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THE VALUE OF TEACHERS IN TEACHING

Eric Hanushek

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PREFACE

The study of elementary and secondary education in the United States has been one focus of Rand's domestic research program. During the summer of 1969, Rand sponsored an informal study session on problems of education. Staff members were joined by a number of outside consultants, including Professor James Coleman of Johns Hopkins University, Professor Henry Levin of Stanford University, Professor Herbert Kiesling of Indiana University, and the author of this study, who is Assistant Professor of Economics, U.S. Air Force Academy, and consultant to The Rand Corporation. A point of departure for the work of this group was the U.S. Office of Education study prepared by Coleman and others, entitled *Equality of Educational Opportunity*. This study, published in 1966, presented a detailed statistical analysis of U.S. elementary and secondary education, with particular stress on factors affecting student achievement. One inference that was drawn from the study was that teacher characteristics had very little effect on educational achievement as measured by standardized tests. The major school-related determinant of educational achievement, according to the Coleman report, appeared to be the nature of the student peer group -- the socio-economic background of one's fellow students. These conclusions, particularly those indicating the unimportance of school inputs, have been contested on methodological grounds by a number of scholars, including Bowles, Levin, Hanushek, Kain, Weisbrod, and Hansen.

Professor Hanushek undertook an effort to examine the impact of teachers and other school-related factors on educational achievement by studying one Southern California school district. Instead of doing a cross-sectional study of one school year, as was done in the Coleman report, he followed students' performances and factors that affect them, including their peer groups and their successive teachers, from grades 1 through 3. The results of his study, although limited to one school district, indicated that individual teacher qualities influence student reading achievement substantially, and that the peer-group effect may be less significant than the Coleman study indicated.

Professor Hanushek's work, which was sponsored jointly by Rand and the Carnegie Corporation, is part of a larger effort in progress at Rand to examine the relationship between inputs into the school system -- teachers, curricula, fellow students, facilities -- and the outputs as measured by achievement scores and attitudinal change. Studies in progress by Professor Kiesling on California compensatory education programs, by Dr. Marjorie Rapp on special programs in the San Jose (California) School District, and by Dr. Harvey Averch and Professor Kiesling on educational production functions are among a number of Rand studies that address these issues.

These studies may in turn help cast some light on larger questions concerning the effectiveness of the public education system and ways in which its performance could be improved.

SUMMARY

This study develops and tests an analytical model of the educational process and the various influential factors that enter into it. These factors include the effects (a) of family life, as proxied by such socio-economic measures as family size and structure and father's occupation; (b) of peer group; (c) of the student's innate abilities; and (d) of the school itself. This last factor, in its many manifestations, provides the focus of the study.

The basic sample of data was drawn from a large school system in California during the summer of 1969. Information was gathered on a sizable sample of students in the third grade and on their teachers, drawing from cumulative records and (in the case of the teachers) from survey results. For analytic purposes, the sample of students was divided into subsamples: (a) whites and Mexican-Americans (the only minority group represented in the system), and (b) white, manual occupation; white, non-manual occupation; and Mexican-American, manual occupation. Statistical tests were then applied to the hypothesis that differences exist among teachers which lead to differences in achievement among students.

From this study three conclusions are drawn:

First, the present set of hiring practices leads to an inefficient allocation of resources. The analysis indicates that teaching experience and graduate education do not contribute to gains in student achievement scores. Moreover, the characteristics that do matter are not highly correlated with these factors. Yet these attributes are being purchased by the school district.

Second, in the sense that different teachers and different classroom compositions do not affect the achievement outcome of Mexican-American students, teachers do not appear to count for this group. For Mexican-Americans from blue collar families, once the entering achievement level is known, no other information is useful in predicting the achievement level after a given year of school. Further,

the average gains in a given school year are about one-half of the national average for reading achievement gains.

Third, differences in teachers and classrooms do make a difference to white children regardless of their socio-economic level. There are significant differences in the performance of white children, depending upon what classroom they are in. These differences in gains are independent of their entering achievement level, their socio-economic status, and their sex.

Looking at both models for whites, there are some different measures of the effects of classroom and teacher. Yet important hypotheses were consistently rejected in both. For example, the effect of peers, as measured by the occupational and ethnic composition of the classroom, was always insignificant after the individual's socio-economic status, initial achievement level, and school factors were accounted for. Other hypotheses tested and rejected were that teacher attitudes, similarities in student and teacher background, advanced education, academic degrees, age, and experience were beneficial factors in education.

These findings refer to one school system and one particular grade level in elementary schools. For this reason this study is best looked upon as being suggestive rather than definitive, as being a prototype rather than a final analysis.

ACKNOWLEDGMENTS

Many people have offered useful suggestions during the preparation of this study, but special thanks go to Franklin Fisher of the Massachusetts Institute of Technology, John Jackson and John Kain of Harvard University, Herbert Kiesling of Indiana University, Frank Sloan of The Rand Corporation, and Finis Welch, formerly of Southern Methodist University and now with the National Bureau of Economic Research. This project could not have been undertaken without the help of officials of the California school district studied in this report, who arranged for data collection and engaged in discussions of the overall problems.

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I. INTRODUCTION

Recent concern about education in the United States represents the merger of two different forces. First, there is an interest in promoting efficient allocation of resources. This arises not only from the observation that some $35 billion is being spent annually on elementary and secondary education but also from more immediate budgetary pressures on local school systems. These pressures reflect increased demands for education, shifting tax bases, and an increasing reluctance of voters to spend more for education. Second, interest in improving education is spurred by acknowledgment of sizable differences in the results of education along social and racial lines. Since the distribution of educational services affects the social and economic status of individuals, there is a desire to promote equity in the education of individuals.

Once past the assertion that efficiency and equity are desirable goals, however, there is little guidance on satisfying these goals through public policy. Extremely little is known about the relationship between inputs -- particularly inputs available for public policy -- and outputs of the educational process.

Educational research has been slow in providing definitive answers to public policy questions for several understandable reasons: the subject of the educational process is extremely complex, especially in its physiological and psychological aspects; no learning theory amenable to analysis for policy purposes exists; and the required data for such an analysis have not been collected. Yet concern about distributional and efficiency questions has led to some interesting and suggestive beginnings, which, in turn, have provided insights into how the analysis should proceed.* Such analysis represents a

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*For example, Herbert Kiesling, "Measuring a Local Government Service: A Study of School Districts in New York State," The Review of Economics and Statistics, August 1967; Martin Katzman, "Distribution and Production in a Big City Elementary School System," unpublished Ph.D. dissertation, Yale University, 1967; James S. Coleman et al.,

next step of inquiry into the educational process from a public policy point of view.

The specific project reported in this Memorandum has two purposes. First, it is designed as a prototype analysis where a relatively small sample of data is collected to indicate the usefulness of the analysis. This data collection comes directly from an effort to minimize certain serious shortcomings of previous studies. Second, this analysis is intended to provide preliminary answers to a set of fundamental educational policy questions. Previous studies have presented ambiguous answers to basic questions such as "Do teachers count?" and "What characteristics of teachers and classrooms are important?" This ambiguity appears to be, at least partially, a function of inadequate data. In particular, in the past there has been no data set that supplied accurate information on educational output and inputs at an individual level. An attempt has been made to remedy this shortcoming for a set of students (third graders) in one school district.

Equality of Educational Opportunity, Washington, D.C., U.S. Government Printing Office, 1966 [hereafter referred to as EEO]; and Eric Hanushek, "The Education of Negroes and Whites," unpublished Ph.D. dissertation, Massachusetts Institute of Technology, 1968.

