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By- Furno, Orlando F.; Collins, George J.

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To test the hypothesis that pupil achievement is inversely related to class size, a 5-year study (1959-1964) examined the relationship between class size and pupil achievement in reading and arithmetic. Data were taken from records of the Baltimore public school system for all 16,449 grade 3 pupils in the class of 1959, comprised of 6,568 regular white pupils, 8,341 regular nonwhite pupils, 441 special education white pupils, and 1,099 special education nonwhite pupils. Pupils in smaller classes in both the regular and special education curricula were found to make significantly greater achievement gains than students in larger classes. Smallest class size (1-25) was considerably more productive for nonwhite than for white students. Other variables correlated to class size and pupil achievement included pupil home mobility, parental occupation and level of education, percentage of nonwhite faculty, faculty knowledge, and faculty experience. A review of related research and a description of the research design are included. Extensive comparisons from the study's findings are tabulated and described. (JK)

# CLASS SIZE AND PUPIL LEARNING

ORLANDO F. FURNO
AND
GEORGE J. COLLINS

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION





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The Division of Research and Development of the State Department of Education in Maryland not only provides significant contributions to describing the education of children and youth, but also owes to the profession support and recognition for developing studies that will advance our society toward our common goals of obtaining more knowledge about the educational process.

The question of class size is of great significance to all school officials, citizens, and taxpayers throughout the nation. In this century, a number of research studies on class size and learning have been published. Each made its unique contribution to education at the time. This publication acknowledges the pioneer efforts of other researchers, but in the light of present research techniques evaluates the studies for current use. Each previous class size study had its limitations and advantages and so has the present study. Time, money, and sensitive instruments for measuring the educational process have limited the contributions of research to understanding the learning process more fully. But nevertheless the urgency is constantly upon educators and researchers for more information on the relationship between class size and student learning.

Dr. M. Thomas Goedeke, Associate Superintendent-in-Charge, and the Baltimore City Board of School Commissioners constantly searched for answers to cost-effectiveness and student learning rates by varying class size. To them this was a multimillion dollar question for staff and classroom spaces with very few reliable research studies. Congressman John Brademas of Indiana also pressed hard for definitive answers on optimal class size at the Federal level to determine the need for school construction. Based on years of experience in education, Dr. James A. Sensenbaugh, Superintendent of Schools for the State of Maryland, continually stated the need for smaller classes and praised the financial inducements built into the formula for State support of education to local districts to attain smaller class groupings.

Teachers, supervisors, parents, students, taxpayers, econometricians, and more recently teacher negotiation agencies expressed concern for class sizes conducive to better teacher-student effectiveness. Clearly, class size is of universal concern at every level of government.

We are indebted to Dr. Richard K. McKay, Director of the Division of Research and Development, Maryland State Department of Education. As a member of the Planning Committee for Basic Educational Development Systems representing the Chief State School Officers, Dr. McKay recognized the unique contributions of this multidimensional study of class size. He particularly praised:

1. The longitudinal research of five years of continuous study when most studies measured the effect of class size from September to December.
2. The number of students in the study.
3. The exploration of 300 items on students, staff, parents, home, and school.
4. The differences in learning in varying class groupings between white and nonwhite students.
5. The attempt to measure and hold constant parental employment and intelligence.

We are, also, deeply indebted to the following organizations and persons:

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ORLANDO F. FURNO
*Assistant Superintendent*
*Research and Development*
*Baltimore City Public Schools*

GEORGE J. COLLINS
*Assistant Commissioner*
*School Facilities and*
*Related Services*
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# FOREWORD

Emphasis in public education in recent years has been placed heavily by forward-looking educators on the need to conduct a wide variety of research activities to provide information necessary to improve the work of the schools. To facilitate experimentation and research in Maryland's schools, the Quality Improvement Project was launched by the State Department of Education in 1965-1966 to provide financial assistance to the school systems for such programs. The Baltimore City Public Schools applied for assistance for several proposed projects immediately after the QIP was announced, and the first project in the State to be funded is the one reported here entitled "The Relationship Between Class Size and Pupil Learning."

This study is a particularly fine example of a research activity which reveals much about the effects of administrative arrangements in the schools in relation to the social and personal characteristics the pupil brings to class. All of the results of this investigation were obtained without disturbing the pupils and without altering in any way the educational settings in which they were located as a result of the usual assignment procedures of the system. Thus no artificial influences because of the study were introduced to make interpretations of the findings more difficult.

Unpretentious as the title of this study is, the implications of its interpreted findings are far-reaching. Teachers, school administrators, parents, professional groups, governmental bodies and officials, and taxpayers should certainly be interested in the results described in this report and in the further, corroborative research which should follow.

The Baltimore City Public Schools have given the State Quality Improvement Program an auspicious start with a well-designed and executed research effort in an important aspect of education.

RICHARD K. MCKAY, DIRECTOR
DIVISION OF RESEARCH AND DEVELOPMENT

October 2, 1967

# CHAPTER I

# INTRODUCTION

The volume of research concerning class size and pupil learning and related studies is massive—over 300 separate studies have been cataloged; yet not much of the material has been based upon acceptable research procedures. The most frequent shortcomings are (1) failure to invest sufficient money in the class size research design model and (2) a lapse of too many years between the design of the research and the report of the findings.

Recent important developments indicate a need to take stock of the research related to class size and pupil learning and to develop research designs and procedures which will reflect innovative methods in teaching and learning.

First, and of foremost importance, is a mushrooming concern that shortages of teachers will become more and more acute. The Research Division of the National Education Association reported a shortage of 170,000 teachers for the 1966-67 school year. Unless the source of qualified teachers increases dramatically, we will continue to witness a growing deficit of qualified teachers for our public elementary and secondary schools.

Second, staff utilization studies indicate that the traditional, stereotyped concept of the self-contained classroom seems to be breaking down. New concepts of teaching processes are emerging. Writing in the *Bulletin of the National Association of Secondary School Principals,* Singer[1] noted, "With the school population explosion and the acute shortage of qualified teachers becoming more serious each year, educators grew increasingly concerned over the role of the teacher and the utilization of time, talent, and energy." Singer found that many schools are experimenting with flexible class size in connection with the use of team teaching, teacher aides, and technical devices such as educational television, language laboratories, dial-a-program circuits, and computer-assisted learning laboratories.

Because previous research on the relationship between learning and class size has been inconclusive, this research study sought to study the relationship between class size and the development of two basic skills—reading and arithmetic.

## The Importance Of Answers To The Relationships Between Class Size And Pupil Learning

How schools are organized has great implications with respect to financial support of schools. If, for example, it can be shown conclusively that children in large classes can learn certain skills just as easily and effectively as those in smaller classes, the cost of operating our public elementary and secondary schools clearly can be reduced without a lessening of educational excellence for those particular skills. To get an idea of the budget implications of a decision on class size, consider what a reduction in class size would do in a large city; for example, the Baltimore City Public Schools. In 1966-67, Baltimore City had over 2800 elementary classrooms in which 30 or more children were enrolled; at the

[1]Ira J. Singer, "Survey of Staff Utilization Practices in Six States," *Bulletin of the National Association of Secondary School Principals,* Vol. 46, No. 270 (January 1962).

secondary level, almost half of all subject classes had 30 or more pupils. An administrative decision to increase the professional staff to 50 members per 1000 pupils and to reduce class size to 30 pupils would have the following effects:

(1) 940 new educational staff members would have to be employed
(2) Approximately 19 new elementary schools and 6 new secondary schools would have to be built
(3) 381 additional classified workers (secretaries, custodians, cafeteria workers, etc.) would have to be employed

Such developments would subsequently have the following budget implications:

(1) An additional $9,500,000 would be needed each year for current operating expenses
(2) The school construction budget would have to be increased by $86,000,000

The results of the National Inventory of School Facilities and Personnel[2], conducted by the Office of Education in 1962, showed that similar conditions existed in numerous communities throughout the nation. Collins reported that despite expanding budgets for current expenses and for school construction, the problem of overcrowding in school districts throughout the United States still persists. In fact, in a special report to Congress he showed a variation in need for additional classrooms from about 66,000 to 272,000 depending solely on *choice of class size*. At an average cost of $50,000 for a classroom, which includes the cost of necessary supporting facilities to construct a school, the backlog for overcrowding alone varied from $3.3 billion to $13.6 billion or over $10 billion, depending upon what Congress selected as a minimum class size. Without reliable research, Congress could not decide upon an optimum or minimum class size. Consequently, to date no action has been taken by the Federal government to assist state and local officials in alleviating overcrowded conditions in the schools of the nation.

Previous studies of the effects of class size on pupil learning have failed to demonstrate conclusively that large classes materially affect pupil attainment in certain subject matter areas. Nevertheless, the conviction has persisted among educators that small classes provide a more desirable learning setting than large classes. We must ask these questions: (1) What is this more desirable learning setting? (2) Can research help the school administrator implement a sound class-size policy? Unless it can be shown that reduced class size offers significantly increased opportunities for essential learning activities, economic pressures for the largest possible ratio of students to teachers may be expected to prevail. Since we are all concerned with educational efficiency and economic productivity which can be soundly supported, whichever ratios are best without a deterioration in pupil learning or in teacher morale should be the ratios to prevail.

## The Purposes And Objectives

The primary objective of this research study was to examine the relationship between class size and pupil achievement in two critical skills—reading and arithmetic. The working hypothesis is that pupil achievement in these two areas may be inversely related to class size. The study was also designed to provide tests for a related hypothesis: Class size is a more critical factor in pupil learning for children from culturally deprived backgrounds than for children from more advantaged homes. Another hypothesis that the study was designed to test: Class size represents a more critical factor in pupil learning for children of limited mental ability than it does for

[2]George J. Collins, *National Inventory of School Facilities and Personnel, Spring 1962*, OE-21026, Misc. No. 44, U.S. Department of Health, Education, and Welfare (Washington, D.C., Government Printing Office, 1964).

children of high mental ability.

A secondary objective of this research study was to assess the feasibility of conducting a more extensive study which would determine the relationship between class size and achievement in other academic subjects, as well as in other areas of child development such as creativity, deportment, citizenship, critical judgment, critical reasoning, and pupil attitudes toward learning. We also sought to study other related social and economic variables as they impinged upon class size and pupil learning. Staff attitude, teaching methods, and classroom materials should also be added to the matrix of a class-size and pupil-learning study if greater measuring precision and greater understanding of the pupil learning process is to be attained.

Numerous factors other than pupil achievement must be considered in making decisions regarding pupil-teacher ratios. If it can be shown that large classes are a detriment to the acquisition of skills, in such critical areas as reading and arithmetic, it is reasonable to believe that school administrators would have sufficient persuasive reasons for asking taxpayers to assume the burden of providing financial support necessary to reduce class size to those levels which permit pupils to acquire the competence they need in these skill areas. Conversely, should these skills be acquired equally as well in large classes as in small classes, educators need not be as greatly concerned about the problems of class size. Problems of class size—such as overcrowded classrooms part-time education, double shifts, construction of additional classrooms, and the incurring of debt obligations—must be approached from a matrix of factors which excludes learning the basic skills, particularly reading, writing, and arithmetic.

## Organization Of This Study

This study on class size and pupil learning is organized as follows: Chapter II deals with the related research on class size and pupil learning, summarizing the most significant studies with respect to class size and pupil learning. Chapter III deals with the general design and procedures used. Chapter IV discusses the distribution of cell parameter variables. Chapter V contains the analysis of the statistical data on class size and pupil achievement. The concluding section, Chapter VI, spells out suggestions for future class size research studies.

