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This paper reports the results of a large-scale study on the school environment and its influence on the academic achievement, values, and aspirations of students. The study (1) identifies a number of dimensions of educational and social climates of high schools, (2) assesses the effects of these dimensions on the academic performance and college plans of students, and (3) investigates the sources of these effects on the achievement and college plans of students by cont olling formal organizational properties of school- and community-level variables. Statistical analysis was performed on data derived from questionnaires and aptitude tests administered to 20,345 students, 1,029 teachers, and 20 principals in 20 public, coeducational high schools in eight States spread over seven different geographical areas. Results of the study show that the educational and social environment of the school does have a moderate effect on the academic behavior of students and that the research design used holds much promise for future research in the area. (TT)

# EDUCATIONAL CLIMATES OF HIGH SCHOOLS: THEIR EFFECTS AND SOURCES*

Report No. 28

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THE JOHNS HOPKINS UNIVERSITY
The Center for the Study of Social
Organization of Schools

# EDUCATIONAL CLIMATES OF HIGH SCHOOLS: THEIR EFFECTS AND SOURCES

## THE PROBLEM

In a recent article, Benjamin Bloom[1] has contended that there are few schools in the U.S. which actually constitute consistent and powerful educational environments. Research evidence by social scientists on the impact of differing contexts, climates, or environments of both high schools and colleges supports such a position. The findings from a number of studies[2] in this area in the last two decades indicate that those school environments in which intellectualism and academic achievement are positively valued and stressed by teachers and students have a positive but only modest impact on the cognitive development of students. Moreover, in the high school studies there has been a tendency to infer the normative climate of schools from the "dominant social class character" of the student body (ie., the average socio-economic composition). In other words, there is a conspicuous lack of direct measures for the characteristics of the school environment and their influence on the academic achievement, values, and aspirations of students. As Bloom[3] has noted, steps should be taken to assess school environment more directly in order that policy decisions which will promote the desired academic growth in students may be made.

This paper reports the results of a large-scale study relevant to this concern. More specifically, it focuses on three interrelated problems:

(1) The identification of a number of dimensions of educational and social climates of high schools.

(2) The assessment of the contextual effects of these environmental dimensions on the academic performance and college plans of students.[4]

(3) The investigation of sources of climate effects on the achievement and college plans of students by controlling formal organizational properties of the school and also community level variables.

After presenting the results relevant to the above three problems, a discussion will be presented of possible ways of modifying the influence of those factors which seem to be the sources of the effects of school climate and thereby strengthen the impact of the school environment on the academic growth of students.

## METHOD[5]

Twenty public, co-educational high schools selected in a three-stage, non-random manner from seven different geographical areas and eight different states comprise the sample.[6] This design resulted in a sample of institutions which exhibit marked heterogeneity with respect to demographic, socio-economic, and community characteristics, and also considerable variation in academic achievement (as measured by one of the standardized achievement tests used in Project TALENT) and in rates of college attendance.

Data were collected in 1964 and 1965 from students, teachers, and principals of the twenty schools, using the following instruments.

1. Self-administered questionnaires to 20,345 students. This instrument was designed to treat subjects as both respondents and informants. As respondents they gave information about their social backgrounds, intellectual attitudes and values, educational and occupational plans, and academic and interpersonal behavior--in the school and with family and peers outside of school. As observer-informants they provided information on the functioning of the social system of students--what types of activities and values were rewarded by their own peer group, by the entire student body, and by teachers. Finally, a list of 54 true-false items was adapted from the College-Characteristics Index (CCI) and High School Characteristics Index (HSCI) developed by Pace and Stern[7] and Stern,[8] respectively, and these were included in the questionnaire. These items were designed to tap informants' perceptions of a number of diverse conceptual areas of the school environment such as faculty "presses" toward scientism, intellectualism, humanism, vocationalism, enthusiasm, and supportiveness. These items also tapped student counterparts of these presses.[9]

2. A self-administered questionnaire was completed by 1,029 faculty members in the twenty institutions. In completing the questionnaire, the teacher, just like the student, was acting as both respondent and observer-informant. In addition to personal history information, data were obtained about the teacher's intellectual norms and values in relation to students. There were also items to elicit the teacher's career aspirations for his students. As observer-informants, these teachers were presented with a number of items tapping the academic and social norms, values, and behavior patterns of the student society and those of their faculty colleagues. Finally, with only minor changes, teachers were presented with the same battery of faculty and student press items as that contained in the student questionnaire.

3. Principal's Questionnaire. Each of the twenty principals completed a questionnaire to provide data on a number of objective social, demographic, and academic characteristics of the school. Other than limited background information on the principal, the inventory did not deal with personal information about any member of the school community.

4. Two academic tests from Project TALENT were administered to the student bodies of the twenty schools. These were: (a) Aptitude for Abstract Reasoning (AR), a fifteen-item, multiple choice test designed to measure one's ability to determine the relationship among patterns of diagrams. Scores on the AR test provide one indication of a

student's intellectual potential which is relatively independent of curriculum content since formal instruction is not generally provided on this specific reasoning task at any grade level.[10] The testing experts who developed the test believe it is more "culturally free" than a device directly involving verbal ability. A follow-up longitudinal survey by the Project TALENT staff of 6,600 students who were 9th graders in the original survey and 12th graders in 1963 lends support to the position that the AR test functions more as an aptitude test than as an achievement test. Students' scores on the test over the three years were sufficiently stable that the Project TALENT investigators felt confident in viewing the test as one measure of "general mental ability."[11] (b) Achievement in mathematics (MATH), a twenty-four item multiple choice test constructed to provide an indicator of achievement through the ninth grade level (other than arithmetic computation and reasoning).[12]

The response rates of subjects to each of the four instruments were high. Consequently, bias due to non-response cannot have an appreciable effect on the validity of the findings presented below.[13]

Measures of School Climate

The measures of the academic and social climate of the schools were obtained using a modified version of Selvin's and Hagstrom's procedure[14] for classifying formal groups in terms of a large number of variables so

that contextual effects on the variation in behavior of members can be assessed. In the present research, thirty-nine aggregative characteristics[15] of the schools, based on data from both student and teacher questionnaires, were factor analyzed using the principal component solution and then orthogonally rotated to simple structure using the Varimax method. These 39 aggregative variables, all of which are based on individuals' perceptions of the school environment not information about their personal attitudes or characteristics, were taken from the following sources. Twenty-three of them are derived from student questionnaires; the other sixteen are from the instrument completed by teachers. Twenty-seven of the 39 variables are scales adapted from the CCI and HSCI. The remaining twelve variables are single-item indicators of school climate. Ten of these were selected from student questionnaire items and two from teacher questionnaire items.

Using the eigenvalue criterion, six interpretable factors were extracted which summarize with a relatively high degree of precision (82% of the total variance) the information contained in the 39 variables. Estimates of factor scores were computed for the schools on each factor, and these estimates were subsequently transformed into measures of various dimensions of school climate, to be used in the contextual analysis.

The measures of these various components are considered one of the most important accomplishments of the study since they represent comprehensive, stable, and <u>direct</u> indicators of the normative influence of school environment. Many earlier studies in this area have inferred the level of school climate

from indirect indicators such as the average socio-economic composition of the student body of the school or of the neighborhood in which the school is located--indicators whose overall adequacy has recently been questioned.[16]

Limitations of space do not permit a detailed description of the dimensions of school environment. This information is ready available to interested readers.[17] The six dimensions were interpreted and labelled using those variables which have statistically significant loadings ($.05 > p$) on the corresponding rotated factors:[18]

Factor I - Academic Emulation

Factor II - Student Perception of Intellectualism-Estheticism

Factor III - Cohesive and Egalitarian Estheticism

Factor IV - Scientism

Factor V - Humanist[ic] Excellence

Factor VI - Academically Oriented Student Status System

Measures of Individual Level Variables

The AR test is employed as the measure of mental aptitude. Measures of sex, grade in school, and family socio-economic status (SES) were obtained from single items in the student questionnaire. The measure of family SES is provided by information on father's education.

Students' academic orientations or values are measured by a scale derived from six items contained in the student questionnaire, each tapping a different component within the broad realm of intellectualism-achievement;

for example, "learning as much as possible," the importance of "good grades," the degree of satisfaction received from "working hard on studies," and the degree of admiration the subject has for "bright students." The responses to each item were dichotomized, and each respondent was assigned a score based on the number he answered in the positive direction. The reliability estimate of .59 obtained from the KR-20 formula indicates that the scale has an acceptable level of internal consistency.

The measure of one of the two dependent attributes, students' plans regarding college attendance, is inferred from a single item in the student questionnaire. Students' scores on the 24-item MATH test serve as the measure of academic achievement.