II. CONCEPTUAL MODEL AND DATA

It is not possible to look at the effects of schools and teachers in isolation. It is necessary to consider all of the factors that enter into the educational process and how they interact with one another. Thus, this study starts with a discussion of a larger model of the educational process and the various factors that enter into it. After presenting an abstract model of the educational process, this section considers specific measurement of the various inputs and outputs. Identifying and measuring the effects of schools and teachers on the education of individual children allows analysis of the efficiency of school systems, or how best to organize the schools to provide the most educational output.

The basic model of the educational process is given in Equation (1).

$$\underline{A}_{it} = f(\underline{B}_i^{(t)}, \underline{P}_i^{(t)}, \underline{I}_i, \underline{S}_i^{(t)}) \qquad (1)$$

where

$\underline{A}_{it}$ = vector of educational outputs of the i^{th} student at time t

$\underline{B}_i^{(t)}$ = vector of family inputs to education of i^{th} student cumulative to time t

$\underline{P}_i^{(t)}$ = vector of peer influences of i^{th} student cumulative to time t

$\underline{I}_i$ = vector of innate endowments of i^{th} student

$\underline{S}_i^{(t)}$ = vector of school inputs of i^{th} student cumulative to time t

This model simply states that educational output ($\underline{A}_{it}$), itself a multi-dimensional factor, is a function of the cumulative background influences of the individual's family ($\underline{B}_i^{(t)}$), of the cumulative influences of his peers ($\underline{P}_i^{(t)}$), of his innate abilities ($\underline{I}_i$), and of the cumulative school inputs ($\underline{S}_i^{(t)}$). This abstract model provides a framework for discussion of models of the educational process that can be tested empirically.

Specific measures of each of the inputs listed in Equation (1) are derived from a combination of past work in the field, theoretical considerations, and the available data. Here, data availability may be the critical constraint. For instance, it is possible to develop many measures of the output of the educational process, such as standardized test scores, juvenile delinquincy rates, post-school income streams, occupational choice, or level of education completed. However, any given sample of data is usually limited to one or two specific measures. Although schools are expected to produce several different outputs, usually lumped under the major categories of cognitive development and socialization, the availability of data has restricted most past studies of education to examining a single output. Indeed, this will be the situation in the analysis presented in this Memorandum. Here, we concentrate entirely on an analysis of cognitive development as reflected by standardized reading achievement test scores.* It is believed that these scores represent differences that are valued by society.** Yet results in terms of this single measure must be considered tentative until there is confirmation from analysis of different outputs.

The input measures are subject to many of the same considerations as the measures of output. There is no firm theoretical basis for choosing inputs. Likewise, there is often a lack of desired data. Each input vector will be discussed in turn.

Families contribute to the education of children in many different ways. They provide basic shelter and food for the individual child. But more than that, they provide models of verbal structure, examples

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*The specific test to be used is the Stanford Achievement Test (SAT).

**There is scattered evidence on this in W. Lee Hansen, Burton A. Weisbrod and William J. Scanlon, "Schooling and Earnings of Low Achievers," American Economic Review, June 1970; Burton A. Weisbrod and Peter Karpoff, "Monetary Returns to College Education, Student Ability and College Quality," The Review of Economics and Statistics, November 1968; and Randall D. Weiss, "The Effects of Education on the Earnings of Blacks and Whites," Review of Economics and Statistics, February 1970.

of problem solving, behavior patterns, and a basic set of attitudes. To measure each of these concepts explicitly would be a difficult task, but for our purposes this is not necessary; it is generally accepted that the relevant educational inputs are highly correlated with the socio-economic status of the family. Thus the effects of each of these individual family inputs into the educational process can be proxied by a set of measures of socio-economic status. The specific measures for this analysis were family structure, family size, and father's occupation. Previous work has suggested that the analysis is not very sensitive to the precise specification of this input vector.*

Peer groups provide many of the same inputs that the families provide. The individual child's peer groups would include his friends both inside and outside of school. To be precise, one would want to know exactly which individuals were friends or tended to interact with each other, but collecting this kind of information on a large scale would be prohibitively expensive. In this case, it seems acceptable to aggregate the individuals in a classroom to measure the peer groups. In measuring the types of interactions of individual children, the same proxies for peers that are used in the case of the individual's family can be used; that is, socio-economic status can serve as a proxy for the types of interaction that exist among friends. Thus, peer groups call for aggregates of the individual family background measures.

Innate abilities present probably the most difficult concept to measure in the whole model. In fact, it is not well understood how innate abilities enter into the educational process, and there is considerable controversy over the role of innate ability in education. The only consensus that seems to exist in this area is that common IQ scores do an inadequate job of measuring innate abilities. All is not lost, however, when innate abilities cannot be measured directly.

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*From analysis of alternative specifications of family inputs using EEO data in Eric Hanushek, "The Education of Negroes and Whites," op. cit.

In particular, under a set of plausible assumptions (which will be detailed in the empirical section) it is possible to circumvent the most serious problems.

School influences are the focus of this study and will be discussed in more detail than the other inputs. The hypotheses to be analyzed actually are quite simple and straightforward. It is surprising how little is actually known about the ways in which schools and teachers affect education. This results largely from a fixation on inputs to education rather than outputs. However, one can impute a set of hypotheses about teacher effects from the behavior of schools. In particular, schools determine pay schedules by teaching experience and educational levels. Thus, they must believe that increased experience and further schooling have a positive relationship to educational output. These provide two central hypotheses for the study of efficiency in the present system.

Other hypotheses can also be found in the actions of school administrators. A frequent compensatory education plan is the reduction of class size. Since this is an expensive undertaking, the presumed benefits (increased outputs) must be great. Also, many persons argue that some forms of student distributions in the schools and classrooms (for example, ability tracking or racial and social integration) have a beneficial effect on education.* All of these are testable hypotheses about the relationship between school inputs and achievement. It must be borne in mind, however, that the tests are restricted to the range of experiences observed. For example, since there is little variation in class size within this school district, it is not possible to test adequately the effects of varying class size.

Further, in the recent literature** there is a suggestion that one can measure other dimensions of teacher and school quality. These

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*Cf. U.S. Commission on Civil Rights, Racial Isolation in the Public Schools, Washington, D.C., U.S. Government Printing Office, 1967, Chapter III.

**Particularly EEO.

include attitudes of teachers and administrators, verbal facility (and perhaps general ability) of teachers, quality of physical plant, quality of teacher education, background of teachers, and more.

In the several studies of the educational process that have been undertaken, two major shortcomings have persisted. First, it has not been possible to match inputs at the individual level, particularly for schools, with the other inputs and outputs of the educational process. This has led to either biased or inconclusive results. Second, there has been a lack of historical data on inputs. Even though the conceptual model, Equation (1), depicts education as a cumulative process, most past studies have relied upon cross-sectional data containing only contemporaneous information about inputs. These data problems have introduced considerable doubt into the conclusions of past studies.* A primary objective of this present study was to come closer to Equation (1) than had been done previously, by eliminating these two sources of data error.

The basic data sample was drawn from a large school system in California during the summer of 1969. All children in the third grade during the school year 1968-1969 were initially included in the sample. For these 2,445 students, information on family background, scores on the Stanford Achievement Tests, and names of teachers were abstracted from cumulative records. At the same time, all kindergarten-through-third-grade teachers currently in the system were surveyed for information similar to that contained in EEO. Information was collected on teacher backgrounds and attitudes, and on specific aspects of schooling. An attempt was made to ascertain their use of time, that is, the division in the classroom between instructional efforts, disciplinary efforts, and administration. Also, a verbal facility test

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*For example, Eric Hanushek and John Kain, "On the Value of Equality of Educational Opportunity as a Guide to Public Policy," in Frederick Mosteller and Daniel P. Moynihan (eds.), On Equality of Educational Opportunity, New York, Random House (forthcoming).

was given each teacher.* The sample used for this analysis was developed by applying two criteria to this group of third graders. First, individuals were eliminated from the sample if data were not available on both their second and third grade teachers. Second, students were eliminated if both first and third grade achievement test scores were not available. When these criteria were applied, a total of 1,061 students was left in the sample. A separate analysis of the effects of moving appears to be called for here, but it is beyond the scope of this Memorandum.