# CHAPTER II

# REVIEW OF RELATED RESEARCH

The educational community long has been perplexed by what constitutes optimum class size, particularly when the focus is upon improving the level of pupil achievement. There is no dearth of opinion about the relative merits of class size in organizing children for effective learning. But the extent to which small class size makes a difference in pupil learning poses many questions that are difficult to answer. The problem is not made any easier by the fact that there is substantial unsupported sentiment, inside as well as outside the profession, that smaller classes produce better results. Few persons spell out in any detail what they mean by "better results."

Obtaining dependable answers to most questions about education requires knowledge and understanding of the complex, interrelated factors involved in the learning process. In most physical sciences, definitive characteristics can be attributed to factors under consideration; but in educational research, teachers, children, and the environment cannot always be precisely assessed. Nor can these same elements, which constitute the props of the educational experiment, be held constant and invariant.

Although far short of our needs, some current research findings do offer leads to increased understanding of factors that make a difference in pupil learning. Small class size could be one of the most significant variables among all those that could be considered for study.

The purpose of this chapter is to determine what implications and conclusions may be drawn from an analysis of research studies already completed concerning class size. The following objective was foremost in mind: To see if we could determine, from an analysis of the research already concluded, if such a setting as optimum class size had been established, and for what pupil learnings.

## Class Size For What Objective?—An Overview

The first comprehensive study of problems relating to class size was conducted by Blake[1], and reported in his doctoral dissertation in 1954. Blake identified 267 articles, theses, and dissertations; 85 of these were based on research, and only 22 survived his criterion for acceptable research. From 11 studies specifically directed to outcomes on pupil achievement, he found that

5 favored small classes
3 favored large classes
3 were inconclusive

A more recent review of research reports in class size concluded "that well-constructed studies are few and far between."[2] Nonetheless, much can be learned from the efforts of researchers who sought to reduce opinions and broad generalizations to acceptable research findings.

Most of the research between 1900 and 1940 measured short-term or immediately obtainable outcomes of pupil achievement. Later studies emphasized more desirable conditions for pupils. Results obtained from these studies favored small classes, primarily for two reasons:

(1) Pupils were more apt to receive individual attention.

[1]Howard E. Blake. "Class Size: A Summary of Selected Studies in Elementary and Secondary Public Schools." Unpublished Doctoral Dissertation (New York, Columbia University, Teachers College, 1954).

[2] Howard Holland and Armand Galfo. *An Analysis of Research Concerning Class Size* (Richmond, Virginia, State Department of Education, 1964).

(2) Educational accidents were reduced.

In 1965, Congressman John Brademas[3], Third District, Indiana, with keen perception asked the multimillion dollar question—"What is the optimum class size? Or what class size should Congress recommend to eliminate overcrowding?" It became obvious that the question needed rigorous attention since research had shown that the addition or subtraction of a few children in class size made the need for classrooms change significantly up or down, in a nation as large as ours. (We have already indicated the implications of class size policy in a large city school district in Chapter I.) How class size policy affects school construction needs in both the United States and in the State of Maryland may be seen in Table 1.

[3]*School Construction, 1965*. Hearings before the General Committee on Education, House of Representatives Eighty-Ninth Congress First Session on H.R. 9948, H.R. 10080, and H.R. 10105, July 27, pp. 59-62.

**TABLE 1**

**Number of Additional Classrooms Needed in the United States and in the State of Maryland in 1962 and 1965 if Class Size Is Reduced to Designated Values**

| If Pupils per Classroom Were Reduced to Values Indicated Below | | Additional Classrooms Needed at Both Elementary and Secondary Levels | | | |
|---|---|---|---|---|---|
| | | For the 1962 Year[4] | | For the 1965 Year[5] | |
| Elementary Class Size | Secondary Class Size | In U.S. | In Md. | In U.S. | In Md. |
| 30.0 | 30.0 | 65,970 | 1,500 | 50,800 | 1,000 |
| 27.6 | 26.3 | 117,400 | 2,800 | — | — |
| 27.4 | 27.5 | — | — | 98,300 | 2,200 |
| 25.0 | 20.0 | 271,870 | 6,400 | 285,900 | 6,600 |

Note: If class size had been reduced to 30 pupils or less at both the elementary and secondary levels in 1962, some 65,970 new classrooms would have had to be constructed in the United States as a whole, and 1,500 in the State of Maryland. For the calendar year 1962, the elementary median class size was 27.6 and the secondary median class size was 26.3. For the calendar year 1965, the elementary median class size was 27.4 and the secondary median class size was 27.5.

[4]George J. Collins. *National Inventory of School Facilities and Personnel, Spring 1962*, OE-21026, Misc. No. 44, U.S. Department of Health, Education, and Welfare (Washington, D.C., Government Printing Office, 1964).

[5]George J. Collins and William Stormer. *Conditions of Public School Facilities 1964-65* (Washington, D.C., U.S. Office of Education).

Collins' National Inventory Study[6] reported that by applying the same measure of pupil accommodation in Maryland, to reduce class size to 30 pupils, 1000 additional rooms for instructional use would be needed; to reduce class size to 27.4 pupils, 2200 would be needed; but to reduce class size to 25 pupils at the elementary level, and 20 pupils at the secondary level, 6600 additional classrooms would be needed. *School Management's* July 1967 issue[7] indicated that the cost to construct a classroom in 1967 was $45,800. This clearly indicates the cost implications of class size policies.

## Pupil Achievement And Class Size

Smith[8], in an experiment conducted between 1925-1928, matched children for intelligence, age, sex, and grades in English the previous year. She tested ninth-grade English students in groups of either 20 or 50 pupils.

Smith reported no significant difference in achievement in either grouping for grammar, capitalization, punctuation, or composition.

Smith found that children in large classes did better than those in small classes in the six following areas: spelling, reading, literature, amount of work completed, variety of activities, and higher pitch of enthusiasm.

[6]George J. Collins, *National Inventory of School Facilities and Personnel, Spring 1962*, op. cit.

[7]"Cost of School Buildings." *School Management*. Vol. 11, No. 7 (July 1962), p. 69.

[8]Dora V. Smith. "Problems of Class Size and Efficiency in English." *The English Journal*. Vol. 19, No. 3 (November 1930), pp. 724-736.

She also found that children in the smaller classes did better than those in larger classes in the following three areas: library methods, letter writing, and causing less emotional strain on teachers.

Smith reached these conclusions: there was no optimum size for grouping children for instructional purposes, there may be optimum sizes for accomplishing certain objectives, and the methods used were more important than class size per se. Smith did, however, indicate that clerical assistance and mimeographed practice materials to individualize instruction were given to the teachers of large classes.

In 1932, Cunningham[9] concluded that there was no significant difference in achievement in algebra for students in two classes of 66 and 33 persons matched on the basis of scores on the Algebra Prognosis Test. Teaching methods, books, assignments, and tests were kept constant. The study reflected statistical limitations in

1. Sample selection
2. Number of groups tested
3. Questionable selection of mean scores
4. Clerical assistance given to the teacher of larger classes
5. Use of different teachers for the two groups

In 1943, Pertsch[10] utilized 100 elementary schools in New York City to study the subject areas of reading and arithmetic. He found that greater use was made of individualized instruction in smaller classes than in larger classes, and that teachers in smaller classes knew more about individual children.

In 1950, Anderson[11] compared final examination marks for chemistry made by students in 73 high schools in nine states. Classes were equated on the basis of intelligence and knowledge of chemistry. Statistical analysis demonstrated that students assigned to smaller classes achieved higher grades than those in larger classes. The significance of the study appears questionable because standard tests were not used, and final examination marks are only one indicator of achievement.

In 1963, Anderson[12] randomly divided 120 students with scores at or above the 90th percentile on the Differential Aptitude Numerical Test into two groups of 80 and 40. Classes were taught by the same instructor with two twelfth-grade assistants. Pupil achievement, measured at the end of the first semester with the Sequential Test of Educational Progress, showed no significant difference between the two classes as measured by the test. Several shortcomings in Anderson's study seem evident.

1. Sample included only high level students.
2. Class of 40 students is hardly a small class.
3. Teacher used assistants, which reduced the ratio.
4. Two classes limit the scope of the study.
5. One testing instrument limits the tested objectives of the research.
6. One measurement at the end of the semester restricts the application of the learning process.

## New Teaching Practices And Class Size

Based on a premise that children get better educational experiences if teachers use new and promising educational practices, in 1943 Newell[13] found that teachers

[9]M.S. Cunningham. "An Experiment in Class Size in B-9 Algebra." *California Journal of Secondary Education*. Vol. 7 (1931-32), pp. 19-26.

[10]C. Frederick Pertsch. "Some Effects of Class Size on the Educational Program in the New York City Schools." *The Advancing Front of Education. Eightieth Yearbook*, New York Society for the Experimental Study of Education (New York, Thesis Publishing Company, 1943).

[11]Kenneth E. Anderson. "The Relationship Between Teacher Load and Student Achievement." *School Science and Mathematics*. Vol. 50 (June 1950), pp. 468-470.

[12]Frank H. Anderson, et al. "A Report of an Experiment at Camelback High School." *The Mathematics Teacher*. Vol. 56, No. 3 (March 1963), pp. 155-159.

[13]Clarence A. Newell. *Class Size and Adaptability* (New York, Bureau of Publications, Columbia University, Teachers College, 1943).

of smaller classes

1. Invent more new practices
2. Adapt new practices invented by others more readily

Smaller classes alone, however, are no guarantee of adaptability (improved practices) or efficiency of learning. Many *other conditions exert an influence,* not the least of which is *the competence of the teaching staff.*

The concept of adaptability, ingrained in the research of the late Professor Paul R. Mort and his students at Columbia, has been given a Madison Avenue synonym—innovation.

In 1955, Richmond[14] reported from his research of 62 selected practices in middle elementary grades that

1. Desirable practices tend to be dropped when class size is increased.
2. Desirable practices are added when class size is reduced.

He further discovered that where class size had been deliberately reduced, practices designed to evoke individualized concern became evident. Teachers showed greater

1. Understanding of children
2. Use of children's aptitudes and needs
3. Discovery and development of individual talents
4. Encouragement of individual exploration

Where class size increased, the aforementioned practices of individual concern were used with less frequency, situations became more formalized, and teachers took refuge in routines to assure that all children were drilled principally in basic skills.

An additional insight gained by Richmond confirms the *importance of informing and involving professional staff members in policy decisions.* The famous "Hawthorne effect" is evident. Better results appeared more quickly when teachers were asked to give definite attention to taking advantage of smaller class size groups. The loss in good practices, however, was not as great when teachers were asked to compensate for larger class size groups.

In high school social studies and English classes, Whitsitt[15] found that teachers of classes which were small by design (less than 24 children) tended to use a greater variety of instructional methods than did teachers of comparable ability in larger classes. He discovered that 50 percent of the small classes did not have an identical pattern of work, but only 6 percent of the larger classes (more than 33 children) did. Based on time-unit observations, the smaller classes recorded greater use of

1. Subgroup work
2. Informality
3. Enrichment materials beyond textbooks
4. Dramatizations
5. Special publications
6. Details and depth in subject areas
7. Concrete examples
8. Opportunity for new practices

Freedom from fear of failure to teach every child some minimum of knowledge is perhaps the greatest fall-out or concomitant spin-off that teachers receive or believe they receive from smaller classes. Thus, teachers can obviate anxieties before they inhibit performance.