## The Statistical Technique and Categorization of Variables

To minimize the problem of obtaining spurious climate effects, which is a matter of special concern in contextual analysis, a statistical procedure for use with attribute data was employed using as many categories as possible on the individual level attributes.[19] In this multiple regression technique, the "effect parameter" for each explanatory attribute may be viewed as closely analogous to an unstandardized regression coefficient. In particular, when the dependent variable is dichotomous (as here), this parameter can be operationally interpreted as follows: It gives the change in probability of being "high" on the dependent attribute given that the person changes from one level to the next higher level on the independent attribute under consideration, but that his level on all other attributes stays unchanged.

## RESULTS

### Effects of School Climate and Personal Characteristics on MATH Achievement and College Plans

As noted above, contextual analysis requires that the effects of the environment on the dependent attributes be demonstrated while relevant personal attributes are controlled since any purported effects of the group level attributes could be attributable to systematic uncontrolled differences in the individual characteristics among the different groups. This is the primary task of this section of the analysis. A second and related task is to assess the relative effects of each of the individual characteristics.

Each row in Table 1 gives the estimated effect parameters for a model in which one of the climate dimensions and three individual level attributes are used as explanatory variables in an attempt to account for variation in MATH achievement. Table 2 gives corresponding results using college plans as the dependent attribute.[20] Thus, in each row of Tables 1 and 2 the same three individual level characteristics are being statistically controlled.

Tables 1 and 2 here

The results for the two dependent attributes will be discussed separately. The most important finding in Table 1 is that when three relevant individual level attributes are held constant, each of the six climate dimensions has a significant positive effect on MATH achievement. These effects are in the direction which would be expected given the content of the factors. The effects of Dimension I are the strongest of the six dimensions, which

is probably attributable to its being the most comprehensive and reliable measure of school environment. In fact, its effect is almost as strong as that of father's education, and indicates that the more emphasis on academic performance, competitiveness, and intellectualism by both faculty and students, the more likely students are to achieve "high." The effect of the second dimension indicates that the more the school atmosphere encourages an intrinsic value of knowledge and the more teachers are emotionally supportive of students, the more likely students are to achieve on the MATH test. Each of the four remaining climate components has less than half the explanatory power for academic performance than does the first. The effect of the third dimension indicates that the greater the degree of social cohesion, democratic values, and intellectual standards for recognition among students, the higher the achievement level of individual students. The small effect parameter for Factor IV indicates a tendency for those schools exerting a strong press toward scientism to have a higher proportion of their students with high MATH achievement than those institutions which don't encourage excellence in this broad substantive area. Likewise, the effects of the fifth construct reveal that the greater the value placed on the humanities by teachers and students and the greater their emphasis on achievement in general and on an intrinsic value of knowledge, the greater the proportion of students with achievement in a very specific substantive area. Finally, the small positive effects of Factor VI suggest that the more t. student social system of the school rewards intellectualism and achievement the greater the tendency for students to achieve. This result is consistent with the widely accepted hypothesis among social scientists that adolescent subcultures of high schools have

Table 1

Independent Effects of Each of Six Climate Dimensions of Schools and of Three Personal Attributes on MATH Achievement[a]

| Climate Dimensions | Weighted Effects of Climate Dimensions | Weighted Effects of Father's Education | Weighted Effects of Student's Academic Values | Weighted Effects of Student's Ability |
|---|---|---|---|---|
| I Academic Emulation | .110 | .119 | .137 | .299 |
| II Intell.-Esthet. | .072 | .130 | .136 | .305 |
| III Cohesive and Egalitarian Esthet. | .048 | .132 | .135 | .307 |
| IV Scientism | .033 | .138 | .136 | .309 |
| V Humanistic Excellence | .042 | .133 | .136 | .308 |
| VI Academically Oriented Status System | .046 | .134 | .136 | .308 |

[a]All effect estimates are standardized to dichotomous form and are significant at the .01 level.

Table 2

Independent Effects of Each of Six Climate Dimensions of Schools and of Three Personal Attributes on College Plans[a]

| Climate Dimensions | Weighted Effects of Climate Dimensions | Weighted Effects of Father's Education | Weighted Effects of Student's Academic Values | Weighted Effects of Student's Ability |
|---|---|---|---|---|
| I Academic Emulation | .112 | .200 | .190 | .151 |
| II Intell.-Esthet. | .071 | .212 | .188 | .156 |
| III Cohesive and Egalitarian Esthet. | .031 | .219 | .190 | .159 |
| IV Scientism | .002[b] | .225 | .190 | .160 |
| V Humanistic Excellence | .025 | .219 | .190 | .159 |
| VI Academically Oriented Status System | .046 | .216 | .188 | .157 |

[a]All effect estimates are standardized to dichotomous form. Unless otherwise noted effect estimates are significant at the .01 level.

[b]Not significant at the .05 level.

an impact on the values, aspirations and achievement of individual students.[21]

Each of the three individual attributes in Table 1 has a sizeable effect on achievement in the expected direction, with ability having by far the greatest magnitude. The high degree of association between ability and performance is consistent with the findings of numerous studies which document the considerable predictive power of intellective factors for performance.[22]

The substantial effect of father's education is certainly not unexpected since family SES is the social background factor which has been demonstrated to be related most consistently to academic performance.

The third personal attribute in the table, students' academic values, also has an appreciable independent influence on their achievement level. This attribute may be viewed properly as an indicator of students' commitment to learning and achievement, and its effect suggests tne importance of such a personal value system to the academic development of youth who are in constant demand as the educational and scientific entrepreneurs of modern society.

The results of Table 2 reveal that in general the effects of the climate dimensions on college plans are not appreciably different from those on achievement. The single exception is for Factor IV, Scientism, which has a small positive effect on MATH but no effect on college plans. One possible explanation for this lack of effect is that the items used in the faculty and student presses for scientism, which are the variables with the highest loadings on Factor IV, are inadequate measures of the degree of scientific emphasis in the schools.[23] However, this does not appear to be a completely

satisfactory explanation since Factor IV has a small positive effect on MATH as shown in Table 1. This result suggests an alternative explanation: The degree of scientific ferment in the high school, although related to MATH performance, is not directly related to college plans. In other words, for the kind of scientific enthusiasm that may prevail in a high school, achievement in mathematics is useful, but college plans are irrelevant. It is not science as a career, but science in the here and now that is being tapped. Two pieces of evidence to support this interpretation are offered. First, as Table 3 shows, the great majority of students with college plans do not mention understanding science as a primary purpose in attending college. Furthermore, out of the diversified list of ten

Table 3 here

purposes it ranks next to lowest in importance. Secondly, (not shown in the table) only twelve percent of the students with college intentions indicated they planned to major in science in college.

Turning to the independent effects of the three personal attributes on college plans as shown in Table 2, it can be seen that each has a considerable effect on students' intentions, with father's education having more impact than any of the other attributes. Especially noteworthy is the point that on the average father's education has an effect parameter approximately .05 larger than that for student ability. Michael,[24] in his analysis of a nationally representative sample of seniors in 500 public high schools reports similar results; that is students' socio-economic background exerted a slightly greater influence on their college plans than

Table 3

Responses of Students with College Plans to a List of Items About the Main Purposes of a College Education

| Items | Percent of Students Ranking Each Item as Highly Important |
|---|---|
| Provide Vocational Training | 75 |
| Develop Abilities to Get Along with Different People | 59 |
| Develop Knowledge and Interests in Community, National, and Moral Problems | 52 |
| Develop Morals and Values | 48 |
| Prepare for a Happy Marriage and Family Life | 35 |
| Develop Skills Which Will Help Earn a High Income | 63 |
| Develop Understanding of Principles of Science | 30 |
| Develop Understanding of Principles of Human Behavior | 48 |
| Develop Understanding of Philosophy, Art, Literature, and Music | 33 |
| Provide Social and Athletic Activities | 22 |

did ability. Both of these findings seem consistent with the conclusion reached by Sibley[25] twenty-five years ago that the intelligence of the student was more important than family SES in determining whether he would finish high school but the opposite was true regarding the likelihood of finishing college. The fact that the effect parameters for father's education and for students' academic values are larger for college plans than for MATH can be best explained in terms of the qualitative difference between the two dependent attributes. College plans and aspirations belong to a class of social-psychological phenomena which are highly susceptible to the constraints of significant others in the immediate interpersonal environment (for example, parental pressures, of which father's education is an indicator) and to personal motivation and values (as measured by the respondent's academic values). Although the pressures of significant others and personal motivation can enhance students' achievement, such effects are limited simply because there is an upper bound to the ability of the student. Stated differently, it is a truism that the student cannot achieve higher on a standardized test than his ability level permits.