Looking at one school district has both advantages and disadvantages. Many hard-to-measure attributes such as curriculum, school organization, community attitudes, and so on are automatically taken care of by looking at one school system. Thus, potential biases from community or system-specific variables that cannot or are not measured are eliminated in such a sample. However, the same arguments can be turned around. By looking at only one system it is difficult to make generalizations about behavior in other systems located in different regions and having different types of organization. If system-specific attributes are very important, it might not be possible to apply estimated models to other systems. This implies that generalizing the results calls for expansion of the analysis to other systems. Consistency in different samples would strengthen any results considerably.

Two factors help compensate for the lack of direct measurement of innate abilities. At least for whites, it is reasonable to assume that this factor is fairly well captured in the family background variables. This is the case if innate abilities tend to be hereditary and if social mobility is highly correlated with ability.** The principal problem arising from a lack of measure of initial

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*Edgar F. Borgatta and Raymond J. Corsini, Quick Word Test: Level 2, New York, Harcourt, Brace and World, Inc., 1964. This test appears to be superior to the test in Equality of Educational Opportunity as it appears to give better discrimination among teachers. One complaint voiced about the EEO test is that it was too easy.

**Peter M. Blau and Otis D. Duncan, The American Occupational Structure, New York, John Wiley and Sons, 1967.

endowments is biased statistical results. But bias only arises when the excluded variable (innate abilities) is not independent from the included inputs. Thus, severe problems -- at least at the school level -- do not arise unless there is a mechanism that leads to the correlation of innate abilities and specific school resources. For the purposes of analyzing school and teacher influences, this omission, then, does not seem too damaging. Note, however, that this factor quite possibly further complicates the family background factors. Those who would attempt to derive policy implications from the background portions of the model are warned again of the extremely complicated nature of that set of inputs.

It is possible to work with a modified version of Equation (1). Since the data contain a measure of the student's educational level when entering school, that is, the first grade Stanford Achievement Test score, it is possible to examine the gain in achievement during the second and third grades. In other words, by looking at a model such as Equation (2), we can analyze the "value added" to education by each input.

$$\underline{A}_{i3} = f^*(\underline{B}_i^{(1-3)}, \underline{P}_i^{(1-3)}, \underline{I}_i, \underline{S}_i^{(1-3)}, \underline{A}_{i1}) \qquad (2)$$

where superscripts denote cumulative influences from grades 1 through 3. This does two things for the empirical analysis. First, it reduces the informational requirements; only the second and third grade histories of students are required instead of the entire past history. Second, it makes more plausible the assumptions about biases due to missing information on innate abilities. The concern in a value-added analysis centers upon increases in achievement and not on the absolute level of achievement. Thus, biases arise only if components of innate ability that reflect learning speed are correlated with school and teacher inputs.

For analytic purposes, four different samples were analyzed. As a first step, whites and Mexican-Americans were separated. (The latter was the only minority group represented in this particular school system.) There are two reasons for this stratification: (a) the

nominal values of the proxies for background inputs do not necessarily have the same meaning for the two groups, and (b) there is no reason to insist on the same model of the educational process for both groups. The ethnic samples were then divided on occupational grounds -- fathers in manual or blue collar occupations and nonmanual or white collar occupations. From this, the following four samples were constructed for analysis: white, manual occupation (n = 515); white, nonmanual occupation (n = 323); white total (n = 828); and Mexican-American, manual occupation (n = 140).*

*The decision to stratify will be discussed in terms of statistical tests for sample homogeneity in a later section. These samples are not exhaustive. Children with only mothers or those where no occupation was reported for the fathers were not included. For whites, these groups totaled 36 students; for Mexican-Americans, these groups plus the nonmanual occupation group totaled 47. These samples were too small to study separately, and, thus, they were ignored.

III. EFFICIENCY ASPECTS OF SCHOOLS

The first step of the analysis was to ascertain whether or not the current operations of schools could be considered efficient. This was done by estimating the relationship between the "pay parameters" of teaching experience and graduate education and the gains observed in student achievement. For each of the four samples, a linear regression model was estimated with the dependent variable being third grade achievement and the independent variables being first grade achievement, characteristics of the family and classroom, and years of teaching experience and semester hours of graduate work for each student's specific second and third grade teacher.* From this it is possible to test the hypothesis that the pay parameters do not affect the learning of Children. If the pay parameters were to affect learning, it would also be possible to ascertain whether the pay scale correctly reflected the educational value of each element.

The results of the hypothesis tests for each sample are shown in Table 1. This table displays the t-statistic values for tests of the hypothesis that the individual pay parameters for the second and third grade teachers have no effect on the achievement gains of individual students. As evidenced by the very low values, we cannot reject the hypothesis that the factors purchased by schools have no effect on this measure of output.** In fact, only six of the estimated coefficients are larger than their standard errors ($t > 1.0$), and one of those has a theoretically incorrect sign.

In other words, we are not very confident that any of the attributes of teachers that are purchased have any effect on education. Schools are, seemingly, paying too much for the amount contributed by these attributes to education if they buy any quantity above the minimum level. (This is an overstatement if turnover costs are large.)

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*In order to calculate semester hours of graduate work, a Master's Degree was assumed to be 30 semester hours.

**If $|t| < 1.96$, the hypothesis of no effect at the 5 percent level cannot be rejected.

However, the above results give minimum guidance to an administrator. While they indicate what he should not do, they give an imperfect picture of what he should do. For his purposes we wish to identify what attributes of teachers do seem to count. That is the emphasis of the remainder of this Memorandum.

Table 1

TESTS FOR SIGNIFICANT EFFECT OF PAY PARAMETERS

	t-ratios			
	White Total	White Manual	White Nonmanual	Mex.-Amer. Manual
$EXPER_3$	.91	.58	1.16	-.45
$UNITS_3$	.97	.82	.06	1.62
$EXPER_2$	-.77	-.75	.19	1.45
$UNITS_2$	1.27	1.23	.07	-1.62

Note:
Complete Model: $Achievement_3$ = f(sex, income, siblings, number of absences, percent Mexican-American in school, average income in school, $Achievement_1$, $EXPER_3$, $UNITS_3$, $EXPER_2$, $UNITS_2$) where subscripts indicate grade level of student or teacher.

IV. DO TEACHERS COUNT?

There is another important and interesting line of inquiry that is a subcategory of this discussion. Recently there has been considerable controversy among those analyzing education as to whether teachers count in the educational process. This arises from interpretation of past empirical work (namely EEO). However, since our sample experience did not include children without teachers, the only testable hypothesis is whether or not there are differences in teachers that lead to differences in achievement among students. In other words, does it matter which teacher a student has, or are all teachers perfectly substitutable?