Two studies utilized *The Growing Edge,* an instrument developed by the late Professor Paul R. Mort, to measure better educational practices, with a strong emphasis on individual attention and participation in classroom and extracurricular activities. Binion[16] found the smaller the average class size, the greater the quality, as measured by the instrument used. He found a higher correlation with expenditures per pupil than with class size; and further, that these other factors were interrelated with class size.

1. Adequacy of instructional materials
2. Teaching aids
3. Supporting professional staff

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[14]Harold Richmond. *Educational Practices as Affected by Class Size* (New York, Bureau of Publications, Columbia University, Teachers College, 1955).

[15]Robert C. Whitsitt. "Comparing the Individualities of Large Secondary School Classes with Small Secondary School Classes through the Use of a Structural Observation Schedule." (Ed. D. Columbia University, Teachers College, 1955).

[16]Stuart Binion. "An Analysis of the Relationship of Pupil-Teacher Ratio to School Quality." (New York, unpublished Doctoral Dissertation, Columbia University, Teachers College, 1954).

Using the same instrument, McKenna[17] found a higher correlation with quality and total school staff than with smallness of classes. The limitations of the findings from the two research studies are total reliance upon

1. A single instrument which depends upon educational practices
2. A sampling of schools from the same geographic area

Mastery of fact, in tests of achievement, is only a partially satisfactory measure of educational objectives. Modern educational theory favors accompanying changes in behavior, attitudes, and thought processes.

In a review of studies of class size, Ross and McKenna[18] concluded that the most dependable research studies favored smaller classes by a ratio of 2 to 1.

In 1956, the Research Division of NEA[19] conducted an opinion survey among elementary and secondary school teachers. About half (47 percent) of the elementary teachers with classes under 25 children reported no "troublemakers" in their classes. Almost 70 percent of the teachers in secondary schools selected the largest or second largest groups as the most difficult to manage. In neither case do the data establish a cause and effect relationship between class size and pupil misbehavior.

## Newer Concepts Of The Educational Process

The traditional process of education is undergoing change. Today, the classroom teacher receives assistance from numerous supporting professional staff members for remedial work, in special areas of instruction, in guidance, with audio-visual materials and library resources, in psychological and social services. Experiments involving class size and pupil learning are now commonplace and include para-professionals or aides, team teaching, television, computers, and programmed instruction. The inclusion of these parameters complicates the traditional concept of class size that has distinguished mass education in America since its inception.

## Research In Team Teaching

From 1957 to 1960, Johnson and Lobb[20] measured the effects of class size on achievement and attitudes of pupils in Jefferson County, Colorado.

In the first year, differences in achievement were not statistically significant between pretest and posttest, but classes for small groups of pupils, with high mental capacity, were not academically or economically feasible.

In the second and third year, a study of the effect of a ratio of 100 pupils to one teacher in high school English provided contradictory findings. Team teaching was more favorable in the eleventh grade; procedures in regular classes were superior in grade ten.

During the third year of the experiment, a nongraded class in English was established for grades 10 through 12. The class contained 274 pupils, with one teacher specialist, two general teachers, and one classroom assistant. The data suggested that this organization produced as good or better results than would be expected in regular classes.

In this study, better attitudes among stu-

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[17]Bernard McKenna. "Measures of Class Size and Numerical Staff Adequacy Related to a Measure of School Quality." (Unpublished Ed. D. Dissertation, Columbia University, Teachers College, 1955).

[18]Donald H. Ross and Bernard McKenna. *Class Size, The Multimillion Dollar Question.* New York Metropolitan School Study Council.

[19]"Teacher Opinions on Pupil Behavior." *National Education Association Research Bulletin.* Vol. 34 (April 1956), pp. 65-69.

[20]Robert H. Johnson and M. Delbert Lobb. "Jefferson County, Colorado, Completes Three-Year Study of Staffing, Changing Class Size, Programming, and Scheduling." *Bulletin of the National Association of Secondary School Principals.* Vol. 45, No. 261 (Jan. 1961), pp. 55-77.

dents in the larger class groups might be related to the newer organization of instruction which encourages experimental veneration.

## Research In The Use Of Teaching Devices

An analysis of studies [21] concerned with educational television and programmed instruction revealed

1. Research studies are poorly constructed.
2. Evaluation is short termed.
3. Testing is limited to the use of paper and pencil.
4. Experimental controls are lacking.
5. Finally, the results are contradictory.

Maltby[22] and Morrell[23] concluded that there is no solid research evidence to support that teacher shortages can be alleviated through the use of automated or program materials in mathematics or English at the secondary school level.

The teaching of spelling to second-graders by television[24] exclusively to groups of 70, 89, and 98 revealed that

1. Superior children are not challenged.
2. Slow children cannot receive additional help.
3. Control group has significantly higher gains on tests for upper grades.

The groups were equated on the basis of intelligence, socioeconomic status, and achievement in spelling. The study illustrates the complexities of designing class size studies, the importance of teacher attitudes, what statistical tests of significance should be used, and what other important educational objectives should be measured.

Experiments evaluating the use of television in Philadelphia[25] began in 1957. Reports in 1960 included

1. Two elementary classes of 150 to 250 children for social studies in fifth and sixth grades
2. Four junior high school classes between 150 to 300 students for science in eighth grade and for history in ninth grade
3. Three senior high school classes between 150 to 275 students for Biology I and II

The study revealed that

1. Large classes seemed to be effective for pupils of rapid, average, and slightly slow learning speeds.
2. Very slow learners, in need of constant individual help, did not do as well as other pupils.
3. Evaluation procedures were reported unsystematically.
4. Personal judgments confused the effectiveness of statistical analysis.

## Teacher Assistance

College graduates assisted English teachers with grading themes in an experiment by Ford[26] in Newtonville, Massachusetts. The experimental group received individual assistance through evaluative comments and conferences.

1. Reader-aided classes
   a. improved more in writing skills

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[21]Howard Holland and Armand Galfo. *An Analysis of Research Concerning Class Size.* Richmond, Virginia, State Department of Education (Nov. 1964), p. 15.

[22]William Maltby. "The Mathematics Teacher Shortage, Class Size and Programmed Learning." (Unpublished Ed. M. Thesis, The College of William and Mary, 1964).

[23]Judith B. Morrell. "A Survey of Three Approaches to Alleviating the Problem of the Large English Class." (Unpublished Ed. M. Thesis, The College of William and Mary, 1964).

[24]William R. Foley. "A Study To Determine the Value of Television as a Teaching Method as Compared to Conventional Teaching Methods." (Unpublished Ed. M. Thesis, The College of William and Mary, 1964).

[25]"Report of the National Experiment in TV Teaching of Large Classes." (Philadelphia Public Schools, 1960).

[26]Paul M. Ford. "Lay Readers in High School Composition Program." *The English Journal.* Vol. 52, No. 4 (April 1964), pp. 273-276 and 305.

b. wrote more
c. were more concerned about their writing
2. College-bound students made the greatest improvements
3. Teachers had more time for individual help, professional improvement, and lesson planning

In 1960, Noall and Jensen[27] matched students in grade eight on the basis of intelligence and California Achievement Test scores for an experiment in the team-teaching of English and social studies. Structured interviews and attitudinal scales were used to measure the reactions of children, teachers, and parents. The results indicated a statistically significant gain for team-taught groups in history and total language skills. No significant differences were found in reading, social interaction, or disciplinary problems.

## Future Research Directions For Class Size Studies

Most class size research has excluded more variables than it included to measure pupil learning, in a global sense. What few studies have been done along these lines have indicated a large residual factor, principally unexplained, when factors influencing class size and pupil learning are intercorrelated with each other and a criterion measure in a multiple order correlation. For example, Dibble[28] reported in a study that only 32 percent of the variance in the criterion measure, academic achievement, could be explained by Intelligence (.16), School Activities (.05), Family Income (.05), Retention History (.03), and Sex of Student (.03). As can be readily deduced, the greater part of the variance (.68) of the academic achievement criterion remained to be explained.

What detracts from Dibble's results is that he utilized a questionable and probably invalid measure, namely, Teacher Assigned Pupil Grades, as the criterion measure for academic achievement. Teacher Assigned Pupil Grades are notoriously unreliable predictors of academic performance, particularly of standardized test results. See Furno's[29] study on equality of educational opportunities. In this study, Furno found that teacher grades did not correlate significantly with academic achievement, as defined in terms of pupil results on standardized tests. Numerous other studies could be cited in which similar results were found. The tip-off to Dibble's poor choice of a criterion measure for academic achievement was the relatively low contribution intelligence made to explaining the total variance of the academic achievement criterion. For example, in a study made by the Baltimore City Public Schools' Bureau of Research, the zero order correlations between standardized tests in reading and in arithmetic and pupil intelligence were around the .70 value and above. Table 2 contains correlation results between pupil ability and pupil achievement.

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[27]Mathew F. Noall and Lawrell Jensen. "Team Teaching at Roosevelt Junior High School, Duchesne County, Utah." *Bulletin of the National Association of Secondary School Principals*. Vol. 44, No. 252 (January 1960), pp. 156-163.

[28]John Goodwin Dibble. "A Study of the Relationship of Certain Factors to Academic Achievement of Public High School Students of Fairfax County, Virginia." (Unpublished Ed. D. Dissertation, The George Washington University, 1966).

[29]*A Pilot Study in the Baltimore City Public Schools To Measure the Achievement of Educational Opportunities*. Mimeo Study for the U.S. Office of Education, Contract No. OE-5-99-262. Orlando F. Furno, Project Director (April 1966).

## Research Advances At The Horizon

As research techniques attain new levels of sophistication, a complex matrix of multiple variables becomes possible, especially since the advent of the computer. Statistical techniques are commonly in use to separate dependent and independent variables. Yet, the design of the ultimate study of class size remains to be accomplished.

We foresee, then, future class size and pupil learning research studies concerned with class size as a criterion measure against which a global constellation of factors are to be correlated. With collective bargaining in the profession coming into greater prominence, one working condition of classroom teachers which will be subject to intense negotiation through collective bargaining is class size. Policy, with respect to class size, needs to be adopted in line with research findings, and not through hunches or hopes.

**TABLE 2**

**Relationships Between Pupil Intelligence and Selected Pupil Achievement Areas. Baltimore City Public Schools, 1966**

| Curriculum | Correlation Between Pupil Ability and Standardized Reading Test Scores | Correlation Between Pupil Ability and Standardized Arithmetic Test Scores |
|---|---|---|
| | Grade 7 Results | |
| 1. Accelerate (High I.Q.) | .77 | .77 |
| 2. Regular (Av. I.Q.) | .78 | .75 |
| 3. Basic (Low I.Q.) | .69 | .68 |
| | Grade 9 Results | |
| 1. Accelerate (High I.Q.) | .67 | .61 |
| 2. Regular (Av. I.Q.) | .78 | .80 |
| 3. Basic (Low I.Q.) | .68 | .60 |

# CHAPTER III

# THE GENERAL RESEARCH DESIGN

As noted at the outset, this research design represented a study to provide data on the investigation of the influence of class size on achievement among pupils, cross-classified by intelligence, occupation of the father or, in the absence of the father, occupation of the mother. This provides for a three dimensional grid with these axes:

1. Class size
2. Occupation
3. Pupil intelligence[1]

The remainder of this chapter deals with population universe, sampling procedures, data collection procedures, and data parameters that were examined.

## Population Universe

Baltimore City has, over the past two decades, maintained a census of public school pupils enrolled as of October 31 of each school year. For each pupil, the following information is collected.