Before turning to a discussion of the sources of school climate effects on achievement and college plans of students, it is important to return to a critical problem in all contextual analyses--the adequacy of the controls for the individual attributes of the respondents. With respect to the dependent attributes under consideration here there could be concern with the adequacy of father's education as a measure of family background. Consequently, two additional measures of family SES, father's occupation and mother's education, are introduced into the analysis.[26] Table 4 presents the effects of the

most important measure of school climate, Factor I, on the two dependent attributes with father's education, mother's education, father's occupation, student's academic values, and ability simultaneously controlled. Thus, the first row of Table 4 is comparable to the first row of Table 1, and the second row of Table 4 is comparable to the first row of Table 2. Holding constant the two additional measures of family

Table 4 here

background reduces the effects of the climate dimension on the two dependent attributes only a negligible amount. This finding offers further support for the climate effects reported in Tables 1 and 2. In fact, the only noteworthy impact made by the simultaneous introduction of mother's education and father's occupation on the results of Tables 1 and 2 is to reduce by more than 50 percent the independent effects of father's education on both MATH achievement and college plans. These reductions in the effect parameters reflect the high correlations among father's education, mother's education, and father's occupation.

## Sources of Climate Effects on the Dependent Attributes

A number of educational researchers and practitioners have asserted that characteristics of the community environment--primarily socio-economic and "cultural" resources--are important determinants of academic "output." Community factors such as amount of financial support for education and presence of intellectual facilities such as libraries and museums have been viewed as outside-school sources of variation in student achievement and educational aspirations. However, as noted by Boocock,[27] the evidence that

Table 4

Independent Effects of One Climate Dimension and Five Individual Level Attributes on MATH Achievement and College Plans[a]

| Dependent Attribute | Weighted Effects of Factor I | Weighted Effects of Father's Education | Weighted Effects of Mother's Education | Weighted Effects of Father's Occupation | Weighted Effects of Student's Academic Values | Weighted Effects of Student's Ability |
|---|---|---|---|---|---|---|
| MATH Achievement | .097 | .050 | .062 | .061 | .139 | .290 |
| College Plans | .091 | .081 | .114 | .084 | .179 | .139 |

[a]All effect estimates are standardized to dichotomous form and are significant at the .01 level.

such factors have important educational consequences is far from conclusive. Given the lack of consistency of findings in this area, it is especially important to assess the importance of those community characteristics for which measures are available in the present study.

A second set of factors which will be introduced as potential sources of climate effects are formal organizational properties of the school. These are school characteristics which, for the most part, were included in the original Project TALENT survey--characteristics which reflect a few of the many curriculum innovations and organizational approaches being explored in the last two decades. The single most comprehensive piece of research dealing with the relationship of curriculum and school facilities measures to student achievement is the U.S. Office of Education's survey, Equality of Educational Opportunity,[28] often referred to as the Coleman report. Among the numerous important findings produced in the highly provocative and controversial work,[29] one is especially relevant to the present discussion: Most of the variation between students' performance on a standardized test of verbal achievement was not explained by school characteristics and resources such as per-pupil expenditures, number of books in the library, and student-teacher ratio. That is, despite the great diversity of school facilities, curricula, and resources, the variation in achievement between pupils in the same school was roughly four times as large as the variation between schools.[30] However, in a review article, Bowles and Levin[31] seriously question the validity of these results in the Coleman report on a number of grounds. Data are available in the present research on a number of school resources and curricular variables similar to those which were used in the Coleman report.

Thus, it should be possible to present additional evidence on the debate concerning the importance of school facilities and resources on student output.

a. Factors in the Community as Potential Sources of Climate Effects

Turning first to community characteristics as potential sources of climate effects, a number of "cultural" facilities can be summarily dismissed because they do not vary across communities: In every school students had access to a public community library; in fifteen of the twenty, "concerts" were readily available to them, and the same holds true for "community theatre" in sixteen of the twenty schools. Although the communities showed sufficient heterogeneity on four other cultural resources to justify consideration as potential sources of school environment effects -- museum, art gallery, opera and professional stage[32] -- investigation of these facilities failed to produce any consistent relationships with the climate measures and/or the dependent attributes. Thus, it is concluded that in the present sample the presence or accessibility of a number of community cultural facilities has no impact on the relationship of the educational climates of schools to students' academic performance, and therefore cannot be defended as sources of school environmental effects.[33]

However, one community level factor which does appear to function as a source of climate effects is the extent of involvement and interest by parents in school policies and in their children's academic performance. This variable is labelled "Parental Involvement in the High School" (P.I.H.S.) and consists of a summated binary rating scale constructed from three items <u>in the teacher questionnaire</u>.[34] The relevant summary statistics for the scale are given in Table 5, and they show a high reliability coefficient for a measure containing such a limited number of items. This attribute is introduced as an indicator

Table 5 here

of the extent to which norms and values regarding academic excellence in the school are shared by the parents and thus the community or neighborhood served by the school. The underlying proposition is that the more prevalent these norms and values the more likely the school is to develop an atmosphere which encourages students to higher achievement and educational aspirations. The data of Table 6 lend support to this proposition. School ranks on P.I.H.S. are

Table 6 here

significantly and strongly correlated in a positive direction with their ranks on factor scores for each of the six dimensions of school climate.

In introducing P.I.H.S. into the analysis as a potential climate source variable the schools were ranked according to their median values and then dichotomized at the median of the distribution. Table 7, based on data from a representative ten percent sub-sample of the students in each school (N=2,053), indicates that P.I.H.S. has a substantial effect on MATH achievement and college plans of individual students.[35] Thus it meets the first criterion as a source of climate effects.

Table 7 here

Table 8 shows the effects of P.I.H.S. on the two dependent attributes for the entire sample of students with the effects of ability and father's

Table 8 here

education removed. Controlling these two attributes reduces the effect parameter about fifty percent as compared to those in Table 7, but the impact of P.I.H.S. is still statistically significant and substantively meaningful. Thus P.I.H.S.

meets the second criterion as a climate source variable.

Tables 9 and 10 offer further evidence that P.I.H.S. is functioning as a source of the climate effects on both dependent attributes. First, the effects of the climate dimensions on both dependent attributes, with

Tables 9 and 10 here

ability and father's education controlled, tend to disappear when P.I.H.S. is introduced as an additional control. In fact, none of the climate effects in either of the two tables is statistically significant at the .01 level. On the other hand, the significant effects of P.I.H.S. on MATH and college plans persist with the climate dimensions controlled.[36]

A discussion of the substantive importance of P.I.H.S. as a source variable will be postponed until a number of other potential sources have been considered. However, it should be noted here that these results are consistent with those of a recent large scale study by Gross, et al.,[37] on a number of correlates of the "academic productivity" of urban elementary schools. One of the variables most positively correlated with the criterion was the faculty's assessment of the extent of parental interest in the academic performance of their children.

b. Resources and Organizational Properties of Schools as Sources of School Climates

As noted above, one of the most controversial findings of the Coleman report is that economic resources of schools explained only a very small proportion of variance in the verbal achievement of children. Bowles and

Table 5

Items and Summary Statistics for the Scale of Parental Involvement in the High School

| Items | Percentages[a] |
|---|---|
| 1. Most parents in this school are apathetic to school policies. (F) | 68.3 |
| 2. Parents of students here seem interested in their children's progress. (T) | 83.4 |
| 3. Parents often ask for appointments with teachers to discuss their children's school work. (T) | 66.7 |
| Scale Reliability = .64 | |

[a]Percentages are those of the 100% sample of teachers (N=1,029) answering each item in the keyed direction shown in parentheses to the right of the item.

[b]Estimate of scale reliability was obtained from the KR-20 formula.

Table 6

Spearman Rank-Order Correlations Between P.I.H.S. and Six Climate Demensions for Twenty Schools

| Climate Dimensions | $r_s$ with P.I.H.S. |
|---|---|
| I Academic Emulation | .79[a] |
| II Intell.-Esthet. | .62[a] |
| III Cohesive and Egalitarian Estheticism | .78[a] |
| IV Scientism | .68[a] |
| V Humanistic Excellence | .76[a] |
| VI Academically Oriented Status System | .48[b] |

[a]Significant at the .01 level

[b]Significant at the .05 level

Table 7

Zero-Order Dichotomized Effects of P.I.H.S. on MATH Achievement and College Plans[a]

| Independent Attribute | Dependent Attributes | |
|---|---|---|
| | MATH Achievement | College Plans |
| P.I.H.S. | .194 | .193 |

[a]Results are based on a representative ten percent sub-sample of the students in each school (N = 2,053). Both effect estimates are significant at the .01 level.