There are two approaches to ascertaining whether productive differences exist in teachers. First, one can attempt to identify the individual components of the bundle of characteristics that make up an individual teacher and relate these to output. Alternatively, one can test the "whole bundle" without decomposing it into components. The latter approach is used here because of theoretical and measurement problems. That is, simply because one can find no significant relationship between a set of measured characteristics of teachers and output does not mean that teachers do not matter. It only means that one is not very confident that his measured characteristics have any effect on achievement. There still could be other characteristics, as yet unmeasured, that characterize the productive aspects of teachers. Since we have little information on what precise attributes are important, this approach seemed to be a logical first step. Thus, one wants to test first the bundle of "teacherness" without regard to the specific components.

This test is made by constructing a series of dummy variables, T_{ij}, for each teacher in the sample. Thus, if the j^{th} student has the i^{th} teacher, $T_{ij} = 1$ for him and $T_{kj} = 0$, where $k \neq i$. The complete model looks like:

$$A_{j3} = \sum_{i=1}^{n} t_i T_{ij} + aS_j + bA_{j2} + u_j \qquad (3)$$

where

A_{j3} = achievement in third grade of the j^{th} student

S_j = 1 if j^{th} student is female; = 0 otherwise

A_{j2} = achievement in second grade of j^{th} student

For any individual child who was in a given classroom (i), the model reduces to:

$$A_{j3} = t_i + aS_j + bA_{j1} + u_j \qquad (4)$$

In this formulation it is possible to ask whether the individual classroom coefficients are significantly different from a constant. In other words, does model (3) do significantly better than model (5) in explaining achievement?

$$A_{j3} = c + aS_i + bA_{j2} + u_t \qquad (5)$$

where c is a constant for all j.

The total sample was divided into three groups: whites with fathers in a manual occupation; whites with fathers in a nonmanual occupation; and Mexican-Americans with fathers in a manual occupation. At least two students from a sample had to be in a class with a teacher before the student and teacher were included in the analysis. From these samples tests for differences in the t_i's were performed. In fact two separate tests were performed for each sample: the gains from second to third grade, as depicted in Equation (3); and the gains from first to second grade (the dependent variable is A_{j2} and one exogenous variable is A_{j1}). The results of these six F tests for equality of coefficients are depicted in Table 2. For whites, the hypothesis of no teacher differences is rejected at the 1 percent level. However, for Mexican-Americans it is not possible to reject the hypothesis of no teacher differences at the 10 percent level. In other words, the teacher appears to count for whites of all social strata but not for Mexican-Americans.

One qualification is needed before any further interpretations are made. Since these students had only one teacher during the year,

Table 2

F-STATISTICS FOR NULL HYPOTHESIS OF UNIFORM TEACHER EFFECTS

Sample	F	d. f.[a]	R^2
Third Grade			
White, manual	2.03[b]	(69,426)	.71
White, nonmanual	1.57[b]	(57,247)	.76
Mexican-American, manual	.78[c]	(29,78)	.68
Second Grade			
White, manual	2.96[b]	(55,440)	.68
White, nonmanual	2.39[b]	(48,264)	.71
Mexican-American, manual	1.09[c]	(26,82)	.64

Notes:

[a]Degrees of freedom.

[b]Statistically significant at the 1 percent level.

[c]Statistically insignificant at the 10 percent level.

it is impossible at this stage of the analysis to distinguish between the effects of particular teachers and a classroom composition effect. There is no independent observation here for a given teacher with several different classrooms. This problem will be dealt with directly in the next section.

This analysis suggests that the Mexican-Americans at this lower grade level are not getting much out of school. On the average, they tend to progress at a rate of about one-half grade level per year, or 50 percent of the national average, for reading achievement gains, regardless of which teacher they have. It is possible that the classroom composition exactly offsets teacher differences, or that teachers are matched with Mexican-American classes to equalize gains. However, this seems highly unlikely, since it would be difficult to make such a matching. (Remember that the model analyzes the effects of teachers independent of the entering achievement level. The matching needed to

achieve no teacher-classroom effects calls for putting the best teacher-classroom combination with the room of worst "gainers," and so on). Moreover, since the white children are sensitive to teacher-classroom differences, as indicated by Table 2, a finding of no differences for Mexican-Americans -- when in fact white differences exist -- implies that teachers are distributed only in conjunction with the Mexican-Americans in the class. Yet, the proportion of Mexican-Americans ranges from 6 percent to 63 percent in the 30 third grade classrooms that have more than two Mexican-American students. The policy implications of this finding for Mexican-Americans will be discussed in the concluding section.

V. CHARACTERISTICS OF TEACHERS

The preceding section suggested that the performance of white students is dependent upon the specific teacher and classroom associated with the student. For policy purposes it would be useful to identify the characteristics that contribute to increased performance. This phase of the analysis was accomplished by introducing a variety of quantitative teacher and classroom characteristics into an overall model of student achievement.* This was done for both the white manual occupation and white nonmanual occupation samples.

The estimates for the white manual sample are displayed in Equation (6). Variables definitions, means, and standard deviations appear in Table 3.

$$A_{j3} = \underset{}{20.8} + \underset{(2.3)}{2.81F} - \underset{(-2.8)}{6.38R} + \underset{(18.8)}{.79A_{j1}} - \underset{(-2.1)}{.07D} \qquad (6)$$

$$+ \underset{(2.4)}{.09T_3} - \underset{(-1.5)}{.57Y_3} + \underset{(1.9)}{.06T_2} - \underset{(-2.9)}{.68Y_2}$$

$$R^2 = .51 \qquad SE = 13.5$$

(t-statistics are displayed below each coefficient; SE is the standard error of estimate.)

This model presents an interesting view of teachers. The teacher characteristics that appear to be important are not the characteristics that are purchased by schools. For both the second and third grade teachers, the score on the verbal facility test (T) and the recentness

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*An intuitively appealing analysis of teacher characteristics calls for estimating value added models which use the estimated coefficients, t_i, from Equation (3) as the dependent variable and characteristics of just the teachers and classrooms for the independent variables. However, there are some very severe statistical problems with this. In particular, the assumption that the error variance-covariance matrix is $\sigma^2 I$ is untenable. If we let the variance-covariance matrix of estimated coefficients from Equation (3) equal Ω and assume that value added is stochastic with an error matrix of $\sigma^2 I$, then the error matrix in estimating a value added model would be $(\Omega + \sigma^2 I)$ where σ^2 is unknown. It is not possible to find efficient coefficient estimators in this case.

Table 3

VARIABLE DEFINITIONS, MEANS AND STANDARD DEVIATIONS --
WHITE MANUAL OCCUPATION MODEL

Variable	Mean	Standard Deviation	Definition
A_3	55.74	19.1	Stanford Achievement Test raw score - third grade
F	.50	.5	Sex: = 1 for female = 0 for male
R	.08	.3	Repeat grade: = 1 if a grade was repeated; = 0 otherwise
A_1	35.17	15.1	Stanford Achievement Test raw score - first grade
D	17.93	18.8	Percent of time spent on discipline by third grade teacher
T_3	66.90	15.8	Quick Word Test score - third grade teacher
Y_3	1.91	1.6	Years since most recent educational experience - third grade teacher
T_2	68.41	19.0	Quick Word Test score - second grade teacher
Y_2	2.64	2.6	Years since most recent educational experience - second grade teacher

of education (Y) are the most important factors.* Additionally, there is a "quasi-teacher" characteristic of percent of time spent on discipline by the third grade teacher. Each of these has important implications for school operations.