1. Pupil name
2. School number
3. House number
4. Direction
5. Street name
6. Birth date of pupil (month, day, year)
7. Sex of pupil
8. Race of pupil
9. Tuition status
10. Grade in which pupil is enrolled
11. Census tract
12. City block
13. Curriculum in which pupil is enrolled

Because achievement tests were administered to all Baltimore City Pupils enrolled in the 6th and 8th grades as of March 1965, and because Baltimore City's systemwide testing program starts in Grade 3, pupils enrolled in Baltimore City Public Schools Grade 3 in 1959 were used as the population universe for this study. Thus, pupils who were in Grade 3 in 1959 ranged in 1965 from Grade 5 to Grade 10. The total number of pupils enrolled in Grade 3 in 1959 was 16,449. This number, then, represents the population utilized for this study on class size and pupil learning. Before the needed pupil data from the various cumulative folders were obtained, the Grade 3 pupil universe was divided into four cells:

1. White pupils enrolled in Regular Grade 3 Curriculum
2. Nonwhite pupils enrolled in Regular Grade 3 Curriculum
3. White pupils enrolled in Grade 3 Special Education Programs
4. Nonwhite pupils enrolled in Grade 3 Special Education Programs

Because each pupil was recorded alphabetically in the 1959 child population register (Baltimore City Public Schools), it was necessary first to identify each pupil in the Grade 3 population universe. At the same time, each pupil was identified as belonging to one of the four groups previously enumerated. Thus, 166,968 pupils had to be examined in order to locate the 16,449 pupils in the Grade 3 population universe. In actuality, what this necessitated was going through the three child population

[1]Intelligence tests used were Kuhlman-Anderson Intelligence Test, Lorge-Thorndike Verbal Intelligence Test, Binet-Simon Intelligence Test.

registers of 166,968 names four times. The first time was to note by a red "X" those pupils in group 4; 6,568 pupils were so identified. The second time was to note by a green "X" those pupils in group 3; 8,341 pupils were so identified. The third time was to note by a blue "X" those pupils in group 2; 441 were so identified. The fourth time was to note by a yellow "X" those pupils in group 1; 1,099 pupils were so identified.

Table 3 shows the Grade 3 population universe by group.

**TABLE 3**
**Pupils Enrolled in Grade 3 in 1959 in the Baltimore City Public Schools**

| Category | Number |
|---|---|
| 1. Total pupils enrolled (K-12) | 166,968 |
| 2. Total pupils in Grade 3 Programs | 16,449 |
| 3. Group 4 Regular Grade 3 White Pupils | 6,568 |
| 4. Group 3 Regular Grade 3 Nonwhite Pupils | 8,341 |
| 5. Group 2 Special Education White Pupils | 441 |
| 6. Group 1 Special Education Nonwhite Pupils | 1,099 |

## Cell Design

Pupils were assigned to cells in accordance with their (1) parent's occupation, (2) intelligence test score of the pupil, and (3) the number of children enrolled in each pupil's class (class size). Originally, we had anticipated, with respect to the three axes, a larger number of cell groupings. A detailed examination of the actual occupations of the parents, of the actual pupil intelligence scores, and of the actual class sizes in which children were enrolled led us to develop the cell groupings based on class size for two different periods. Cell Grouping One represents the pupil's median class size over a two-year period, in particular, the school years 1959-60 and 1960-61. Cell Grouping Two represents the pupil's median class size over a period of four years, or, in particular, the school years 1959-60, 1960-61, 1961-62, and 1962-63. Only Cell Grouping Two will be statistically analyzed and reported upon in this study.

Pupils were separated by curriculum: (1) Regular Curriculum and (2) Special Education Curriculum. They were also separated by race: (1) white and (2) nonwhite. Occupational codes, intelligence quotient codes, and class size codes are indicated in Table 4.

In the Regular Curriculum grid, there were 64 cells, starting with Cell 111 and ending with Cell 444. See Table 5. For the Special Education Curriculum grid, there were 12 cells, starting with Cell 111 and ending with Cell 413. The first number in each cell code represents the occupation group; the second number, the intelligence quotient group; the third number, the class size group. For example, for the Regular Curriculum grid and for Cell 111, occupation refers to clerical, sales, and kindred workers; the intelligence quotient refers to pupils who had an intelligence quotient of 79 and below; the class size grouping refers to pupils who were enrolled in classes of 25 pupils and below. Consider for a moment Cell 413 in the Special Curriculum grid: the 4 refers to operators, service workers, laborers, and kindred workers; the 1 refers to an intelligence quotient of 79 and below; the 3 refers to a class size of 26 pupils and above. Table 5 indicates the actual numbers of the 64 cells for the Regular Curriculum grid and the actual cell numbers for the Special Education Curriculum grid.

Tables 6 and 7 indicate by Cell Grouping One and Cell Grouping Two a distribution of pupils by grid axes parameters and race.

## TABLE 4

### Occupational Codes, Intelligence Quotient Codes, and Class Size Codes Used in Baltimore City's Class Size and Pupil Learning Research Project

| Grid Axes | Code Number Used | Explanation of Code Number Used |
|---|---|---|
| | Regular Curriculum Grid | |
| I. Occupation Axis | 1 | Clerical, Sales, and Kindred Workers |
| | 2 | Private Household and Housewives, and Kindred Workers |
| | 3 | Professional, Technical, Craftsmen, Foremen, and Kindred Workers |
| | 4 | Operatives, Service Workers, Laborers, and Kindred Workers |
| II. Intelligence Quotient Axis | 1 | I.Q. of 79 and below |
| | 2 | I.Q. between 80-94 |
| | 3 | I.Q. between 95-104 |
| | 4 | I.Q. of 105 and above |
| III. Class Size Axis | 1 | 25 pupils and below |
| | 2 | Between 26-31 pupils |
| | 3 | Between 32-37 pupils |
| | 4 | 38 pupils and above |
| | Special Curriculum Grid | |
| I. Occupation Axis | 1 | Clerical, Sales, and Kindred Workers |
| | 2 | Private Household and Housewives, and Kindred Workers |
| | 3 | Professional, Technical, Craftsmen, Foremen, and Kindred Workers |
| | 4 | Operatives, Service Workers, Laborers, and Kindred Workers |
| II. Intelligence Quotient Axis | 1 | I.Q. of 79 and below |
| III. Class Size Axis | 1 | 19 pupils and below |
| | 2 | Between 20-25 pupils |
| | 3 | 26 pupils and above |

## TABLE 5

### Cell Groupings for Pupils Enrolled in Regular Curriculum and in Special Education Programs, Baltimore City Public Schools, Class Size and Pupil Learning Research Study

| | | | |
|---|---|---|---|
| I. Regular Curriculum—Cell Groupings Used | | | |
| 111 | 211 | 311 | 411 |
| 112 | 212 | 312 | 412 |
| 113 | 213 | 313 | 413 |
| 114 | 214 | 314 | 414 |
| 121 | 221 | 321 | 421 |
| 122 | 222 | 322 | 422 |
| 123 | 223 | 323 | 423 |
| 124 | 224 | 324 | 424 |
| 131 | 231 | 331 | 431 |
| 132 | 232 | 332 | 432 |
| 133 | 233 | 333 | 433 |
| 134 | 234 | 334 | 434 |
| 141 | 241 | 341 | 441 |
| 142 | 242 | 342 | 442 |
| 143 | 243 | 343 | 443 |
| 144 | 244 | 344 | 444 |
| II. Special Education—Cell Groupings Used | | | |
| 111 | 211 | 311 | 411 |
| 112 | 212 | 312 | 412 |
| 113 | 213 | 313 | 413 |

## TABLE 6

### Distribution of Pupils (Cell Group One) by Grid Axes Parameters and Race in Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964

| Grid Axes Parameters | Category 1 | | Category 2 | | Category 3 | | Category 4 | |
|---|---|---|---|---|---|---|---|---|
| | White | Non-white | White | Non-white | White | white | White | Non-white |
| Occupation | | | | | | | | |
| Regular Curriculum | 856 | 298 | 634 | 1,766 | 2,245 | 1,210 | 2,585 | 4,352 |
| Special Curriculum | 12 | 21 | 85 | 299 | 93 | 108 | 149 | 480 |
| Total | 868 | 319 | 719 | 2,065 | 2,338 | 1,318 | 2,734 | 4,832 |
| Intelligence Quotient | | | | | | | | |
| Regular Curriculum | 515 | 1,284 | 1 900 | 3,708 | 1,772 | 1,776 | 2,133 | 858 |
| Special Curriculum | 339 | 908 | — | — | — | — | — | — |
| Total | 854 | 2,192 | 1,900 | 3,708 | 1,772 | 1,776 | 2,133 | 858 |
| Class Size | | | | | | | | |
| Regular Curriculum | 335 | 797 | 1,101 | 964 | 3,342 | 4,653 | 1,542 | 1,212 |
| Special Curriculum | 69 | 109 | 226 | 570 | 44 | 229 | — | — |
| Total | 404 | 906 | 1,327 | 1,534 | 3,386 | 4,882 | 1,542 | 1,212 |

Note: Explanation of Categories 1, 2, 3,and 4: See Table 4 (Category 1 will be used as an illustration). Regular Curriculum Grid, Occupation Axis: Clerical, Sales, and Kindred Workers; Regular Curriculum Grid, Intelligence Quotient Axis: I.Q. of 79 and below; Regular Curriculum Grid, Class Size Axis: 25 pupils and below; Special Curriculum Grid, Occupation Axis: Clerical, Sales and Kindred Workers; Special Curriculum Grid, Intelligence Quotient Axis: I.Q. of 79 and below (Category 1 only); Special Curriculum Grid, Class Size Axis: 19 pupils and below (Categories 1, 2, 3 only).

## TABLE 7

### Distribution of Pupils (Cell Group Two) by Grid Axes Parameters and Race in Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964

| Grid Axes Parameters | Category 1 | | Category 2 | | Category 3 | | Category 4 | |
|---|---|---|---|---|---|---|---|---|
| | White | Non-white | White | Non-white | White | Non-white | White | Non-white |
| Occupation | | | | | | | | |
| Regular Curriculum | 855 | 296 | 714 | 1,641 | 2,246 | 1,211 | 2,587 | 4,296 |
| Special Curriculum | 12 | 25 | 83 | 322 | 94 | 116 | 150 | 516 |
| Total | 867 | 321 | 797 | 1,963 | 2,340 | 1,327 | 2,737 | 4,812 |
| Intelligence Quotient | | | | | | | | |
| Regular Curriculum | 596 | 1,225 | 1,899 | 3,578 | 1,772 | 1,783 | 2,135 | 858 |
| Special Curriculum | 339 | 979 | — | — | — | — | — | — |
| Total | 935 | 2,204 | 1,899 | 3,578 | 1,772 | 1,783 | 2,135 | 858 |
| Class Size | | | | | | | | |
| Regular Curriculum | 232 | 510 | 1,149 | 1,473 | 3,779 | 4,755 | 1,242 | 706 |
| Special Curriculum | 60 | 83 | 230 | 665 | 49 | 231 | — | — |
| Total | 292 | 593 | 1,379 | 2,138 | 3,828 | 4,986 | 1,242 | 706 |

Note: Explanation of Categories 1, 2, 3, and 4: See Table 4 (Category 1 will be used as an illustration). Regular Curriculum Grid, Occupation Axis: Clerical, Sales, and Kindred Workers; Regular Curriculum Grid, Intelligence Quotient Axis: I.Q. of 79 and below; Regular Curriculum Grid, Class Size Axis: 25 pupils and below; Special Curriculum Grid, Occupation Axis: Clerical, Sales,and Kindred Workers; Special Curriculum Grid, Intelligence Quotient Axis: I.Q. of 79 and below (Category 1 only); Special Curriculum Grid, Class Size Axis: 19 pupils and below (Categories 1, 2, 3 only).