Table 8

Effects of P.I.H.S. on Math Achievement and College Plans with Ability and Father's Education Simultaneously Controlled[a]

| Independent Attribute | Dependent Attributes | |
|---|---|---|
| | MATH Achievement[b] | College Plans[c] |
| P.I.H.S. | .099 | .111 |

[a]Results are based on total sample of students, not the ten percent sub-sample. Both weighted effect parameters are significant at the .01 level.

[b]The effects of father's education and ability on MATH achievement are .133 and .320, respectively.

[c]The effects of father's education and ability on college plans are .216 and .175, respectively.

Table 9

Independent Effects of Climate Dimensions, P.I.H.S., ABILITY, and Father's Education on MATH Achievement[a]

| Climate Dimensions | Weighted Effects of Climate Dimensions | Weighted Effects of P.I.H.S. | Weighted Effects of Student's Ability | Weighted Effects of Father's Education |
|---|---|---|---|---|
| I Academic Emulation | * | * | * | * |
| II Intell.- Esthet. | -.006[c] | .103 | .320 | .132 |
| III Cohesive and Egalitarian Esthet. | .016[c] | .092 | .319 | .131 |
| IV Scientism | .022[b] | .093 | .320 | .130 |
| V Humanistic Excellence | .007[c] | .095 | .319 | .132 |
| VI Academically Oriented Status System | .000[c] | .098 | .319 | .134 |

[a]Results are based on total sample of students, not the ten percent sub-sample. All effect parameters are significant at the .01 level unless otherwise noted.

[b]Significant at the .05 level.

[c]Not significant at the .05 level.

*The relationship between P.I.H.S. and Climate Dimension I is sufficiently pronounced that there are no schools low on P.I.H.S. and high on Academic Emulation. Consequently, the effects of P.I.H.S. on MATH with Academic Emulation, ability, and father's education simultaneously controlled cannot be computed. Conversely, the effects of Academic Emulation on MATH with P.I.H.S., ability, and father's education simultaneously controlled cannot be calculated. (As shown in Table 6, the rank correlation between median school scale scores on P.I.H.S. and factor scores on Academic Emulation is .79.)

Table 10

Independent Effects of Climate Dimensions, P.I.H.S., Ability, and Father's Education on College Plans[a]

| Climate Dimensions | Weighted Effects of Climate Dimensions | Weighted Effects of P.I.H.S. | Weighted Effects of Student's Ability | Weighted Effects of Father's Education |
|---|---|---|---|---|
| I Academic Emulation | * | * | * | * |
| II Intell.-Esthet. | -.018[c] | .143 | .175 | .216 |
| III Cohesive and Egalitarian Esthet. | -.011[c] | .115 | .173 | .219 |
| IV Scientism | -.009[c] | .107 | .176 | .215 |
| V Humanistic Excellence | -.021[b] | .119 | .174 | .219 |
| VI Academically Oriented Status System | -.012[c] | .110 | .174 | .217 |

[a]Results are based on total sample of students, not the ten percent sub-sample. All effect parameters are significant at the .01 level unless otherwise noted.

[b]Significant at the .05 level.

[c]Not significant at the .05 level.

*The relationship between P.I.H.S. and Climate Dimension I is sufficiently pronounced that there are no schools low on P.I.H.S. and high on Academic Emulation. Consequently, the effects of P.I.H.S. on college plans with Academic Emulation, ability, and father's education simultaneously controlled cannot be computed. Conversely, the effects of Academic Emulation on college plans with P.I.H.S., ability, and father's education simultaneously controlled cannot be calculated. (As shown in Table 6, the rank correlation between median school scale scores on P.I.H.S. and factor scores on Academic Emulation is .79.)

Levin are highly critical of this finding, arguing that the measurement of variables and statistical techniques used are "biased in a direction that would dampen the importance of school characteristics."[38] For example, they contend that the measure of per-pupil expenditure used is biased in that it was averaged for an entire school district and therefore did not reflect the variation among schools within a system. They also indicate that further analysis by them of data in the Coleman report leads to the implication that another measure of economic resources of schools -- teachers' salaries -- is positively related to student achievement. Fortunately, rigorous measures of these two variables are available for each of the twenty schools in the present investigation -- average per-pupil expenditure and annual starting salaries for teachers. These data permit the consideration of these two variables as climate sources, which can provide further evidence on this important controversy. It should be emphasized that the twenty schools show a great deal of variation on these two characteristics; per-pupil expenditure ranges from $365 to $1,000 per year, and starting salaries for teachers vary $1,000. Consequently, any failure of these two measures of capital investment to account for variation in climate effects could not be explained in terms of restricted range.

Table 11 presents the zero-order effect parameters of these two characteristics on the dependent attributes for the representative ten percent sub-sample of students. Both input resources can be eliminated as sources of

Table 11 here

climate effects since neither is significantly related to the two dependent attributes. Thus, Bowles' and Levin's criticisms of the Coleman report notwithstanding, the results for the twenty schools in this sample certainly do not contradict the conclusion of the Coleman report that the variance in achievement

which is accounted for by a school facilities measure (which included per-pupil expenditure) is of little consequence.[39]

Ten different formal organizational properties of the schools were also examined as possible sources of climate effects. Three facilities measures were dismissed immediately because the schools do not show sufficient variation on them. These were

(1) Use of teaching machines as instructional devices[40]

(2) Volumes in school library[41]

(3) Percentage of students on half-day sessions (i.e., double shifts)[42]

Table 12 lists seven curricular and facilities characteristics on which the schools were sufficiently heterogeneous to permit their consideration as climate sources. Each of these characteristics is based on a single-item indicator in the Principal's Questionnaire. The zero-order effect parameters

Table 12 here

for each of these characteristics on both dependent attributes for the ten percent sample are also given. (Whenever there is sufficient heterogeneity across schools on these characteristics, their effects are based on quartile ranks standardized to dichotomous form.)

Three of the characteristics (average size of math and science classes, average size of classes in non-science courses, and homogeneous grouping of students by ability) are not related at the .05 level to either dependent attribute. (The effects of class size in non-science areas are not in the "expected" direction.) The failure of the two measures of class size to have appreciable predictive power on MATH achievement is highly consistent with

Table 11

Zero-Order Effects of Per-Pupil Expenditure and Annual Starting Salary for Teachers on MATH Achievement and College Plans

| Independent Attributes | Dependent Attributes | |
|---|---|---|
| | MATH Achievement | College Plans |
| Per-Pupil Expenditure | -.008[b] | .054[b] |
| Teachers' Salaries | .008[b] | .016[b] |

[a]Results are based on a representative ten percent sub-sample of the students in each school (N=2,053). All effect estimates are unweighted and obtained from school quartile ranks standardized to dichotomous form.

[b]Not significant at the .05 level.

Table 12

Zero-Order Effects of Seven Curricular and Facilities Characteristics of Schools on MATH Achievement and College Plans[a]

| Independent Attributes | Dependent Attributes | |
|---|---|---|
| | MATH Achievement | College Plans |
| Size of Math and Science Classes[b] | -.058[e] | -.002[e] |
| Size of Classes in non-Science Courses[b] | .023[e] | .032[e] |
| Accelerated Curriculum for Superior Students[c] | .065[d] | .065[d] |
| Opportunity to Obtain Advanced Placement and/or Credit in College[c] | .105 | .114 |
| Homogeneous Grouping of Students by Ability[c] | -.032[e] | -.041[e] |
| Acceleration Policy for Graduation[c] | .142 | .149 |
| Percentage of Teachers with More than Bachelor's Degree[b] | .076 | .124 |

[a]Results are based on a representative ten percent sub-sample of the students in each school (N=2,053). All effect estimates are significant at the .01 level unless otherwise noted.

[b]Effect estimates for these attributes are unweighted and obtained from school quartile ranks standardized to dichotomous form.

[c]Effect estimates for these attributes are unweighted and obtained from dichotomies, not school quartiles.

[d]Significant at the .05 level.

[e]Not significant at the .05 level.