The verbal facility test (T) probably plays two roles: first, it is a measure of communicative ability; second, as the authors of the test point out, it can be taken as a quick measure of overall intelligence or general ability. Thus, general ability seems important, regardless of formal training. There are some important policy implications surrounding the verbal test measure of teacher quality. By interchanging teachers at the top and bottom of the verbal ability scale for this system, achievement changes by .2 to .4 grade levels.** This seems significant at this grade level, particularly if the increasing grade level disparities hypothesized in EEO hold true for the individuals in this sample.*** (The powerful effect of the student's early education on later achievement is also shown by the strength of first grade achievement in Equation (6).) Thus, teacher distribution according to T score can have a significant effect on individual children. Further, since this test has national norms, it is possible to get some idea of how the teachers being hired in this system rate alongside other college graduates. The mean score of 68 places the teachers in this sample slightly under the median for female college graduates. Thus, this system is not being successful in attracting the best people.

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*The model was not constrained to have the same characteristics for second and third grade teachers; this results from the analysis of various characteristics without constraint. If we test the joint hypotheses that all four strictly-teacher characteristics together have no effect on education, we reject at the .01 level with $F_{4,506} = 5.68$.

**This is calculated by changing only the third grade teacher verbal score for the lower limit and both second and third for the upper limit. The scores are changed from 40 to 96 to represent the range found in the data (maximum score is 100). The resulting achievement score is then converted to grade level equivalents.

***EEO, Chapter 3.

In addition to teacher ability as measured by the verbal facility test, the recentness of educational experiences (Y) has a significant effect on educating students. This seems to provide the rationale for encouraging or requiring teachers to take additional courses periodically. However, as indicated by the results of analyzing graduate units and the effects of Master's degrees, it does not really matter whether the teacher is enrolled in an advanced degree program or is taking many courses. Education of the second and third grade teachers in the past year as opposed to five years ago would be worth .2 to .3 years of reading achievement to a given third grader.

Finally, there is the measure of discipline time (D) that was labeled as a quasi-teacher characteristic. Certainly, an interaction between the classroom and the teacher is reflected in this variable. However, as expected, the more time spent on disciplinary matters, the lower the achievement level of the class. It does suggest, however, that efforts to reduce such time could be beneficial. These would include using principals or assistant principals or even teacher's helpers as disciplinarians.

It is immediately obvious that these are not the characteristics of teachers that are currently being purchased. Certainly, if there is an excess supply of teachers, schools can be selective in hiring and can attempt to evaluate the general ability of teachers. However, casual observation suggests that the most selective (suburban) systems weight previous teaching experience heavily. Moreover, as suggested by the simple correlation matrix for teacher characteristics displayed in Table 4, the purchased factors (experience and units of graduate work) are not highly correlated with the characteristics included in the model.

At the same time, a model for the white nonmanual population was estimated. The results of this analysis, shown in Equation (7), provided a different set of teacher characteristics that seemed important.

$$A_3 = \underset{}{35.0} + \underset{(16.0)}{.72A_1} - \underset{(-3.0)}{5.1C} - \underset{(-1.9)^3}{.79Y_3} + \underset{(1.2)^3}{.10S_3} - \underset{(-1.7)^2}{.66Y_2} + \underset{(1.8)^2}{.20S_2} \qquad (7)$$

$$R^2 = .52 \qquad SE = 11.8$$

Table 4

SIMPLE CORRELATIONS FOR TEACHER CHARACTERISTICS -- WHITE MANUAL SAMPLE

	D	T_3	Y_3	T_2	Y_2	$EXPER_3$	$UNITS_3$	$EXPER_2$	$UNITS_2$
D	1.00								
T_3	-.19	1.00							
Y_3	.01	.08	1.00						
T_2	.07	.19	.13	1.00					
Y_2	-.14	-.09	.11	-.19	1.00				
$EXPER_3$	-.14	.37	.11	.17	.05	1.00			
$UNITS_3$	-.09	.01	-.14	.09	.12	.53	1.00		
$EXPER_2$	.09	-.11	-.01	-.09	.20	-.18	-.11	1.00	
$UNITS_2$	-.02	.07	.01	-.03	-.15	-.02	.03	.43	1.00

(Variable definitions, means, and standard deviations are displayed in Table 5.) However, before discussing this model, a word on sample stratification is necessary. A formal test for equality of coefficients between the two white models was performed.* When testing the entire model and restricting the models for both samples to the form of Equation (6), the hypothesis of coefficient equality was rejected at the .025 level ($F_{9,820} = 2.13$). However, since the principal interest centers upon teacher characteristics, a test of this subset of variables alone seems more appropriate. When this test is performed, the results are inconclusive, since $F_{4,820} = 1.57$ when the critical value for those degrees of freedom at the .10 level is 1.94. Thus, it is not possible to reject the hypothesis of homogeneity with a high level of confidence; yet, at the same time, the evidence does not seem strong enough to pool the sample. Since both samples are large, the

*The methodology of this test can be found in Franklin M. Fisher, "Tests of Equality Between Sets of Coefficients in Two Linear Regressions: An Expository Note," Econometrica, March 1970.

Table 5

VARIABLE DEFINITIONS, MEANS AND STANDARD DEVIATIONS --
WHITE NONMANUAL OCCUPATION MODEL

Variable	Mean	Standard Deviation	Definition
A_3	64.82	16.8	Stanford Achievement Test raw score - third grade
A_1	42.43	15.8	Stanford Achievement Test raw score - first grade
C	.19	.4	Clerical occupation: = 1 if father in clerical job; = 0 otherwise
Y_3	2.02	1.7	Years since most recent educational experience - third grade teacher
S_3	7.85	8.1	Years of experience with this socio-economic level - third grade teacher
Y_2	1.88	1.7	Years since most recent educational experience - second grade teacher
S_2	7.94	6.1	Years of experience with this socio-economic level - second grade teacher

loss in efficiency by not pooling would not be large, and the decision was made to stratify.

Returning to Equation (7), the characteristics that seem important for the white children from nonmanual occupation families are not entirely the same as for children from families with manual occupations. The recentness of education is again a significant factor, with approximately the same effect here as in the previous model. However, teacher verbal ability does not appear to be significant. Instead, experience with this socio-economic group assumes importance. As would be expected, the correlation between total experience and socio-economic group experience is quite high. The simple correlation for third grade teachers is .8. Thus, the present policies of paying for experience could be reasonable in this case. Recentness of education is, however, only slightly correlated with the pay factors, as in the manual occupation sample.

In comparison with the manual occupation sample, the coefficient estimates are not as reliable in the nonmanual sample. Although there is a smaller standard error of estimate for the nonmanual model, this is coupled with a smaller variance in overall achievement; the R^2's in the two models are almost equal. The estimated coefficients in Equation (7) do indicate that teachers have less effect on these nonmanual children. Although the effects of recent education are roughly the same in the two models, the potential for change in achievement through increasing verbal facility, or general ability, is considerably greater. Not only can verbal facility be changed rapidly -- since experience usually comes by aging rather than hiring -- but given percentage changes in verbal quality have a considerably larger effect on student achievement.

The previous discussions of Equations (6) and (7) must be taken within the context of the overall model. In the process of developing these models, several other hypotheses about educational inputs were tested and rejected. In particular, variables measuring school composition in terms of occupational distribution, ethnic distribution, and achievement distribution; variables measuring objective background

characteristics of the teachers, such as socio-economic background, college major, and membership in professional organizations; and variables measuring subjective factors, such as attitudes toward types of students, were tested and found to have statistically insignificant effects on the students' achievement. The implication that arises from these "nonresults" and from the models presented is that we do not have very good measures of teachers. We can identify a few objective factors that appear to affect education. Yet most of our notions about important attributes of teachers are probably too simple. Although teachers do appear important in the model, precise decision rules for hiring teachers are not readily available at this time.

VI. CONCLUSIONS

From this study three conclusions are apparent. It should be borne in mind that these conclusions derive from a sample of one school system: therefore, some caution should be used in generalizing to other systems.

