findings which did differentiate between the various schools in terms of these objectives.

1. Grades were negatively related to dependency on peers more consistently at Nova than at the control schools.

2. Positive Attitudes were least frequently related to grades at Nova.
3. Grades were totally unrelated to four measures relating to student initiative and independence for both boys and girls at School Z.
4. Positive and Negative Attitudes Toward School were most consistently related to grades at School Z.
5. Grades were not related to measures of self-discipline at School X.

There were also a number of findings related to the cognitive and achievement variables, especially with regard to the de-emphasis of rote learning of facts.

1. Contrary to expectations, Nova was one of the schools in which grades most consistently related to (and possibly reinforced) the kinds of achievement measured by the Metropolitan Achievement Test.
2. Partial correlations between grades and MAT scores were also quite frequent at School Y, but quite infrequent at Schools X and Z.
3. Grades were seldom related to measures of divergent thinking in any of the schools, but "defensive" students who could not admit being wrong often received lower grades at Nova.
4. Grades at School Z were highly correlated with SCAT, while the correlation between grades and SCAT were quite low at Nova and often negligible at School Y.

In addition to these results for specific schools, the Totals column of Table 2 indicates that certain variables were consistently good predictors of grades for boys and girls in all schools.

1. Girls' grades were most consistently predicted by "Negative Attitudes Toward School," MAT Language, MAT Arithmetic Computation, and MAT Arithmetic Problem Solving.
2. The best predictors for boys' grades were Negative Attitudes Toward School, MAT Language, MAT Arithmetic Computation.
3. Except at School Y, girls' grades were not related to MAT Reading independently of SCAT.

On the basis of the results of this study, it would appear that in comparison with School X and School Z, teacher assigned grades at Nova were more consistently related to achievement as measured by the Metropolitan Achievement Test, but were not more consistently related to measures of scholastic ability, student independence, student attitudes toward learning, or self-discipline with regard to personal conduct.

It should be noted, however, that these results were obtained in the Fall of 1963, while the Nova faculty was still under the burden of an extensive curriculum development program. Further research with more recent data would be needed to determine if the grading practices of Nova teachers under normal teaching conditions are more consistent with the objectives of the Nova Plan.

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