Project TALENT results[43] which used average MATH scores for schools as the unit of analysis and those of the Coleman report[44] which used verbal achievement scores of students as the unit. Bowles and Levin[45] are highly critical of Coleman's conclusion on this point because they feel the measure of pupil-teacher ratio he used, which was obtained by dividing school enrollment by number of students, is an inadequate measure of class size given the fact that unpublished data in the Coleman report suggest great heterogeneity in teaching loads within schools. Nevertheless, the results of the Coleman report, Project TALENT, and the present investigation are consistent with the general conclusion of numerous studies at both the high school and college levels to the effect that class size shows no clear relationship to learning.[46] Furthermore, at the elementary level the evaluation of the More Effective School Program in New York City for disadvantaged students (with one of its most distinguishing characteristics being small classes) has failed to show greater academic growth for these students than for the students in the control schools where there were substantially larger student/teacher ratios and larger average class sizes.[47]

The non-significant effects of homogeneous ability grouping are also in the direction opposite to that predicted by the rationale typically offered by educators who advocate this mode of classroom organization: Teachers can achieve better academic results when teaching a group of students who are relatively similar in learning ability. The measure of ability grouping in this study is admittedly weak because it is based on a single item indicator which classified the schools into two crude categories -- those which have grouping for "many" or "all" courses and those which utilized it

for only a "few" or "no" courses. However, the results using this measure are consistent with the findings of the most rigorous and comprehensive study of ability grouping ever undertaken. This is the experimental investigation of elementary school children in New York City recently completed by Goldberg, Passow, and Justman, which produced the following generalization:

> "The general conclusion which must be drawn from the findings of this study and from other experimental grouping studies is that, in predominantly middle-class schools, narrowing the ability range in the classroom on the basis of some measure of general academic aptitude will, by itself, in the absence of carefully planned adaptations of content and method, produce little positive change in the academic achievement of pupi at any ability level." [48]

The four remaining characteristics in Table 12 have significant effects in the expected direction on both dependent attributes, and Table 13 presents the effects of these four on the dependent attributes for the total sample of students with ability and family SES both controlled. A comparison of these data with those of Table 12 indicates that although all four characteristics

Table 13 here

exert a significant effect on MATH (and the same holds true for two of them with respect to college plans), much of their apparent explanatory power is attributable to family status and ability level of students. Consequently they have only very limited substantive influence on students' academic behavior.[49] The one exception to this statement is the effect of teachers' educational level on college plans and to a lesser extent on their MATH performance. The level of formal education of teachers may be viewed as one indicator of the academic competence of the staff, a variable which previous research has shown to be related to student performance.[50]

Rather than presenting several tables which show (a) the independent

Table 13

Summary Effects of Four Dichotomized Curricular and Facilities Characteristic of Schools on MATH Achievement and College Plans with Father's Education and Scholastic Ability Simultaneously Controlled[a]

| Independent Attributes | Weighted Effects of Independent Attributes on MATH[b] | Weighted Effects of Independent Attributes on College Plans[c] |
|---|---|---|
| Accelerated Curriculum for Superior Students | .020 | .028 |
| Opportunity to Obtain Advanced Placement and/or Credit in College | .043 | -.003[d] |
| Acceleration Policy for Graduation | .032 | -.017[d] |
| Percentage of Teachers with More than B.A. Degree | .046 | .083 |

[a]Results are based on total sample of students, not the ten percent sub-sample. All effect parameters are significant at the .01 level unless otherwise noted.

[b]Father's education and ability have approximately constant effects on MATH with each of the four independent attributes controlled. The effects of father's education vary from .142 to .151 and those of ability from .325 to .327.

[c]Father's education and ability have approximately constant effects on college plans with each of the four independent attributes controlled. The effects of father's education vary from .237 to .243 and those of ability from .178 to .184.

[d]Not significant at the .05 level.

effects of each of the four curricular and facilities measures listed in Table 13 on the two dependent attributes when the climate dimensions, father's education, and ability are simultaneously controlled and (b) the independent effects of each of the climate dimensions on the dependent attributes with each of the four curricular measures, father's education and ability simultaneously controlled, the important results may be summarized as follows.

(1) The small, statistically significant effects of accelerated curriculum on college plans (in Table 13) disappear when each of the six climate dimensions is held constant. However, the effects of each of the climate dimensions are unaffected by controlling accelerated curriculum.

(2) The significant effects of educational level of teachers on college plans are unaffected by controlling each climate dimension. Likewise, the effects of each climate dimension are almost totally independent of the educational level of faculty.

(3) The small, significant effects of accelerated curriculum on math performance disappear when each of the climate dimensions is controlled. On the other hand, the effects of the six climate dimensions on MATH are not reduced when accelerated curriculum is held constant.

(4) The statistically significant effects of advanced placement in college on MATH scores disappear when Climate Dimensions II, III, V, and VI are held constant; although they remain statistically significant when Dimensions I and IV are controlled, they are reduced by approximately fifty percent. On the other hand, the effects of each climate dimension

on MATH are reduced only a minute amount when the effects of advanced college placement are removed.

(5) The small, statistically significant effects of an acceleration policy for graduation on MATH disappear when each of the six climate dimensions is controlled. However, the effects of all the climate dimensions remain almost totally intact when graduation policy is controlled.

(6) In general, the effects of average educational level of teachers on MATH remain intact when each climate dimension is held constant. Likewise, the influence of each factor dimension on MATH is not appreciably reduced when teachers' educational level is controlled.

These findings, taken together, strongly suggest that none of these four organizational properties of schools is an important source of variation in climate effects on students' academic behavior since controlling them has no appreciable influence on the magnitude of the relationships between the six climate dimensions and the dependent attributes. However, controlling the effects of the climate dimensions tends to result in the disappearance of the limited effects of these characteristics on the dependent attributes. The one exception to this generalization is the effect of teachers' educational level on both MATH achievement and college plans.

Perhaps the small effects of curricular and facilities characteristics on achievement and educational plans are a consequence of variation in community involvement and interest in academic excellence of the schools. That is, schools located in neighborhoods or communities with a strong social

commitment to quality education for their children are more likely to institute pedagogical innovations and to attract highly competent teachers than communities lacking such a social investment in the quality of education. Although there are no comprehensive measures of community interest available in the present study to test such a proposition, the scale measuring parental involvement in the high school, P.I.H.S., can serve as an indicator of this phenomenon. To test the proposition adequately would require a protracted longitudinal study of communities and their schools rather than the cross-sectional approach employed here. However, a necessary condition for the proposition to have validity is that there be positive correlations between these curricular and resource characteristics of the schools and P.I.H.S. Table 14 shows that such is the case: Each of the four organizational characteristics has a significant relationship with P.I.H.S. Of course, it is possible that P.I.H.S. is generated by school policy and quality and is, therefore, a consequence of such characteristics rather than a source of them. However, it seems, for example, more plausible to argue that competent

Table 14 here

teachers (as indicated by level of formal education) are attracted to schools in communities where the residents (especially the parents) and school officials are socially committed to quality education than the converse.[51] Of course, each of these statements is undoubtedly an oversimplification of the complex causal process involved, with a two-dimensional or "feedback" causal relationship being more accurate.[52]

More evidence to suggest the validity of the argument that the extent of the collective parental and community support is one source of variation

in the small influence of various indicators of curriculum and facilities on students' achievement and educational plans is found in Table 15 which is identical to Table 13 except that P.I.H.S. is also held constant. A comparison of the effect parameters in the two tables indicates that holding

Table 15 here

constant P.I.H.S. (1) "washes out" the small effects of an acceleration policy for graduation on MATH achievement, (2) reduces the small effects of advanced college placement on MATH scores, and (3) reduces the small effects of teachers' education on MATH to a point of little substantive significance even though the parameter remains statistically significant.

In sum, the extent of parental and community interest in the school functions generally as a factor accounting for the small net impact of curriculum and facilities on academic behavior of students.

Table 14

Product-Moment Correlations of Four Curricular and Facilities Characteristics of Schools with PIHS

| School Characteristics | P.I.H.S.[a] |
|---|---|
| Accelerated Curriculum for Superior Students[b] | .423[b] |
| Opportunity to Obtain Advanced Placement and/or Credit in College | .494[b] |
| Acceleration Policy for Graduation | .635[c] |
| Percentage of Teachers with More than B.A. Degree | .470[b] |

[a]Measured by the median score for the school on the three-item scale.

[b]Significant at the .05 level

[c]Significant at the .01 level

Table 15

Summary Effects of Four Dichotomized Curricular and Facilities Characteristics of Schools on MATH Achievement with Father's Education, Scholastic Ability, and P.I.H.S. Simultaneously Controlled[a]

| Independent Attributes | Weighted Effects of Independent Attributes on MATH[b] | Weighted Effects of Independent Attributes on College Plans[c] |
|---|---|---|
| Accelerated Curriculum for Superior Students | * | * |
| Opportunity to Obtain Advanced Placement and/or Credit in College | .031 | ** |
| Acceleration Policy for Graduation | .018[d] | ** |
| Percentage of Teachers with More than B.A. Degree | .026 | .061 |

[a]Results are based on total sample of students, not the ten percent sub-sample. All effect parameters are significant at the .01 level unless otherwise noted.

[b]The effects of father's education, ability, and P.I.H.S. on MATH are almost invariant with each of the three independent variables controlled in this column. The effects of father's education vary from .128 to .132, those of ability from .316 to .319, and those of P.I.H.S. from .092 to .097.