## Class Size And Pupil Learning Variables Studied

Three hundred and twelve variables were included in each student record (see Appendix A). All were scrutinized. Seven were selected as most significant for Baltimore City Schools. These were processed in cell groupings previously discussed. Although all of the variables could have been processed, time and money were important considerations and restricted the number of variables and methods ultimately used in this study. The variables selected and studied follow.

| Variable | Explanation of Variable |
|---|---|
| 1 | Number of different home addresses |
| 2 | Highest grade obtained |
| 3 | Total Reading score |
| 4 | Total Arithmetic test score |
| 5 | Percentage of nonwhite faculty |
| 6 | Baltimore Teachers Examination score |
| 7 | Teacher's years of experience |

*Variable Number 1*. The number of different home addresses was obtained from an examination of the child's cumulative pupil record; each different home address was noted. Thus, the number of different home addresses the child had over the six-year period[2] covered by this study was recorded.

*Variable Number 2*. The highest grade attained by either parent was obtained from the child's cumulative pupil record. The highest grade of the father was recorded; in the absence of a male head of the household, the highest grade attained by the female was recorded.

*Variable Number 3*. Reading achievement[3] was derived as follows: Each pupil's actual reading score was subtracted from the expected normal score, at the time the child took the test, resulting in a plus or minus value. This was done for each of the years that the child had a reading score. In a sense, this represented a deviation from his expected score, either positively or negatively, and averaged over the period of this study. For example, assume that the child had taken two reading tests, one in the third grade and one in the fifth grade. The third grade expected score was 3.5; the child actually made a score of 3.3. His reading score would be −.2 months. Suppose at the fifth grade level his expected reading score should have been 5.5, but when he actually took the test it was 5.0. The reading score was 5 months below his expected reading score. Thus, the −.2 and the −.5 were averaged to yield a reading score of −.35 months.

*Variable Number 4*. Arithmetical achievement[4] was computed in the same way as the reading score explained in the previous paragraph.

*Variable Number 5*. The average percentage of nonwhite faculty was obtained as follows: Each year, the percentage of nonwhite faculty in the child's school was calculated; thus, six data values were obtained. These were averaged, and the resulting score was the average percentage of nonwhite faculty in the schools attended by each child.

*Variable Number 6*. The Baltimore Teachers Examination Score represents the score a teacher made on a locally developed general-knowledge test. The scores made by each teacher who taught a given pupil were averaged.

*Variable Number 7*. This statistic was the teacher's years of experience. Clearly, each child had had several teachers during the six years covered by this study. The number of years of teaching experience of each teacher who had taught a given pupil was duly noted, and the resulting sum was divided by the number of teachers whose years of teaching experience had been summed. The resulting score was the average teacher's years of experience.

Differences of means were compared for each variable by race and curriculum grouping, and by cell grouping. Comparisons between means allowed only for differences in class size with respect to each of the seven variables. We could have varied occupational level as well as intelligence quotient groupings. But time and money were not available to do so for this study. In Chapter V, an analysis of the data is presented.

[2]This study covered the following school years: 1959-60, 1960-61, 1961-62, 1962-63, 1963-64, and 1964-65. For certain measurements, such as pupil achievement in Reading and Arithmetic, the measurements covered a five-year interval.

[3]Reading achievement tests used were Metropolitan Elementary Reading Test, Stanford Elementary Reading Test, Stanford Intermediate Reading Test.

[4]Arithmetic achievement tests used were Metropolitan Elementary Arithmetic Test, Stanford Elementary Arithmetic Test, Stanford Intermediate Arithmetic Test.

# CHAPTER IV

# DISTRIBUTION OF CELL PARAMETER VARIABLES

In this chapter, the percentile distributions of the variables studied are discussed as well as those parameters used in cell determinations, i.e., parental occupations, intelligence quotients of the pupils studied, and the size of classes in which pupils were enrolled.

Pupils were separated into two main groups: (1) pupils enrolled in the Regular Curriculum and (2) pupils enrolled in the Special Curriculum. Each of these groups was divided by race.

## Pupil Mental Abilities

Table 8 indicates the distribution of pupil mental abilities for the pupils utilized in this study.

With respect to pupils enrolled in Regular Curriculum classes, a larger percentage of white than nonwhite children scored at the upper end of the intelligence scale. This corresponds with findings by other researchers. Specifically, the median intelligence quotient value for nonwhite children enrolled in Baltimore City's Regular Curriculum was 89 compared to 98 for white children enrolled in the same curriculum. It must be remembered that I.Q. numbers are not absolute measures of intelligence, but more truly represent a range of values dependent upon cultural and psychological factors which are not clearly defined or precisely measurable.

The reason that 100 percent of the children enrolled in Special Curriculum classes were in the I.Q. cell grouping 79 and below is that before a child is placed in Special Curriculum classes, he must have an I.Q. score of 79 or below.

**TABLE 8**

**Distribution of the Intelligence Quotients by Selected Intelligence Quotient Cell Groupings of Children Studied by Class Size, Baltimore City Public Schools, 1959-1964**

| Intelligence Quotient Groupings | Regular Curriculum | | | *Special Curriculum | | |
|---|---|---|---|---|---|---|
| | Nonwhite Children | White Children | Total | Nonwhite Children | White Children | Total |
| 1. 79 & below | 17% | 8% | 13% | 100% | 100% | 100% |
| 2. 80-94 | 49 | 30 | 41 | — | — | — |
| 3. 95-104 | 23 | 28 | 26 | — | — | — |
| 4. 105 & above | 11 | 34 | 20 | — | — | — |
| Totals | 100% | 100% | 100% | 100% | 100% | 100% |
| Median I.Q. values | 89 | 98 | 92 | — | — | — |

* Only one Intelligence Quotient cell distribution was computed for Special Curriculum children.

## Parental Occupations

Table 9 contains data on occupations of parents of children studied. Most nonwhite parents tended to be in service, laborer, operative, and kindred occupations, and next in domestic and related ones. Most white parents tended to be in professional, technical, skilled, supervisory, and kindred occupations, and next in service, laborer, operative, and related ones. More than twice as many white as nonwhite parents were in professional and skilled occupations.

## Class Size Distributions

Table 10 presents the percentage distribution of pupils studied in four different class size groupings for pupils enrolled in Regular Curriculum classes, and three dif-

ferent class size groupings for pupils enrolled in Special Curriculum classes. With respect to pupils in Regular Curriculum classes, more white children were enrolled in classes of 38 pupils and above than nonwhite ones. The situation is reversed with respect to pupils enrolled in Special Curriculum classes; more than twice as many nonwhite than white children are enrolled in classes with 26 pupils or more.

**TABLE 9**

**Distribution of the Occupations of the Parents of the Children Studied by Class Size, Baltimore City Public Schools, 1954-1964**

| Parental Occupational Grouping | Regular Curriculum | | | Special Curriculum | | |
|---|---|---|---|---|---|---|
| | Parents of Nonwhite Children | Parents of White Children | Total | Parents of Nonwhite Children | Parents of White Children | Total |
| 1. Clerical, Sales, and Kindred Workers | 4% | 13% | 7% | 2% | 4% | 3% |
| 2. Private Household and Kindred Occupations | 23 | 10 | 18 | 33 | 25 | 30 |
| 3. Professional, Technical, Skilled, Supervisory, and Kindred Occupations | 16 | 36 | 24 | 12 | 27 | 16 |
| 4. Service, Laboring, Operative, and Kindred Occupations | 57 | 41 | 51 | 33 | 44 | 51 |
| Total | 100% | 100% | 100% | 100% | 100% | 100% |

**TABLE 10**

**Distribution of Pupil Enrollments by Selected Class Size Categories of Children Studied by Class Size, Baltimore City Public Schools, 1959-1964**

| Class Size Groupings | Regular Curriculum | | | Class Size Groupings | Special Curriculum | | |
|---|---|---|---|---|---|---|---|
| | Nonwhite Children | White Children | Total | | Nonwhite Children | White Children | Total |
| 1. 25 and below | 10% | 5% | 8% | 1. 19 and below | 12% | 20% | 13% |
| 2. 26-31 | 13 | 18 | 15 | 2. 20-25 | 63 | 67 | 64 |
| 3. 32-37 | 61 | 53 | 58 | 3. 26 and over | 25 | 13 | 23 |
| 4. 38 and above | 16 | 24 | 19 | | | | |
| Total | 100% | 100% | 100% | Total | 100% | 100% | 100% |
| Median Class Size Values | 34 | 35 | 35 | Median Class Size Values | 24 | 23 | 23 |

## Distribution Of Selected Variables Studied

### Pupil Home Mobility

Table 11 contains data on pupil home mobility as measured by the number of different home addresses each pupil had on his cumulative record folder over the period of time covered by this study. As might be expected, nonwhite pupils had higher pupil mobility rates than white ones. Interestingly, in the Regular Curriculum almost 69 percent of the nonwhite pupils had three or more different home addresses over the time span covered by this study, in contrast to 47 percent of the white pupils. Pupils enrolled in Special Curriculum classes had higher mobility rates than those enrolled in Regular Curriculum classes. However, the differences in pupil home mobility rates between white children enrolled in Special Curriculum

classes and their nonwhite counterparts are not significant.

### Parental Education

Data on highest grade completed by parents of the children studied are contained in Table 12. Interestingly, parents of white children enrolled in Regular Curriculum classes completed more formal education than did parents of nonwhite children. On the other hand, parents of nonwhite children in Special Curriculum classes completed more formal education than did parents of white children in Special Curriculum classes.