First, the present set of hiring practices leads to an inefficient allocation of resources. The analysis indicates that teaching experience and graduate education do not contribute to gains in student achievement scores. Moreover, the characteristics that do matter are not highly correlated with these factors. Yet these attributes are being purchased by the school district. Since turnover is costly, some average experience level over one year would be reasonable. However, the current average of over eleven years is certainly excessive.

Second, in the sense that different teachers and different classroom compositions do not affect the achievement outcome of Mexican-American students, teachers do not appear to count for this group. For Mexican-Americans from blue collar families, once the entering achievement level is known, no other information is useful in predicting the achievement level after a given year of school. Further, the average gains in a given school year are about one-half of the national average for reading achievement gains; that is, their reading achievement advances about one-half year in each of the second and third grades.

There has been evidence in the past that blacks are more responsive to teachers than whites.* The insensitivity of Mexican-Americans to teacher differences, then, may well be a language problem and not just a minority problem. (No direct measure of language in the home is included in the study.) It is worth noting that there are no Mexican-American teachers in this sample. Therefore, there is no test of one of the most prominent policy recommendations, that of hiring teachers who understand the problems of the Mexican-American student from

*See E. Hanushek, "The Education of Negroes and Whites," op. cit.

personal experience. The empirical evidence in this study supplies no immediate remedy for this problem. Given the range of classroom composition, desegregation does not appear to be the answer for raising achievement. A range of alternatives from English as a second language to community control has been presented in other locales, but these cannot be evaluated in the context of the district sampled in this study.

Third, differences in teachers and classrooms do make a difference to white children regardless of their socio-economic level. There are significant differences in the performance of white children, depending upon what classroom they are in. These differences in gains are independent of their entering achievement level, their socio-economic status, and their sex. However, this information by itself is not helpful to school administrators, for it does not tell them what characteristics are important. In order to provide those data, an attempt was made to decompose the estimated gains associated with given teachers and classrooms.

The attempts to provide a set of measurable characteristics that schools could use in hiring and administration to affect achievement did not produce clear-cut answers. A considerable part of teaching cannot be explained by a set of standard variables measuring teachers and classrooms, particularly for white students from white collar families.

Looking at both models for whites, there are some different measures of the effects of classroom and teacher. Yet important hypotheses were consistently rejected in both. For example, the effect of peers, as measured by the occupational and ethnic composition of the classroom, was always insignificant after the individual's socio-economic status, initial achievement level, and school factors were accounted for. This is consistent with hypotheses about biases arising from data limitations in previous work.* If one's goal is to raise achievement, manipulation of SES level of the classroom does not, from this sample, appear

*See Hanushek and Kain, "On the Value of Equality of Educational Opportunity as a Guide to Public Policy," op. cit., on peer effects.

to be the way to proceed. (This is qualified particularly by the age of the students. Peer-effect hypotheses generally center on the development of aspirations, and these intuitively are more important in older children.) Other hypotheses tested and rejected were that teacher attitudes, similarities in student and teacher background, advanced education, academic degrees, age, and experience were beneficial factors in education.

Nevertheless, it would be imprudent to generalize from these findings. They refer to one school system and one particular grade level in elementary schools. For this reason this study is best looked upon as being suggestive rather than definitive, as being a prototype rather than a final analysis. In its role as a prototype analysis, several further courses of action are suggested. First, replication of this type of individual analysis in many different situations is called for. This means looking at different grade levels, different time spans, and different districts. In addition, the results for teacher and classroom attributes as they affect achievement strongly suggest that better measures of <u>behavior</u> are needed. The objective variables used in this analysis do not appear entirely satisfactory for measuring differences in teachers.

Only after we analyze education in a variety of circumstances and under a variety of programs will we be able to make rational choices among alternatives. Today many complex educational issues, such as the tradeoff between desegregation and compensatory education, are being argued without data. This study suggests how to gather relevant data for such decisions.

Appendix A

TEACHER QUESTIONNAIRE

This appendix presents the introductory letter to teachers and the questionnaire that was given to all kindergarten through third grade teachers in the school system in June 1969. The questionnaires were filled out by individual teachers and mailed directly to The Rand Corporation. Of the 338 teachers in kindergarten through third grade, only 43, or 12.7 percent, failed to respond or failed to identify their questionnaires so that they could be matched to students. Of the 198 second and third grade teachers (the most important for determining the sample used herein), all but 11.6 percent returned questionnaires that could be identified. No attempt at a follow-up on missing teachers was made, largely owing to the fact that teachers had already left the schools for the summer before it was determined who had not responded. The major effect of nonresponse was the loss of pupils for analysis but there is no reason to suspect that the regression results were biased. The teachers remaining in the sample exhibit considerable variation in characteristics, and this is the most important attribute of the sample for the regression analysis. (If an attempt were made to describe the population of teachers instead of the contribution of different attributes to achievement, possible biases from nonresponse would be more important.) The large reduction in the sample of students compared with the relatively small nonresponse rate arises from the fact that both the second and third grade teacher must have responded and the second grade teacher must still have been in the school system. This is, of course, in addition to the requirement that the student's first and third grade test information be available; however, losses due to this latter requirement were significantly less than those due to teacher requirements.

The RAND Corporation
1700 MAIN ST. • SANTA MONICA • CALIFORNIA 90406

12 June 1969 L-10997

Dear Teacher:

The RAND Corporation is conducting a study on the effects of school and family influences on educational achievement. The ultimate goal of the research effort is the development of educational programs which will improve the learning of the children in your district and others throughout the state and nation. In this initial phase we have the much more modest goal of testing the feasibility of relating certain objective measures of the student's environment to his educational achievement.

There are two attachments to this letter: 1) a survey of background factors, and 2) a short verbal facility test. The background survey is used to gather objective information on the input of schools to the educational process. The verbal facility test is included to ascertain whether communicative skills -- very crudely measured -- have any perceptible impact on students' learning. Your candid completion of these two items is the key to the success of this study. We urge you and your colleagues in the Unified School District to answer each question as completely and accurately as possible. The twenty to thirty minutes you spend on this survey could provide valuable information which would lead to increased educational opportunity for students.

We will treat all information in strict confidence. We are in no way trying to "grade" individual teachers, and, furthermore, we guarantee that the information will not be used in that manner. The school administration will not have access to information about individuals.

We request that you place your name on the cover sheet to the questionnaire so that students can be matched with teachers. However, as soon as your background factors are matched with other information about the students, your name will be removed. We only ask that you inform your school secretary when you mail the forms so that we may have an accurate record.

Thank you for your cooperation.

Sincerely,

Eric A. Hanushek

Eric A. Hanushek

EAH:jc

NAME_____

DIRECTIONS

1. Print your name at the top of the booklet. THIS WILL BE REMOVED WHEN THE INFORMATION IS MATCHED WITH THE STUDENT INFORMATION.

2. On multiple choice questions place the letter corresponding to your answer in the Answer Column on the left hand side of the survey pages.

3. For questions other than multiple choice, print your answer on the line provided.

4. Answer all questions including the verbal facility test at the end of the survey.

5. After completing the survey and the test, place in the envelope provided and mail directly to The RAND Corporation. Please place your name in the return address portion of the envelope.