[c]The effects of father's education, ability, and P.I.H.S. with the measure of teachers' level of education controlled are .217, .171, and .096, respectively.

[d]Not significant at the .05 level.

*The positive relationship between accelerated curriculum and P.I.H.S. is sufficiently pronounced that there are no schools with an accelerated curriculum and low on P.I.H.S. Consequently, the effects of the former attribute on MATH and college plans with P.I.H.S., father's education, and ability simultaneously controlled cannot be computed.

**Effects of these independent attributes on college plans were not computed because there is no significant relationship between them and college plans with ability and father's education simultaneously controlled. (See Table 13.)

## Educational Implications of Findings on Sources of Climate Effects

The results of the preceding section, indicating that the critical factor in explaining the impact of the high school environment on the achievement and educational aspirations of students is the degree of parental and community interest in quality education, would appear to have policy implications. The results seem to support a plea recently made by the U.S. Commissioner of Education:

> "In all communities--rural and suburban, but especially inner-city--the principal needs to take the initiative in tailoring his school to the character of the community. He needs to solicit parent participation and to help parents understand what kinds of contributions they can make. The principal ought to be welcoming parents and letting them see how the school is run and explaining to them its policies and programs. He should at the same time be converting the school into a community resource that offers adults a center for community activities, for instruction in practical subjects as well as leisure-time activities."[53]

At present there are innovations underway in different geographical regions of the type advocated by the Commissioner--innovations which need to be carefully evaluated over long periods by educational researchers for their potentially positive benefits. The results of the present investigation suggest that these innovations, if kept free of racial tensions, might set in motion the feedback mechanism of "parental involvement - intellectually viable school environment" discussed above.

One such innovation is the "Community School" which is designed to serve as a community service center where neighborhood residents may obtain health services, counseling services, legal aid, and employment information. In short, the school is conceived as one of the prime loci of community or neighborhood life.[54]

A concept, related to the community school, is the proposed experimental program "Family Opportunities for Reaching Goals through Education" (FORGE), currently being designed by the Office of Special Programs, Franklin and Marshall College, Lancaster Pennsylvania.[55] Under this proposed program, poverty neighborhoods and their accompanying schools would be defined and then used as the basic units of the program. The purpose of the program is to encourage the parents of selected elementary school children to become closely involved in their children's education and their local schools. In addition to long-term advisory and support services, the project staff would guarantee total first-year college expenses for each child accepted by a college upon completion of high school. The primary locus of the program would be the neighborhood under the leadership of a resident director. His chief responsibilities would be to provide long-term advice and counsel to parents regarding resources and limitations of neighborhood schools, to promote student and parental involvement in the schools' policies and programs, and to counsel students individually regarding their educational needs and how they can be met. Hopefully, such a program would create the intellectual and social camaraderie between schools and families which appears to be the hallmark of schools with strong academic climates.

As documented by Bloom in his major work, Stability and Change in Human Characteristics,[56] highly consistent home environments have more potent effects on cognitive development than those lacking internal consistency. He generalizes this to the relationship between schools and homes: School and home environments which are mutually reinforcing are

likely to achieve greater academic growth of students than those lacking such consistency.[57] It would seem that "community schools" and similar organizational innovations in public institutions could perhaps be one mechanism for obtaining support from parents which in turn could provide data for both parents and school officials to achieve consistency between the two environments.

## CONCLUSIONS

In their summary of the follow-up study of Project TALENT high school seniors in 1963 who were 9th graders in the original survey in 1960 (conducted by Shaycoft[58]) the authors conclude that there is a substantial amount of academic growth by students during the high school years and that the schools are of importance in accounting for varying rates of growth. They state:

> "In summary, schools do vary in effectiveness, but the specific school characteristics that produce results are somewhat elusive. One reason they are so resistent to identification may be that they are elusive inherently, not just in the present context. In other words, one of the crucial differences between an effective school and an ineffective one may be something as vague as the school's atmosphere (italics supplied). A school may provide an atmosphere where the motivation to learn is stimulated or it may provide one that produces students whose goal is to 'get by.' This sort of information cannot be gathered through a questionnaire survey."[59]

The present authors find themselves in agreement with the first of the two major points in the above quote. The evidence from the present research indicates that the educational and social environment of the school does have a moderate effect on the academic behavior of students. However, they cannot accept the second point that adequate measures of school environment cannot be obtained through survey techniques. At the college level there is a substantial body of research--based to a considerable extent on survey techniques--focusing on the kinds of college environments which are conducive to academic achievement and aspirations. The results on climate effects presented in this paper are consistent with the general tenor of findings from other studies at both the high school

and college levels using both survey techniques and other approaches such as the interview and both participant and non-participant observation.[60] Of course, none of the studies to date has presented conclusive information on the nature of the academic environment of school which would form the basis for incontrovertible policy prescriptions to school administrators as how to promote particular types of cognitive development in students. Nevertheless, the results of this and other recent studies offer substantial evidence that there are "over-achieving" and "under-achieving" schools. They point also to the need for more intensive studies of such deviant institutions. Such research should produce, in the foreseeable future, systematic evidence on "the realities of the teaching-learning process as they actually are and as they might be."[61]

## FOOTNOTES

[1]Benjamin S. Bloom, "Stability and Change in Human Characteristics: Implications for School Reorganization," Educational Administration Quarterly, 2 (Winter 1966), pp. 35-49.

[2]For a list of references which present extensive reviews of research in this area, see Edward L. McDill, Edmund D. Meyers, Jr., and Leo C. Rigsby, "Institutional Effects on the Academic Behavior of High School Students," Sociology of Education, 40 (Summer 1967), pp. 181-182.

[3]Bloom, op. cit., p. 47.

[4]In order to demonstrate contextual effects on the behavior of individual students it is necessary to separate the consequences of school conditions from those of the individual's own characteristics for his behavior. Stated differently, one has to demonstrate an impact of school environment on the dependent variables with individual "input" factors such as scholastic aptitude, family socio-economic status, and their internalized academic orientations controlled. These three variables are among the most important predictors of academic achievement and educational plans. Furthermore, to isolate a contextual effect requires that a relationship between the group level attribute and a dependent attribute at the individual level be demonstrated while the corresponding characteristic for individuals is controlled. In this study, students' academic orientations or values are used as the individual counterpart of the measure of school environment. For an explication of the logic and methodology underlying contextual analysis, see James S. Coleman, "Relational Analysis: The Study of Social Organization

with Survey Methods," Human Organization, 17 (1958), pp. 28-36 and Peter H. Blau, "Structural Effects," American Sociological Review, 25 (1960), pp. 178-193.

[5]More extensive presentations of the method are found in Edward L. McDill, Edmund D. Meyers, Jr., and Leo C. Rigsby, Sources of Educational Climates in High Schools. Final Report to the Office of Education, U. S. Department of Health, Education, and Welfare under Contract OE-3-10-080, December, 1966.

[6]The schools were chosen with the goal of obtaining considerable variation on (1) various "output" measures such as college-going and achievement levels and (2) a number of "input" measures, such as I.Q. and socio-economic composition and (3) demographic and social factors which were expected to relate to school climates.

[7]Robert Pace and George G. Stern, "An Approach to the Measurement of Psychological Characteristics of College Environments," Journal of Educational Psychology, 49 (1958), pp. 269-277.

[8]George G. Stern, "High School Characteristics Index," in Scoring Instructions and College Norms. Syracuse: Psychological Research Center, Syracuse University, 1963.

[9]"Press" refers to the characteristic emphases or pressures of an environment as perceived by the collectivity of informants who constitute its membership.

[10]John C. Flanagan, et al., Project TALENT, Studies of the American High School. Monograph No. 2, University of Pittsburgh, 1962, p. 5-6.

[11]A National Longitudinal Study of American Youth, Bulletin #6, Project TALENT, American Institutes for Research, Pittsburgh, April 1967. Specifically, 80% of the variance in the AR test was invariant during the high school years. See Marion F. Shaycoft, Project TALENT, The High

School Years: Growth in Cognitive Skills. American Institutes for Research and School of Education, University of Pittsburgh, 1967, p. 6-30.

[12]More complete descriptions of these two academic tests may be found in John T. Dailey and Marion F. Shaycoft, Types of Tests in Project TALENT, U. S. Department of Health, Education, and Welfare, Office of Education, Cooperative Research Monograph No. 9. Washington: U.S. Government Printing Office, 1961. The reliability coefficients, based on the KR-20 formula, for the various grade-sex groups are comparable to those in the 1960 Project TALENT survey. In the present research the mean internal consistency coefficients for the AR and MATH tests are .653 and .847, respectively.