**TABLE 11**

**Distribution of Pupil Home Mobility Rates (Number of Different Home Addresses) of Children Studied by Class Size, Baltimore City Public Schools, 1959-1964**

| Number of Different Home Addresses | Regular Curriculum | | | Special Curriculum | | |
|---|---|---|---|---|---|---|
| | Nonwhite Children | White Children | Total | Nonwhite Children | White Children | Total |
| 0-1 | .38% | 1.78% | .90% | 2.95% | 4.48% | 3.31% |
| 2 | 30.94 | 51.98 | 38.78 | 18.29 | 24.88 | 19.86 |
| 3 | 24.66 | 20.76 | 23.21 | 21.24 | 14.93 | 19.74 |
| 4 | 14.60 | 8.28 | 12.24 | 16.28 | 10.94 | 15.01 |
| 5 | 9.98 | 5.22 | 8.21 | 10.54 | 9.45 | 10.28 |
| 6 | 6.51 | 4.33 | 5.70 | 7.91 | 5.47 | 7.33 |
| 7 | 4.54 | 3.06 | 3.99 | 6.82 | 6.47 | 6.74 |
| 8 | 2.34 | .76 | 1.76 | 5.12 | 5.97 | 5.32 |
| 9 | 1.44 | .76 | 1.19 | 3.72 | 4.48 | 3.90 |
| 10 or more | 4.61 | 3.07 | 4.02 | 7.13 | 12.93 | 3.51 |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |
| Median No. of Home Moves | 3 | 2 | 3 | 4 | 4 | 4 |

**TABLE 12**

**Distribution of Parental Educational Levels (Highest Grade Completed) of the Parents of Children Studied by Class Size, Baltimore City Public Schools, 1959-1964**

| Highest Grade Parent Completed | Regular Curriculum | | | Special Curriculum | | |
|---|---|---|---|---|---|---|
| | Parents of Nonwhite Children | Parents of White Children | Total | Parents of Nonwhite Children | Parents of White Children | Total |
| 1 | | 1.92% | .69% | 1.89% | | 1.52% |
| 2 | | | | | 3.85% | .76 |
| 3 | | .64 | .23 | | | |
| 4 | 1.07% | .64 | .92 | 1.88 | | 1.51 |
| 5 | 2.50 | | 1.61 | .94 | | .76 |
| 6 | 6.43 | 3.85 | 5.50 | 16.98 | 15.38 | 16.67 |
| 7 | 7.50 | 1.28 | 5.27 | 7.55 | 11.54 | 8.33 |
| 8 | 5.36 | 14.74 | 8.71 | 16.04 | 3.84 | 13.64 |
| 9 | 10.71 | 10.26 | 10.55 | 13.21 | 11.54 | 12.88 |
| 10 | 8.57 | 7.05 | 8.03 | 8.49 | 11.54 | 9.09 |
| 11 | 13.21 | 7.05 | 11.01 | 8.49 | 7.69 | 8.33 |
| 12 | 36.07 | 37.18 | 36.47 | 22.64 | 26.92 | 23.48 |
| 13 | 2.50 | | 1.61 | 1.89 | 3.85 | 2.27 |
| 14 | 3.57 | 9.62 | 5.73 | | | .76 |
| 15 or more | 2.51 | 5.77 | 3.67 | | | |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |
| Median Values | 11 | 12 | 11 | 9 | 10 | 9 |

## Reading Achievement Levels

Table 13 contains data with respect to reading achievement (as measured by how far above or below grade average norms pupils scored on standardized reading tests). Children enrolled in Regular Curriculum classes were a grade-and-a-half (1.54) below grade level, on the average, compared to almost three-and-a-half grades (3.43) below grade level for children enrolled in Special Curriculum classes. When children in Regular Curriculum classes were compared by race, both white and nonwhite children were, on the average, below grade norms, but nonwhite children were almost two years (1.86) below grade norms, on the average, compared to less than one year (0.83) below grade norms, on the average, for white children.

When children in Special Curriculum classes are contrasted by race, nonwhite children (3.37) are not, on the average, very much more below grade level norms than are white children (3.66), the difference being about three months.

Clearly, what the data in Table 13 show is that, for whatever reasons, pupils in Baltimore City Public Schools (over the 1959 to 1964 period covered by this study) tended to fall further behind, on the average, in reading achievement.

## Arithmetic Achievement Levels

Table 14 contains data on the arithmetic achievement of pupils in this class size study.

**TABLE 13**

**Distribution of the Reading Achievement by Average Change in Grade Level of Children Studied by Class Size, Baltimore City Public Schools, 1959-1964**

| Average Change in Grade Level | Regular Curriculum | | | Special Curriculum | | |
|---|---|---|---|---|---|---|
| | Nonwhite Children | White Children | Total | Nonwhite Children | White Children | Total |
| 4.00 and above | | .13% | .05% | | | |
| 3.50-3.99 | | .51 | .19 | | | |
| 3.00-3.49 | | 1.01 | .38 | | | |
| 2.50-2.99 | | 1.01 | .38 | | | |
| 2.00-2.49 | .38% | 4.42 | 1.89 | | | |
| 1.50-1.99 | .76 | 4.04 | 1.99 | | | |
| 1.00-1.49 | 1.44 | 5.69 | 3.03 | | | |
| .50-.99 | 2.57 | 7.84 | 4.54 | .16% | | .12% |
| .01-.49 | 3.48 | 7.46 | 4.97 | | | |
| -.00-.49 | 5.74 | 9.73 | 7.24 | .16 | .53% | .24 |
| -.50-.99 | 9.60 | 12.26 | 10.59 | .16 | 1.59 | .49 |
| -1.00-1.49 | 14.28 | 12.77 | 13.72 | 2.23 | .53 | 1.83 |
| -1.50-1.99 | 16.17 | 10.24 | 13.95 | 5.09 | 2.64 | 4.52 |
| -2.00-2.49 | 15.57 | 9.61 | 13.34 | 7.95 | 5.29 | 7.34 |
| -2.50-2.99 | 13.83 | 7.84 | 11.59 | 16.53 | 12.70 | 15.65 |
| -3.00-3.49 | 9.60 | 2.78 | 7.05 | 24.16 | 18.52 | 22.86 |
| -3.50-3.99 | 4.69 | 1.90 | 3.64 | 21.46 | 24.87 | 22.25 |
| -4.00 and below | 1.89 | .76 | 1.46 | 22.10 | 33.33 | 24.70 |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |
| Median Values | -1.86 | -.83 | -1.54 | -3.37 | -3.66 | -3.43 |

**TABLE 14**

**Distribution of the Arithmetic Achievement by Average Change in Grade Level of Children Studied by Class Size, Baltimore City Public Schools, 1959-1964**

| Average Change in Grade Level | Regular Curriculum | | | Special Curriculum | | |
|---|---|---|---|---|---|---|
| | Nonwhite Children | White Children | Total | Nonwhite Children | White Children | Total |
| 4.00 and above | | .13% | .05% | | | |
| 3.50-3.99 | | | | | | |
| 3.00-3.49 | | .25 | .01 | | | |
| 2.50-2.99 | | .13 | .05 | .16% | | .12% |
| 2.00-2.49 | .08% | 1.65 | .66 | | | |
| 1.50-1.99 | .38 | 4.05 | 1.75 | | | |
| 1.00-1.49 | .61 | 6.97 | 2.99 | | | |
| .50-.99 | 2.73 | 12.55 | 6.40 | .16 | | .12 |
| .01-.49 | 5.30 | 14.32 | 8.67 | | .53% | .12 |
| -.00-.49 | 9.08 | 15.72 | 11.56 | 1.11 | 1.06 | 1.10 |
| -.50-.99 | 14.53 | 13.69 | 14.22 | 1.43 | 2.64 | 1.71 |
| -1.00-1.49 | 18.02 | 12.55 | 15.97 | 5.72 | 3.17 | 5.13 |
| -1.50-1.99 | 18.24 | 7.35 | 14.17 | 8.59 | 8.47 | 8.56 |
| -2.00-2.49 | 14.91 | 6.21 | 11.66 | 17.33 | 11.64 | 16.02 |
| -2.50-2.99 | 9.69 | 2.53 | 7.01 | 21.62 | 17.99 | 20.78 |
| -3.00-3.49 | 4.84 | 1.65 | 3.65 | 19.24 | 25.40 | 20.66 |
| -3.50-3.99 | 1.21 | .25 | .85 | 14.15 | 15.34 | 14.43 |
| -4.00 and below | .38 | | .24 | 10.49 | 13.76 | 11.25 |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |
| Median Values | -1.48 | -.35 | -1.10 | -2.86 | -3.08 | -2.91 |

On the average, nonwhite children enrolled in Regular Curriculum classes were almost 1.5 grades below grade level, contrasted to almost 0.4 months for their white counterparts. Children enrolled in Special Curriculum classes were about twice as much below grade level as children enrolled in Regular Curriculum classes. This is, of course, to be expected, since pupils enrolled in Special Curriculum classes scored some 25 I.Q. points, on the average, below their counterparts enrolled in Regular Curriculum classes. White children in Special Curriculum classes fell further below grade level on the average, than their nonwhite counterparts (nonwhite children were 2.86 below grade level, compared to 3.08 for white children).

### Distribution of Faculty Teaching Experience by Race of Pupils

Table 15 contains data on the number of years of teaching experience of the faculty who taught the pupils investigated in this study. The faculty who taught nonwhite pupils enrolled in Regular Curriculum classes had, on the average, 11.5 years of teaching experience. The faculty who taught white pupils enrolled in the same curriculum had, on the average, 13.0 years of teaching experience.

With respect to pupils enrolled in Special Curriculum classes, the faculty who taught nonwhite pupils had, on the average, 10.5 years of teaching experience compared to the 15.0 years of teaching experience of the faculty who taught white pupils.

### Racial Composition of Teaching Faculty

Table 16 contains data on the race of faculty members who taught children studied in this project. In the main, nonwhite faculty taught nonwhite children, and white faculty members taught white children. Statistics in Table 16 show that, on the average, nonwhite students had a faculty composed of 91 percent nonwhites, whereas white students had a faculty composed of only 9 percent nonwhites. Similar statistics prevail for faculty members of students enrolled in Special Curriculum classes; for example, nonwhite pupils had, on the average, faculties composed of 87 percent nonwhite contrasted to 12 percent for white children.

## TABLE 15

### Distribution of the Faculty Teaching Experience of Children Studied by Class Size, Baltimore City Public Schools, 1959-1964

| Teachers' Years of Experience | Regular Curriculum | | | Special Curriculum | | |
|---|---|---|---|---|---|---|
| | Nonwhite Children | White Children | Total | Nonwhite Children | White Children | Total |
| 00.00-2.99 | 1.96% | .75% | 1.51% | 1.86% | | 1.42% |
| 3.00-5.99 | 13.27 | 10.04 | 12.06 | 23.14 | 12.94% | 20.71 |
| 6.00-8.99 | 18.10 | 17.32 | 17.80 | 20.03 | 15.92 | 19.05 |
| 9.00-11.99 | 20.29 | 16.81 | 18.98 | 10.56 | 7.96 | 9.94 |
| 12.00-14.99 | 18.25 | 15.18 | 17.10 | 12.42 | 12.94 | 12.55 |
| 15.00-17.99 | 11.76 | 11.79 | 11.78 | 9.63 | 12.94 | 10.41 |
| 18.00-20.99 | 8.37 | 10.92 | 9.33 | 8.85 | 9.95 | 9.11 |
| 21.00-23.99 | 4.83 | 7.91 | 5.98 | 4.35 | 10.94 | 5.92 |
| 24.00-26.99 | 2.26 | 5.27 | 3.39 | 4.35 | 5.47 | 4.62 |
| 27.00-29.99 | .45 | 2.13 | 1.08 | 2.64 | 3.48 | 2.84 |
| 30.00 or more | .46 | 1.88 | .99 | 2.17 | 7.46 | 3.43 |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |
| Median Values | 11.5 | 13.0 | 11.9 | 10.5 | 15.0 | 11.5 |

## TABLE 16

### Distribution of the Racial Composition of Faculty of Children Studied by Class Size, Baltimore City Public Schools, 1959-1964

| Percent Nonwhite Faculty | Regular Curriculum | | | Special Curriculum | | |
|---|---|---|---|---|---|---|
| | Nonwhite Children | White Children | Total | Nonwhite Children | White Children | Total |
| .01-10.00 | 1.43% | 59.61% | 22.81% | .62% | 44.08% | 10.31% |
| 10.01-20.00 | 1.66 | 21.04 | 8.78 | 3.39 | 25.81 | 8.39 |
| 20.01-30.00 | 3.39 | 11.69 | 6.44 | 6.48 | 15.60 | 8.51 |
| 30.01-40.00 | 4.15 | 3.37 | 3.86 | 3.09 | 5.91 | 3.72 |
| 40.01-50.00 | 4.07 | 1.82 | 3.24 | 5.25 | 2.69 | 4.68 |
| 50.01-60.00 | 5.51 | .39 | 3.63 | 6.64 | 3.22 | 5.88 |
| 60.01-70.00 | 8.22 | .26 | 5.30 | 8.18 | 1.61 | 6.71 |
| 70.01-80.00 | 6.86 | .65 | 4.58 | 10.80 | .54 | 8.51 |
| 80.01-90.00 | 10.33 | .91 | 6.87 | 7.87 | | 6.12 |
| 90.01 and over | 54.38 | .26 | 34.49 | 47.68 | .54 | 37.17 |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |
| Median Values | 91 | 9 | 62 | 87 | 12 | 72 |