6. Notify your school secretary that you have mailed the forms.

Background Survey

Answer Column

_____ 1. What is your sex?
(A) Male
(B) Female

_____ 2. How old were you on your last birthday?

_____ 3. Where have you spent most of your life?
(A) In this city, town, or county
(B) In this state outside this city, town, or county
(C) In another state in the U.S.
(D) In Puerto Rico or another U.S. possession
(E) In Mexico
(F) In Canada
(G) In a country other than the U.S., Canada, or Mexico

_____ 4. In what type of community have you spent most of your life?
(Give your best estimate if you are not sure.)
(A) In the open country or in a farming community
(B) In a small town (less than 10,000 people that was not a suburb)
(C) Inside a medium size city (10,000 to 100,000 people)
(D) In a suburb of a medium size city
(E) Inside a large city (100,000 to 500,000 people)
(F) In a suburb of a large city
(G) In a very large city (over 500,000 people)
(H) In a suburb of a very large city

_____ 5. Are you . . .
(A) Negro
(B) White
(C) American Indian
(D) Oriental
(E) Other

_____ 6. Are you of Puerto Rican or Mexican American background?
(A) Puerto Rican
(B) Mexican American
(C) Neither of these

_____ 7. What is your marital status?
(A) Married
(B) Unmarried
(C) Divorced or Separated
(D) Widowed

_____ 8. What work does (did) your father do? You probably will not find his exact job listed, but mark the answer space corresponding to the one that is closest.

(A) Professional - such as accountant, artist, clergyman, dentist, engineer, lawyer, librarian, scientist, college professor, social worker, etc.

(B) Manager - such as sales manager, store manager, office manager, factory supervisor, etc.
Proprietor or owner - such as owner of a small business, wholesales, retailer, contractor, restaurant owner, etc.

(C) Official - such as manufacturer, officer in a large company, banker, official or inspector, etc.

(D) Farm or ranch manager or owner

(E) Technical - such as draftsman, surveyor, medical or dental technician, etc.

(F) Salesman - such as real estate or insurance salesman, factory representative, etc.

(G) Skilled worker or foreman - such as baker, carpenter, electrician, enlisted man in the armed forces, mechanic, plumber, plasterer, tailor, foreman in a factory or mine, etc.

(H) Workman or laborer - such as factory or mine worker, fisherman, filling station attendant, longshoreman, etc.

(I) Semiskilled worker - such as factory machine operator, bus or cab driver, meat cutter, etc.

(J) Clerical worker - such as bank teller, bookkeeper, sales clerk, office clerk, mail carrier, messenger, etc.
Service worker - such as a barber, waiter, etc.
Protective worker - such as policeman, detective, sheriff, fireman, etc.

(J) Farm worker on one or more than one farm

(K) Don't know

_____ 9. How many years of school did your father complete?

(A) None, or some grade school
(B) Finished grade school
(C) Some high school
(D) Finished high school
(E) Technical or business school after high school
(F) Some college, but less than 4 years
(G) Graduated from a regular 4 year college
(H) Attended graduate or professional school
(I) Obtained graduate degree
(J) Don't know

_____ 10. How many years of school did your mother complete?
(A) None, or some grade school
(B) Finished grade school
(C) Some high school
(D) Finished high school
(E) Technical or business school after high school
(F) Some college, but less than 4 years
(G) Graduated from a regular 4 year college
(H) Attended graduate or professional school
(I) Obtained graduate degree
(J) Don't know

_____ 11. What is the highest earned college degree you hold? Do not report honorary degrees.
(A) No degree
(B) A degree or diploma based on less than 4 years work
(C) A Bachelor's degree
(D) A Master's degree
(E) Professional or Specialist diploma (Sixth year)
(F) A Doctor's degree

_____ 12. What year was this degree granted?

_____ 13. How many credits of college work have you had beyond your highest degree?
(A) None
(B) 1 to 10 semester hours
(C) 11 to 20 semester hours
(D) 21 to 30 semester hours
(E) 31 or more semester hours.

_____ 14. What was your most recent educational experience?
(A) Undergraduate work
(B) Full-time graduate study (including summers)
(C) Part-time graduate work other than night school during school year
(D) Night school during school year
(E) Summer workshop
(F) Other

_____ 15. In what year did the above take place?

_____ 16. What was your major field of study in undergraduate school? If you had two majors, include both.

(A) Agriculture
(B) Biological Science
(C) Business--Commercial
(D) Elementary Education
(E) Engineering
(F) English or Journalism
(G) Foreign Language
(H) Home Economics
(I) Industrial Arts
(J) Mathematics
(K) Music--Art
(L) Philosophy
(M) Physical Education--Health
(N) Physical Science
(O) Psychology
(P) Social Sciences, including History
(Q) Vocational or Technical Education
(R) Special Education
(S) Secondary Education
(T) Other (please specify) _____
(U) I did not go to college

17. At what college or university did you obtain your Bachelor's degree?

_____

18. In what school or department of the college or university did you do the most undergraduate work?

_____

_____ 19. Where did you rank in your undergraduate class?

(A) Top 10%
(B) Top 25%
(C) Top 50%
(D) Below top 50%

20. At what institution did you do the most graduate study?

_____

21. In what school or department of the college or university did you do the most graduate work? (Answer this even if you have not yet received the graduate degree).

_____

_____ 22. As of June 1969, what was the total number of years of full-time teaching experience you have had? (Consider counseling as teaching experience.)

_____ 23. As of June 1969, what was the number of years of full-time teaching experience you have had in this school system? (Consider counseling as teaching experience.)

_____ 24. How many years of full-time teaching experience do you have at this grade level?

_____ 25. How many years of full-time teaching experience do you have in primary education?

_____ 26. How many years have you taught in a school with a socio-economic level of the student body that is similar to this one?

_____ 27. In the last school year (1967-68), how many school days were you absent from work?

(A) I was not a regular teacher or counselor last year
(B) None
(C) 1 or 2
(D) 3 to 6
(E) 7 to 15
(F) 16 or more

28. What California teaching credential(s) do you hold?

_____ _____

29. What year did you receive the above?

_____ _____

_____ 30. What will be your total annual salary from this school system this year?

(A) $6,000 - 6,499
(B) $6,500 - 6,999
(C) $7,000 - 7,499
(D) $7,500 - 7,999
(E) $8,000 - 8,499
(F) $8,500 - 8,999
(G) $9,000 - 9,499
(H) $9,500 - 9,999
(I) $10,000 - 10,499
(J) $10,500 - 10,999
(K) $11,000 - 11,499
(L) $11,500 - 11,999
(M) $12,000 - 12,499
(N) $12,500 - 12,999
(O) $13,000 - 13,499
(P) $13,500 - 13,999
(Q) $14,000 - 14,499
(R) $14,500 - 15,000

_____ 31. What is your employment status in this school system?

(A) I am on a tenured appointment
(B) I have a regular full-time appointment but not on tenure
(C) I am a substitute teacher on temporary assignment

_____ 32. Do you read regularly any national educational or subject matter journals such as the NEA Journal, The Nation's Schools, The English Journal, etc.?
(A) No, not regularly
(B) Yes, 1 regularly
(C) Yes, 2 regularly
(D) Yes, 3 or more regularly

_____ 33. If you could choose, would you be a faculty member in some other school rather than this one?
(A) Yes
(B) Maybe
(C) No

_____ 34. If you answered "yes" or "maybe" to the above question, was the primary reason:
(A) School location
(B) Quality of students
(C) Quality of staff and faculty
(D) Combination of above
(E) Other

_____ 35. Given the backgrounds of your students, approximately what percentage of classroom time do you find it necessary to devote to discipline and behavioral counseling activities?
(A) None
(B) Less than 10%
(C) 10-25%
(D) 26-50%
(E) Greater than 50%

_____ 36. Approximately what percentage of your work day is devoted to clerical and administrative activities?
(A) None
(B) Less than 10%
(C) 10-25%
(D) 26-50%
(E) Greater than 50%