[13]For a systematic treatment of this problem, see McDill, Meyers, and Rigsby, op. cit., 1966, pp. III-17 through III-27.

[14]Hanan C. Selvin and Warren O. Hagstrom, "The Empirical Classification of Formal Groups," American Sociological Review, 28 (1963), pp. 399-411.

[15]Aggregative characteristics are summarizing measures based on smaller units (in this case individuals) within formal groups.

[16]William H. Sewell and J. Michael Armer, "Neighborhood Context and College Plans," American Sociological Review, 31 (1966), pp. 159-168, and McDill, Meyers, and Rigsby, op. cit., 1967.

[17]Ibid., p. 187 (Table 2).

[18]Harry H. Harman, Modern Factor Analysis. Chicago: The University of Chicago Press, 1960, p. 177 and William W. Cooley and Paul R. Lohnes, Multivariate Procedures for the Behavioral Sciences. New York: John Wiley & Sons, Inc., 1962, p. 172.

[19]For a discussion of the problem of statistical artifacts in contextual research and suggestions for ways to cope with these problems see

Arnold S. Tannenbaum and Gerald G. Bachman, "Structural versus Individual Effects," The American Journal of Sociology, LXIX (1964), pp. 585-595. The multivariate technique is a modified version of Coleman's stochastic model for the multivariate analysis of attribute data. See James S. Coleman, Introduction to Mathematical Sociology. London: The Free Press of Glencoe, 1964, Chapter 6. Boyle, by slightly modifying Coleman's technique, has demonstrated that it yields parameters for the effects of dichotomous independent attributes on dichotomous dependent attributes which are mathematically equivalent to unstandardized regression coefficients obtained from multiple regression of dummy variables. (See Richard P. Boyle, "Causal Theory and Statistical Measures of Effect: A Convergence," American Sociological Review, 31, 1966, pp. 843-851.) The model has been formally extended by Coleman to make it applicable to the case of polytomous independent attributes, either ordered or unordered, on dichotomous dependent attributes. The analogy to multiple regression analysis is approximate for polytomous attributes, however. Nevertheless, Boyle has shown that the procedure yields effect parameters which are close estimates of the coefficients obtained from multiple regression analysis of dummy variables which are polytomous.

The following classification scheme was used for the variables. (The primary criterion dictating the classification was to retain a sizable number of cases in each cell of the tables which are used in the multivariate analysis. This procedure results in highly reliable estimates of the effect parameters of each independent attribute on the dependent attributes.) Father's education was divided into four categories, approximating a quartile classification. Raw scores on the AR and MATH tests were standardized (using the C-scale technique) by grade and sex since there were systematic differences

in performance by each sex and grade category. The standardized scores for the AR tests were then collapsed into the four categories which made the number of cases in each of them as near equal as possible. The distribution of scores on the scale measuring students' achievement orientations was also divided into approximately equal quartiles. The two dependent attributes were dichotomized as follows. Students who indicated that they planned to enroll as a full time student in college immediately upon completion of high school were classified as having college plans. All other students were considered as not having firm intentions. For the other attribute, standardized scores on the MATH test were dichotomized as closely as possible to the median. Finally, the contextual measures were dichotomized. This was accomplished by ranking the schools on each contextual dimension and then collapsing them as closely as possible to the median. Obviously, a larger number of categories for all contextual variables would have resulted in more precise measurement of the characteristics. However, use of more refined categories was not feasible because in the analysis presented in a later section the measures of school climate and some of the potential sources of school climate effects are introduced simultaneously. The relationships among these characteristics are sufficiently pronounced that using a larger number of categories would have resulted in empty cells in the tables and produced unreliable effect parameters.

[20]Coleman, op. cit., 1964, pp. 218-219, presents a formula for standardizing effect parameters for polytomous, ordered, independent attributes to make them comparable to measures of effect for dichotomous attributes. However, for such adjusted effect parameters to be identical to those obtained from actual dichotomies, the sample has to be rectangularly distributed over the ordered polytomous categories. In all tables in this paper the effect

parameters for polytomous independent attributes are standardized to dichotomous form.

[21]Sarane S. Boocock, "Toward a Sociology of Learning: A Selective Review of Existing Research," Sociology of Education, 39 (1966), pp. 27-32 and p. 41. For the present sample it should be noted that in nineteen of the twenty schools, both "leadership in activities" and "athletics" ("cheerleader for girls") are viewed as more important for status among other students than "high grades." Furthermore, in all of the twenty schools, both leadership in activities and athletics are considered more important for prestige than "knowing a great deal about intellectual matters." With such evidence it is obvious that the label "Academically Oriented Status System" is not applicable to any of the twenty schools in absolute terms, but only relative to each other. These results are consistent with those of Coleman in The Adolescent Society: In each of the ten high schools he studied, scholastic achievement was less valued by students than other activities such as athletics, popularity, and leadership in activities. See James S. Coleman, The Adolescent Society. New York: The Free Press of Glencoe, 1961.

[22]An excellent summary of this research is found in David E. Lavin, The Prediction of Academic Performance. New York: Russell Sage Foundation, 1965, Chapter 4, who notes that the correlation is higher at the high school level than at the college level which can be explained by the more restricted range of ability of college students. Lavin estimates, based on his survey of the literature, that the average zero-order correlation between ability and grades for high school students is .60. In the present research, the zero-order, product-moment correlation between AR scores and MATH scores is .52.

[23]There are only five variables with significant loadings on Factor IV. These variables with their loadings are as follows: student perceptions of faculty press for scientism (.901), student perceptions of student press for scientism (.735), faculty perceptions of faculty press for scientism (.883), faculty perceptions of student press for scientism (.756), and faculty perceptions of faculty press for independence (.628). This latter variable is conceptually consistent with a strong emphasis on scientism since it measures the extent of teachers' encouragement of independent and creative work by students.

[24]John A. Michael, "High School Climates and Plans for Entering College," Public Opinion Quarterly, 25 (1961), p. 594.

[25]Elbridge Sibley, "Some Demographic Clues to Stratification," American Sociological Review, 7 (1942), p. 330. One could argue that a comparison of college plans of high school students with actual college attendance is tenuous since an unknown number of students are unrealistic about enrolling in college in their responses to the item in the questionnaire. However, the measure of college plans employed here seems not to be an invalid indicator of college attendance: Only those students with definite plans to enroll immediately after graduation from high school were classified as having definite plans. Those who gave any of the following responses were categorized as not planning to attend: "no, never;" "yes, but not right after high school;" "yes, as a part-time student right after high school;" and "undecided." A comparison in each school of the percentage of the preceding year's graduates who attended college did not yield any substantial differences when compared with the percentage of seniors in this sample who had definite college plans. In a study of Wisconsin high school

students it was shown that more than 90% of the seniors with college plans actually enrolled in college the following year. These results are reported in J. Kenneth Little, A State-Wide Inquiry into Decisions of Youth About Education Beyond High School. Madison, Wisconsin: School of Education, 1958. (Cited in William H. Sewell, "Community of Residence and College Plans," American Sociological Review, 29 (February 1964), p. 26.

[26]The other potential measure of family SES available in the data--annual family income--could not be used because more than 38 percent of the students were unable to provide reliable responses to the questionnaire item dealing with this family attribute.

[27]Boocock, op. cit., p. 38. For example, Coleman, op. cit., 1961, p. 65, found no relationship between per-pupil expenditure and achievement in ten Illinois high schools when ability of students was controlled. He also cites a state-wide study of Connecticut high school students which failed to reveal such a relationship when ability was controlled. Finally, at the college level he cites (p. 329) results from the classic study by R. H. Knapp and H. B. Goodrich, Origins of American Scientists. Chicago: University of Chicago Press, 1952, which revealed that the undergraduate institutions which were most productive of scientists were not the most affluent colleges. One large scale study which showed sizeable relationships between community characteristics and test scores was William G. Mollenkopf and Donald Melville, A Study of Secondary School Characteristics as Related to Test Scores. Princeton, New Jersey, Educational Testing Service, 1956 (mimeographed). However, as noted by Boocock, op. cit., his findings are questionable since the response rate from principals was less than 50%.

[28]James S. Coleman, et al., Equality of Educational Opportunity. Washington: U. S. Government Printing Office, 1966.

[29]Christopher Jencks, "Education: The Racial Gap," The New Republic (October 1, 1966), pp. 21-26, has made the unqualified statement that the report incorporates the most important piece of educational research conducted in recent years. On the other hand, Bowles and Levin challenge the adequacy of the data, the statistical analyses, and the validity of the interpretation of the findings. See Samuel Bowles and Henry M. Levin, "The Determinants of Scholastic Achievement--An Appraisal of Some Recent Evidence," The Journal of Human Resources, III (Winter 1968), pp. 3-24.