## TABLE A-1

**Variables Put on Magnetic Tape for Class Size and Pupil Learning Study**
**Baltimore City Public Schools**
**Tape Record No. 1 Format**

Variable

1. Record Number
2. Pupil Number
3. Race/Sex
4. Age in Months (as of October 1, 1965)
5. Grade
6. Number of Different Home Addresses During Elementary School
7. Number of Different Home Addresses During Junior High School
8. Father's Occupation
9. Mother's Occupation
10. Highest Grade Attained by Father
11. Highest Grade Attained by Mother
12. Number of Different Schools Attended Elementary School
13. Number of Different Schools Attended Junior High School

***Standardized Ability (I.Q.) Scores***

14. I.Q. Test Score Taken in 1959
15. I.Q. Test Score Taken in 1960
16. I.Q. Test Score Taken in 1961
17. I.Q. Test Score Taken in 1962
18. I.Q. Test Score Taken in 1963
19. I.Q. Test Score Taken in 1964

***Standardized Reading Scores (Totals)***

20. Reading Test Score Taken in 1959
21. Reading Test Score Taken in 1960
22. Reading Test Score Taken in 1961
23. Reading Test Score Taken in 1962
24. Reading Test Score Taken in 1963
25. Reading Test Score Taken in 1964

***Standardized Reading Scores (Paragraph)***

26. Reading Test Score Taken in 1959
27. Reading Test Score Taken in 1960
28. Reading Test Score Taken in 1961
29. Reading Test Score Taken in 1962
30. Reading Test Score Taken in 1963
31. Reading Test Score Taken in 1964

***Standardized Reading Scores (Word Meaning)***

32. Reading Test Score Taken in 1959
33. Reading Test Score Taken in 1960
34. Reading Test Score Taken in 1961
35. Blank

## TABLE A-2

**Variables Put on Magnetic Tape for Class Size and Pupil Learning Study**
**Baltimore City Public Schools**
**Tape Record No. 2 Format**

Variable

1. Record Number
2. Pupil Number

***Standardized Reading Scores (Word Meaning)***

3. Reading Test Score Taken in 1962
4. Reading Test Score Taken in 1963
5. Reading Test Score Taken in 1964

***Standardized Arithmetic Scores (Totals)***

6. Arithmetic Test Score Taken in 1959
7. Arithmetic Test Score Taken in 1960
8. Arithmetic Test Score Taken in 1961
9. Arithmetic Test Score Taken in 1962
10. Arithmetic Test Score Taken in 1963
11. Arithmetic Test Score Taken in 1964

***Standardized Arithmetic Scores (Reasoning)***

12. Arithmetic Test Score Taken in 1959
13. Arithmetic Test Score Taken in 1960
14. Arithmetic Test Score Taken in 1961
15. Arithmetic Test Score Taken in 1962
16. Arithmetic Test Score Taken in 1963
17. Arithmetic Test Score Taken in 1964

***Standardized Arithmetic Scores (Computation)***

18. Arithmetic Test Score Taken in 1959
19. Arithmetic Test Score Taken in 1960
20. Arithmetic Test Score Taken in 1961
21. Arithmetic Test Score Taken in 1962
22. Arithmetic Test Score Taken in 1963
23. Arithmetic Test Score Taken in 1964

Teacher Grades[a]

***Oral Expression***

24. Grade given in 1959
25. Grade given in 1960
26. Grade given in 1961
27. Grade given in 1962
28. Grade given in 1963
29. Grade given in 1964

***Listening***

30. Grade given in 1959
31. Grade given in 1960
32. Grade given in 1961
33. Grade given in 1962
34. Grade given in 1963
35. Blank

[a]Variables 24 to 34 inclusive are teacher grades given to pupils by their teachers. These represent grades from teacher devised and administered tests.

## TABLE A-3

**Variables Put on Magnetic Tape for Class Size and Pupil Learning Study**
**Baltimore City Public Schools**
**Tape Record No. 3 Format**

Variable

1. Record Number
2. Pupil Number

Teacher Grades*

***Listening***

3. Grade given in 1964

***Reading***

4. Grade given in 1959
5. Grade given in 1960
6. Grade given in 1961
7. Grade given in 1962
8. Grade given in 1963
9. Grade given in 1964

***Written Expression***

10. Grade given in 1959
11. Grade given in 1960
12. Grade given in 1961
13. Grade given in 1962
14. Grade given in 1963
15. Grade given in 1964

***Spelling***

16. Grade given in 1959
17. Grade given in 1960
18. Grade given in 1961
19. Grade given in 1962
20. Grade given in 1963
21. Grade given in 1964

***Handwriting***

22. Grade given in 1959
23. Grade given in 1960
24. Grade given in 1961
25. Grade given in 1962
26. Grade given in 1963
27. Grade given in 1964

***Arithmetic***

28. Grade given in 1959
29. Grade given in 1960
30. Grade given in 1961
31. Grade given in 1962
32. Grade given in 1963
33. Grade given in 1964

***Social Living***

34. Grade given in 1959
35. Blank

*Variables 3 to 34 inclusive are teacher grades given to pupils by their teachers. These represent grades from teacher devised and administered tests.

## TABLE A-4

**Variables Put on Magnetic Tape for Class Size and Pupil Learning Study**
**Baltimore City Public Schools**
**Tape Record No. 4 Format**

Variable

1. Record Number
2. Pupil Number

Teacher Grades*

***Social Living***

3. Grade given in 1960
4. Grade given in 1961
5. Grade given in 1962
6. Grade given in 1963
7. Grade given in 1964

***Music***

8. Grade given in 1959
9. Grade given in 1960
10. Grade given in 1961
11. Grade given in 1962
12. Grade given in 1963
13. Grade given in 1964

***Art***

14. Grade given in 1959
15. Grade given in 1960
16. Grade given in 1961
17. Grade given in 1962
18. Grade given in 1963
19. Grade given in 1964

***Physical Education***

20 Grade given in 1959
21. Grade given in 1960
22. Grade given in 1961
23. Grade given in 1962
24. Grade given in 1963
25. Grade given in 1964

***Other***

26. Grade given in 1959
27. Grade given in 1960
28. Grade given in 1961
29. Grade given in 1962
30. Grade given in 1963
31. Grade given in 1964
32. English Grade for 1963
33. English Grade for 1964
34. Language Grade for 1963
35. Blank

*Variables 3 to 34 inclusive are teacher grades given to pupils by their teachers. These represent grades from teacher devised and administered tests.

## TABLE A-5

**Variables Put on Magnetic Tape for Class Size and Pupil Learning Study**
**Baltimore City Public Schools**
**Tape Record No. 5 Format**

Variable

1. Record Number
2. Pupil Number

Teacher Grades*

3. Language Grade for 1964
4. Mathematics Grade for 1963
5. Mathematics Grade for 1964
6. Algebra Grade for 1963
7. Algebra Grade for 1964
8. Social Studies Grade for 1963
9. Social Studies Grade for 1964
10. Geography Grade for 1963
11. Geography Grade for 1964
12. History Grade for 1963
13. History Grade for 1964
14. Science Grade for 1963
15. Science Grade for 1964
16. Physical Education Grade for 1963
17. Physical Education Grade for 1964
18. Art Grade for 1963
19. Art Grade for 1964
20. Music Grade for 1963
21. Music Grade for 1964
22. Business Education Grade for 1963
23. Business Education Grade for 1964
24. Home Economics Grade for 1963
25. Home Economics Grade for 1964
26. Industrial Arts Grade for 1963
27. Industrial Arts Grade for 1964
28. School in 1959
29. Grade in 1959
30. Teacher's Name Code

***School Data* (as of 1959 only)**

31. Number of White Faculty
32. Number of Nonwhite Faculty
33. Number of White Pupils
34. Number of Nonwhite Pupils
35. Blank

*Variables 3 to 27 inclusive are teacher grades given to pupils by their teachers. These represent grades from teacher devised and administered tests.

## TABLE A-6

**Variables Put on Magnetic Tape for Class Size and Pupil Learning Study**
**Baltimore City Public Schools**
**Tape Record No. 6 Format**

Variable

1. Record Number
2. Pupil Number

***Class Data* (as of 1959 only)**

3. Number of White Pupils
4. Number of Nonwhite Pupils
5. Teacher's Race/Sex

***Teacher Data* (as of 1959 only)**

6. Baltimore Teacher Examination Score
7. Teacher's Salary
8. Teacher's Years of Experience
9. Teacher's Degree Status

***Class Climate* (as of 1959 only)**

10. Median I.Q. of pupil's class
11. Median Reading level of pupil's class
12. Median Arithmetic level of pupil's class
13. School in 1960
14. Grade in 1960
15. Teacher's Name Code

***School Data* (as of 1960 only)**

16. Number of White Faculty
17. Number of Nonwhite Faculty
18. Number of White Pupils
19. Number of Nonwhite Pupils

***Class Data* (as of 1960 only)**

20. Number of White Pupils
21. Number of Nonwhite Pupils
22. Teacher's Race/Sex

***Teacher Data* (as of 1960 only)**

23. Baltimore Teacher Examination Score
24. Teacher's Salary
25. Teacher's Years of Experience
26. Teacher's Degree Status

***Class Climate* (as of 1960 only)**

27. Median I.Q. of pupil's class
28. Median Reading level of pupil's class
29. Median Arithmetic level of pupil's class
30. School in 1961
31. Grade in 1961
32. Teacher's Name Code

***School Data* (as of 1961 only)**

33. Number of White Faculty
34. Number of Nonwhite Faculty
35. Blank

## TABLE A-7

**Variables Put on Magnetic Tape for Class Size and Pupil Learning Study**
**Baltimore City Public Schools**
**Tape Record No. 7 Format**

Variable

1. Record Number
2. Pupil Number

***School Data*** **(as of 1961 only)**

3. Number of White Pupils
4. Number of Nonwhite Pupils

***Class Data*** **(as of 1961 only)**

5. Number of White Pupils
6. Number of Nonwhite Pupils
7. Teacher's Race/Sex

***Teacher Data*** **(as of 1961 only)**

8. Baltimore Teacher Examination Score
9. Teacher's Salary
10. Teacher's Years of Experience
11. Teacher's Degree Status

***Class Climate*** **(as of 1961 only)**

12. Median I.Q. of pupil's class
13. Median Reading level of pupil's class
14. Median Arithmetic level of pupil's class
15. School in 1962
16. Grade in 1962
17. Teacher's Name Code

***School Data*** **(as of 1962 only)**

18. Number of White Faculty
19. Number of Nonwhite Faculty
20. Number of White Pupils
21. Number of Nonwhite Pupils

***Class Data*** **(as of 1962 only)**

22. Number of White Pupils
23. Number of Nonwhite Pupils
24. Teacher's Race/Sex

***Teacher Data*** **(as of 1962 only)**

25. Baltimore Teacher Examination Score
26. Teacher's Salary
27. Teacher's Years of Experience
28. Teacher's Degree Status

***Class Climate*** **(as of 1962 only)**

29. Median I.Q. of pupil's class
30. Median Reading level of pupil's class
31. Median Arithmetic level of pupil's class
32. School in 1963
33. Grade in 1963
34. Teacher's Name Code
35. Blank