_____ 37. How long do you anticipate teaching or working in some other capacity in the school system? (Not necessarily in this specific school or system.)
(A) Leaving after this year
(B) One more year
(C) Two more years
(D) Three to five more years
(E) More than five years
(F) Undecided

_____ 38. What kind of school do you prefer to work in, as far as ethnic composition is concerned?
(A) A school with predominantly Anglo-Saxon students
(B) A school with a mixture of Anglo-Saxons and minority ethnic groups
(C) A school with predominantly minority ethnic groups
(D) No preference

_____ 39. Do you believe that there is a sound basis in educational policy for giving compensatory programs to culturally disadvantaged students at extra cost per student?
(A) Yes
(B) No
(C) Undecided

_____ 40. Do you believe that teachers of Mexican-American children should have a working knowledge of Spanish?
(A) Yes
(B) No
(C) Undecided

_____ 41. Do you believe that Mexican-American children should be allowed to speak Spanish in school?
(A) Yes
(B) No
(C) Undecided

_____ 42. What is the average number of students assigned to your regular class(es)?

_____ 43. Do you hold any jobs aside from your one with the school system?
(A) Summer only
(B) School year only
(C) Summer and school year
(D) None

_____ 44. Do you have a teaching aide?
(A) Yes
(B) No

_____ 45. Have you supervised a practice teacher during the past year?
(A) Yes
(B) No

_____ 46. Do you teach a particular subject?
(A) Yes
(B) No

If so, what is it?

_____

_____ 47. What percentage of your students do you believe represent a severe disciplinary problem?
(A) None
(B) Less than 10%
(C) 10-25%
(D) 26-50%
(E) Greater than 50%

_____ 48. What percentage of your students do you believe represent a moderate disciplinary problem?
(A) None
(B) Less than 10%
(C) 10-25%
(D) 26-50%
(E) Greater than 50%

_____ 49. What percentage of your students do you believe are not socially well-adjusted (e.g., have very few friends, do not play with other children, etc.)?
(A) None
(B) Less than 10%
(C) 10-25%
(D) 26-50%
(E) Greater than 50%

_____ 50. What percentage of your students do you believe have a positive attitude toward school and education?
(A) All
(B) 90-99%
(C) 75-89%
(D) 50-74%
(E) Less than 50%

51. Do you think the following constitute problems within your school? Please place an X in the appropriate column (YES or NO) for each possible problem area.

YES	NO		
___	___	(A)	Home environment of the students is not good
___	___	(B)	Pupils are not well fed and well clothed
___	___	(C)	The different races or ethnic groups don't get along well together
___	___	(D)	Parents attempt to interfere with the school
___	___	(E)	There are too many absences among students
___	___	(F)	The classes are too large for effective teaching
___	___	(G)	There should be a better mixture: the students are all too much of one type
___	___	(H)	Too much time has to be spent on discipline
___	___	(I)	The students aren't really interested in learning
___	___	(J)	There is a lack of effective leadership from the school administration
___	___	(K)	The teachers don't seem to be able to work well together
___	___	(L)	Teachers have too little freedom in such matters as textbook selection, curriculum, and discipline
___	___	(M)	There is too much student turnover
___	___	(N)	The parents don't take enough interest in their children's school work
___	___	(O)	We have poor instructional equipment: supplies, books, etc.
___	___	(P)	There are too many interruptions during class periods
___	___	(Q)	There is too much teacher turnover
___	___	(R)	There is too much turnover of administrators

This is the end of the survey portion. The remining section is the Quick Word Test. Please do not consult any reference material or any other people while taking this test. As with the survey portion, the results of this test will remain completely anonymous.

It is not necessary to complete the identification section at the top of the test form.

APPENDIX B. STUDENT INFORMATION

All student information was collected from the cumulative records of students by the individual school secretaries. Secretaries were compensated for the time they spent in completing the work at their normal hourly wage rate. Each secretary was supplied with a data form which could be keypunched directly. There was very little missing data. The following information was supplied for each student:

Sex
Spanish surname (yes or no)
First grade Stanford Achievement Test--total reading score
Second " " " " " " "
Third " " " " " " "
Grade entered school
Number of schools in the district which student has attended
Grade repeats (yes or no)
Third grade teacher (name)
Second " " "
First " " "
Kindergarten " "
Father's occupation
Mother works (yes or no)
Family structure (both real parents, one stepparent, guardian, father only, mother only, or unknown)
Number of siblings
Health (good, vision problem, hearing problem, paraplegic, combination of above problems, other)
Days absent
Miller-Unruh reading teacher (yes or no)

APPENDIX C. MEAN CHARACTERISTICS AVAILABLE TO STUDENTS AND STANDARD DEVIATIONS FOR SELECTED TEACHER AND CLASSROOM CHARACTERISTICS

Characteristic	White Manual		White Nonmanual		Mex-Amer Manual	
	mean	s.d.	mean	s.d.	mean	s.d.
Third Grade Teachers						
Verbal test score	66.9	15.8	69.1	15.9	65.2	14.0
Age	39.2	12.8	38.6	13.2	39.1	13.7
Total experience	11.6	8.6	11.5	9.3	12.1	9.7
Exper. with SES level	7.1	7.0	7.8	8.1	6.6	6.8
Days absent	9.9	6.4	10.3	6.2	9.7	5.6
% discipline time	17.9	18.8	14.6	14.8	22.5	18.2
Salary ($100's)	93.4	18.9	90.7	17.4	92.7	21.2
Mex-Amer teacher	0.0	0.0	0.0	0.0	0.0	0.0
% master's	6.4	24.5	14.6	35.3	4.3	20.2
% first year teaching	10.3	30.4	7.7	26.7	6.4	24.5
% want Anglo student	25.2	43.4	33.1	47.0	23.6	42.4
% want minority student	2.3	15.1	1.2	11.0	9.3	29.0
% holds part-time job	18.1	38.5	13.0	33.6	10.0	30.0
% practice teacher	12.4	33.0	15.8	36.4	14.3	35.0
% teacher aide	6.8	25.2	4.3	20.4	6.4	24.5
% attends night school	21.0	40.7	12.7	33.3	15.0	35.7
% Elem. Educ. major	64.3	47.9	73.4	44.2	70.7	45.5
Years since degree	1.9	1.6	2.0	1.7	1.9	1.2
Units past degree	22.3	13.7	18.9	14.0	21.0	13.8
Second Grade Teachers						
Verbal test score	68.4	19.0	64.9	21.8	66.7	16.4
Age	43.5	12.9	40.5	12.9	47.3	12.3
Total experience	14.3	9.6	13.0	8.6	19.9	11.1
Salary ($100's)	93.9	14.6	92.9	15.0	98.7	13.9
% Mex-Amer teacher	6.4	43.4	13.9	63.1	0.0	0.0
% master's	5.1	21.9	4.3	20.4	5.0	21.8
% want Anglo student	30.3	45.9	48.6	50.0	18.6	38.9
% want minority student	1.6	12.4	1.9	13.5	.7	8.4
% Elem. Educ. major	75.9	42.8	79.3	40.1	79.3	40.5
Years since degree	2.6	2.6	1.9	1.7	2.3	2.2
Units past degree	21.5	11.8	23.0	9.9	24.3	10.9
Classroom						
Average class size	28.7	1.5	28.5	1.5	29.0	1.6
% Mexican-American	15.5	11.9	11.3	9.0	33.2	21.1
% manual occupation	64.0	12.1	53.7	14.9	70.2	9.5
% mixed 2nd and 3rd	5.4	22.7	8.7	28.1	1.4	11.9
% mixed 3rd and 4th	3.9	19.3	7.4	26.2	1.4	11.9