[30]Coleman, et al., op. cit., Chapter 3, 1966.

[31]Bowles and Levin, op. cit., 1968, pp. 8-12.

[32]All of the data on community resources considered thus far were obtained from items in the principal's questionnaire. These measures of the cultural or intellectual atmosphere of the community are crude in the sense that they are merely indicators of the presence or absence of such facilities. However, it is reasonable to assume that the quality of these facilities is positively correlated with a number of socio-economic resources of the school and/or community presented below for which ordinal or interval data are available, and which are shown not to be sources of climate effects on the dependent attributes. Thus, there is no reason to believe that data on the quality of these three facilities would produce different results as potential sources of school climate effects.

[33]Implicit in this conclusion is a statistical truism: For a given variable to be a source of the effects of climate dimensions on students' academic

behavior, the variable has to be related to both the climate dimensions and the dependent attributes.

[34]It is noteworthy that Neal Gross, et al., in a 1966 study of the correlates of academic productivity of urban elementary school pupils from low socio-economic backgrounds used a similar approach in constructing a contextual measure of parental interest in the academic performance of their children. (See Neal Gross, et al., "Some Sociological Correlates of the 'Academic Productivity' of Urban Elementary Schools with Pupils from Families of Low Socio-Economic Status." Paper presented at the American Sociological Association Meetings, Miami Beach, Florida, August 1966.) That is, the measure was based on an average of teachers' perceptions of parents' interest in their children's academic activities. The present authors were unaware of Gross' study when this analysis was undertaken.

[35]In the search for source variables, zero-order effects of such variables on the dependent attributes are based on this ten percent sub-sample in order to minimize computer costs, and the .05 level of significance is chosen as the one beneath which a relationship is discounted. For those potential source variables which show a significant relationship with the dependent attributes for the ten percent sample, the effects of such variables on the dependent attributes are then computed for the total population with ability and father's education simultaneously controlled. That is, no community or school characteristic can qualify as a source of climate effects unless the characteristic has a significant effect on a dependent attribute with the ability of the students and family SES both held constant.

[36]In fact, the positive effects of P.I.H.S. on college plans are slightly increased when climate components II, III, and V are controlled, and its effects on MATH are very slightly enhanced when Component II is held constant. Furthermore, in every instance in Table 10 and in one case in Table 9 the effects of the climate dimensions are slightly negative. No substantive significance is attached to the fact that in certain instances the effects of P.I.H.S. in Tables 9 and 10 are slightly larger than those of Table 8 and that in six instances out of ten in Tables 9 and 10 the climate effects acquire negative signs. In a recent scholarly article on multivariate techniques Robert Gordon explains how the distribution of the predictive values of two independent variables (as measured by regression coefficients) can be "tipped" or altered in favor of one or the other by changes in the correlations among a set of independent variables. See Robert A. Gordon, "Issues in Multiple Regression," The American Journal of Sociology, 73 (March 1968), pp. 610-611. The more highly correlated the predictors the more susceptible they are to being tipped. In fact, as the predictors become very highly correlated the tipping effect can take the following form: One of the regression coefficients assumes a negative value and the other a higher positive value even though the predictors and the dependent variable are all positively correlated at the zero-order level. Gordon also carefully documents how erroneous substantive conclusions can be reached from indiscriminate use of multiple regression and partial correlation procedures for explanatory variables which are highly correlated and not conceptually distinct. Certainly, in the present investigation P.I.H.S. and the climate constructs are both conceptually and operationally distinct.

[37]Gross, et al., op. cit.

[38]Bowles and Levin, op. cit., p. 8.

[39]Coleman, et al., op. cit., 1966, p. 312.

[40]None of the schools used teaching machines regularly "in many instances," and only four used them regularly "in a few instances."

[41]The adequacy of this measure of library facilities is open to question because the response alternatives for the question measuring library facilities were not presented in sufficient detail. A broader range of response categories would probably have produced sufficient variation for the characteristic to be considered as a source. However, in the Coleman report, op. cit., p. 316, which showed large variation in library facilities, it was shown that the number of volumes per student had only small and inconsistent relationships with verbal achievement for both Negroes and whites in different geographical regions. Furthermore, the Project TALENT survey, Flanagan, et al., op. cit., 1962, p. 6-14, produced correlations of only .203 and .253 between number of volumes in library and performance on comprehensive tests of mathematics achievement and reading achievement. It should be emphasized that these two correlations were based on school means, not on individual student scores. Only under most unusual circumstances can correlations based on individuals be as large as those based on schools, ibid., p. 5-1. Usually, in the Project TALENT survey the correlations based on school means were substantially larger.

[42]Only one of the twenty schools had half-day sessions.

[43]Flanagan, et al., op. cit., 1962, p. 6-17.

[44]Coleman, et al., op. cit., 1966, p. 312.

[45]Bowles and Levin, op. cit., 1968, p. 12. In both the Project TALENT survey and the present study the measures of class size in science and math and in non-science courses were based on responses to the following type of item: "What size is your average instructional class in science and math (non-science courses)?" Thus it is highly likely measures in both studies are "defective" in the manner described by Bowles and Levin.

[46]Boocock, op. cit., 1966, p. 11.

[47]David J. Fox, Expansion of the More Effective School Program. New York: Center for Urban Education, September 1967, p. 121. In this evaluation study, a distinction was made between average class size and pupil-teacher ratio (See p. A-1). The former was defined as number of pupils in school/ by number of organized classes whereas pupil-teacher ratio was obtained by dividing the number of students in school by the total number of authorized teaching positions. To obtain an indication of the large differences between the experimental and control schools on these two measures consider the following data for October, 1966, the termination date of the evaluation: The average class size in the control schools was 28.5 and only 20.1 for the More Effective schools. Pupil-teacher ratio in the former was 22.2 while only 12.3 in the latter.

[48]Mirriam L. Goldberg, A. Harry Passow, and Joseph Justman, The Effects of Ability Grouping. New York: Teachers College Press, 1966, p. 167. This conclusion is also supported at the national level by the results of Coleman, et al., 1966, p. 314, who found that ability grouping at the school level accounted for almost no variance in verbal achievement with family background of students controlled.

[49]These findings are in general accord with those of Coleman, et al., 1966, pp. 312-316. Twelve different characteristics of school facilities (similar to those considered in this section) accounted for only a small amount of variance in individual students' achievement when their family background differences were controlled.

[50]Coleman, et al., 1966, p. 318, found that quality of teachers, as measured by scores on a standardized test measuring verbal skills, had a substantially stronger effect on students' achievement than did physical facilities and curricular measures.

[51]That economic investment on the part of the community (as contrasted with social investment) is not important in this sample in recruiting quality teachers is evidenced by the fact that the product-moment correlation at the school level between beginning teacher salaries and percentage of teachers with more than the B.A. degree is -.11 ($.50 > p > .30$).

[52]Stated in different terms and at a more general level, school environment and community support interact: Communities or neighborhoods with a strong, collective social investment in quality education tend to generate school environments conducive to high educational aspirations and achievement, and these schools attract families to the community who have a strong commitment to quality education. For examples of two-directional relationships involving research on school environments and academic behavior see Edward L. McDill and James S. Coleman, "High School Social Status, College Plans, and Interest in Academic Achievement: A Panel Analysis," American Sociological Review, 28 (1963), pp. 905-918, and Jerome Kirk, Cultural Diversity and Character Change at Carnegie Tech. A Report on the Carnegie Tech Campus Study, Carnegie Institute of Technology,

Pittsburgh, Pa., 1965, p. 40.

[53]Harold Howe II, "Picking Up the Options." Address to the Annual Meeting of the Department of Elementary School Principals, National Education Association, Houston, Texas, April 1, 1968, p. 13.

[54]Baltimore City Public Schools, School-Community Relations Division, Bulletin No. 1, August, 1967. See, also, Reconnection for Learning: A Community School System for New York City. Report of the Mayor's Advisory Panel on Decentralization of the New York City Schools. New York: The Advisory Panel, 1967.

[55]Project/FORGE, Office of Special Programs, Franklin and Marshall College, Lancaster, Pa., 1968 (mimeograph).

[56]Benjamin Bloom, Stability and Change in Human Characteristics. New York: John Wiley and Sons, 1964.

[57]Bloom, op. cit., 1966, p. 46.

[58]Shaycoft, op. cit., 1967.

[59]A National Longitudinal Study of American Youth, op. cit., April, 1967, p. 2.

[60]See Boocock, op. cit., 1966, pp. 24-31, for some of the more important work in this area.

[61]Henry S. Dyer, "School Factors and Equal Educational Opportunity," Harvard Educational Review, 38 (Winter 1968) p. 55.