## TABLE A-8

**Variables Put on Magnetic Tape for Class Size and Pupil Learning Study**
**Baltimore City Public Schools**
**Tape Record No. 8 Format**

Variable

1. Record Number
2. Pupil Number

***School Data*** **(as of 1963 only)**

3. Number of White Faculty
4. Number of Nonwhite Faculty
5. Number of White Pupils
6. Number of Nonwhite Pupils

***Class Data*** **(as of 1963 only)**

7. Number of White Pupils
8. Number of Nonwhite Pupils
9. Teacher's Race/Sex

***Teacher Data*** **(as of 1963 only)**

10. Baltimore Teacher Examination Score
11. Teacher's Salary
12. Teacher's Years of Experience
13. Teacher's Degree Status

***Class Climate*** **(as of 1963 only)**

14. Median I.Q. of pupil's class
15. Median Reading level of pupil's class
16. Median Arithmetic level of pupil's class
17. School in 1964
18. Grade in 1964
19. Teacher's Name Code

***School Data*** **(as of 1964 only)**

20. Number of White Faculty
21. Number of Nonwhite Faculty
22. Number of White Pupils
23. Number of Nonwhite Pupils

***Class Data*** **(as of 1964 only)**

24. Number of White Pupils
25. Number of Nonwhite Pupils
26. Teacher's Race/Sex

***Teacher Data*** **(as of 1964 only)**

27. Baltimore Teacher Examination Score
28. Teacher's Salary
29. Teacher's Years of Experience
30. Teacher's Degree Status

***Class Climate*** **(as of 1964 only)**

31. Median I.Q. of pupil's class
32. Median Reading level of pupil's class
33. Median Arithmetic level of pupil's class
34. Blank

## TABLE A-9

**Variables Put on Magnetic Tape for Class Size and Pupil Learning Study**
**Baltimore City Public Schools**
**Tape Record No. 9 Format**

Variable

1. Record Number
2. Pupil Number

***Standardized Test***
***(Lorge-Thorndike Intelligence Tests)****

***Non-Verbal Test***

3. Test 1 score
4. Test 2 score
5. Test 3 score
6. Total Non-Verbal Test Score

***Verbal Test***

7. Test 1 score
8. Test 2 score
9. Test 3 score
10. Test 4 score
11. Test 5 score
12. Total Verbal Test Score

***Standardized Test***
***(Stanford Achievement Tests)***

***Spelling Test***

13. Paragraph Meaning score
14. Spelling score
15. Total Spelling Test Score

***Language Test***

16. Part A, Usage Test score
17. Part B, Punctuation Test score
18. Part C, Capitalization Test score
19. Part D, Dictionary Skills Test score
20. Part E, Sentence Sense Test score
21. Total Language Test Score

***Arithmetic Test***

22. Computation Test score
23. Concepts Test score
24. Applications Test score
25. Total Arithmetic Test Score

***Social Studies and Science Test***

26. Part A, Social Studies, Content Test score
27. Part B, S.S., Skills Test score
28. Science Test score
29. Total S.S. and Science Test Score

***Teacher Number (numerical code)***

30. 1959
31. 1960
32. 1961
33. 1962
34. 1963
35. Blank

*Pupils in Grade 6 in April of 1965 took Level 3 form of the test.
Pupils in Grade 8 in April of 1965 took Level 4 form of the test.

## TABLE A-10

**Variables Put on Magnetic Tape for Class Size and Pupil Learning Study**
**Baltimore City Public Schools**
**Tape Record No. 10 Format**

Variable

1. Record Number
2. Pupil Number

***Teacher Number (numerical code)***

3. 1964

***National Teacher Examination Scores***

***Professional Information Scores***

4. Professional Information Score made in 1959
5. Professional Information Score made in 1960
6. Professional Information Score made in 1961
7. Professional Information Score made in 1962
8. Professional Information Score made in 1963
9. Professional Information Score made in 1964

***Non-Verbal Reasoning Scores***

10. Non-Verbal Reasoning Score made in 1959
11. Non-Verbal Reasoning Score made in 1960
12. Non-Verbal Reasoning Score made in 1961
13. Non-Verbal Reasoning Score made in 1962
14. Non-Verbal Reasoning Score made in 1963
15. Non-Verbal Reasoning Score made in 1964

***English Expression Scores***

16. English Expression Score made in 1959
17. English Expression Score made in 1960
18. English Expression Score made in 1961
19. English Expression Score made in 1962
20. English Expression Score made in 1963
21. English Expression Score made in 1964

***Social Studies, Literature, and Fine Arts Scores***

22. SS, Lit., and Fine Arts Score made in 1959
23. SS, Lit., and Fine Arts Score made in 1960
24. SS, Lit., and Fine Arts Score made in 1961
25. SS, Lit., and Fine Arts Score made in 1962
26. SS, Lit., and Fine Arts Score made in 1963
27. SS, Lit., and Fine Arts Score made in 1964

***Science and Math Scores***

28. Science and Math Score made in 1959
29. Science and Math Score made in 1960
30. Science and Math Score made in 1961
31. Science and Math Score made in 1962
32. Science and Math Score made in 1963
33. Science and Math Score made in 1964

***Weighted Common Exam Total***

34. Common exam total score made in 1959
35. Blank

## TABLE A-11

**Variables Put on Magnetic Tape for Class Size and Pupil Learning Study**
**Baltimore City Public Schools**
**Tape Record No. 11 Format**

Variable

1. Record Number
2. Pupil Number

***National Teacher Examination Scores***

***Weighted Common Exam Total***

3. Teacher's weighted common exam total score made in 1960
4. Teacher's weighted common exam total score made in 1961
5. Teacher's weighted common exam total score made in 1962
6. Teacher's weighted common exam total score made in 1963
7. Teacher's weighted common exam total score made in 1964
8. Blank

# CHAPTER V

## ANALYSIS OF STATISTICAL DATA ON CLASS SIZE AND PUPIL LEARNING

For purposes of analysis, in this chapter students are subdivided into the following main divisions: curriculum and race. Curriculum is divided into the following two subdivisions: (1) Regular Curriculum, and (2) Special Education Curriculum. Race is also subdivided into two categories: (1) White, and (2) Nonwhite. Data on pupil achievement and class size are analyzed holding constant curriculum, race, occupation of parent, and intelligence quotient groupings. Data on home factors deal with (1) pupil mobility, and (2) parental education. Data on faculty consist of the following three factors: (1) percentage of nonwhite faculty members, (2) faculty knowledge, and (3) faculty teaching experience.

Class size comparisons could have been made in many different ways. For example, white students could have been compared with nonwhite students by various class size categories; students whose parents were in different occupations could have been compared by various class size categories; students in regular curriculum classes could have been compared with students in special education classes; students whose parents were at different educational levels could have been compared by various class size categories; in short the parameters available to us provided opportunities to make hundreds of different class size comparisons—all of great importance in shedding light on the class size and pupil learning question. Because of limitations with respect to time and money, we were forced to make decisions regarding what variables we would study out of the hundreds available to us. Even after the variables actually used in this study were selected for data processing, there were hundreds of different class size comparisons possible. As indicated in Chapter III, students were subsumed under 76 different cell groupings, 4 intelligence categories, 4 class sizes, 2 ethnic groups, 4 occupations, 7 variables, and 2 curriculum divisions making it possible for us to make over 20,000 statistical comparisons. We elected to study pupil achievement in four different class size groupings keeping race, curriculum, intelligence, and parental occupation constant.

## ANALYSIS OF CLASS SIZE COMPARISONS FOR WHITE STUDENTS IN REGULAR CURRICULUM CLASSES BY OCCUPATIONAL GROUPINGS

Data on white pupils enrolled in regular curriculum classes are reported in 16 tables by 4 occupational and 4 intelligence quotient groupings. Although mean differences and critical ratios were computed for each cell matrix, those cells without an acceptable minimum level of cases were not statistically utilized nor reported in the various 16 tables.

## TABLE 17

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were 79 and Below and Whose Parents Were Employed in Sales, Clerical, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Pupil Mobility | | HOME FACTORS: Parental Education | | PUPIL ACHIEVEMENT FACTORS: Reading | | PUPIL ACHIEVEMENT FACTORS: Arithmetic | | FACULTY FACTORS: % Nonwhite Faculty | | FACULTY FACTORS: Faculty Knowledge | | FACULTY FACTORS: Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | .01 | — | .01 | .05 | — | .01 | — | — | — | — | — | — | — |
| 1-25 | 32-37 | — | — | .02 | — | .05 | — | .01 | — | — | — | — | — | — | — |
| 1-25 | 38 & over | — | — | — | .05 | — | — | .01 | — | — | — | — | .05 | — | .02 |
| 26-31 | 32-37 | .01 | — | — | — | .01 | — | .02 | | .05 | — | — | .01 | — | .02 |
| 26-31 | 38 & over | .01 | — | — | .02 | — | .02 | — | .05 | .01 | — | — | — | — | — |
| 32-37 | 38 & over | — | .02 | .01 | — | — | — | — | — | .02 | — | .02 | — | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

Any cell which did not have at least 30 cases was considered as not having an acceptable minimum level, and therefore the results of tests of statistical significance between mean values were not reported regardless of whether or not mean differences were statistically significant.

## Class Size Comparisons of White Students in Regular Curriculum Classes by the Occupational Grouping: Sales, Clerical, and Kindred Occupations

Tables 17, 18, 19, and 20 contain data on tests of statistical significance of the differences between means for selected class size groupings for white children in regular curriculum classes whose parents were employed in sales, clerical, and kindred occupations. Pupils were divided into four intelligence quotient groupings. However, in the paragraphs which follow, student gains in reading and arithmetic achievement are reported without regard for ability (this is done in a later section of this chapter) but with regard to the number of favorable supporting characteristics such as teachers' academic knowledge, teachers' years of teaching experience, and parents' educational level.

*Reading Achievement.* For white students whose parents were employed in sales, clerical, and kindred occupations, those students in smaller classes made significantly higher gains in reading achievement over a 5-year period (1959-1964) in 16 comparisons to 2 for students in larger classes. Six comparisons were not statistically significant, favoring neither larger nor smaller classes. These statistics indicate that the ratio favoring smaller over larger classes is 8 to 1.

When the statistics involving only white students in the smallest class size grouping (1-25 pupils) are analyzed, the results are rather impressive. Out of 12 comparisons, white students in the smallest class size grouping (1-25 pupils) made significantly higher gains in reading in 8 comparisons to 0 for those in the larger class size groupings. Four comparisons were not statistically significant.

*Arithmetic Achievement.* White students in smaller classes and whose parents were employed in sales, clerical, and kindred occupations made significantly greater gains in arithmetic over the 5-year period (1959-1964) in 15 comparisons to 2 for like students in larger classes. Seven comparisons were not statistically significant favoring neither smaller nor larger classes. With respect to gains in arithmetic achievement the ratio favoring smaller over larger classes is 7.5 to 1.

An analysis of the results involving only white students in the smallest class size grouping (1-25 pupils) indicates that out of 12 comparisons, the students in the smallest class size grouping made significantly higher gains in arithmetic in 9 comparisons to 0 for like students in larger classes. Three comparisons were not statistically significant, favoring neither smaller nor larger classes.

*Summary of Pupil Achievement by the Occupational Grouping: Sales, Clerical, and Kindred Occupations.* Table 21 summarizes pupil achievement gains in arithmetic and reading for white students in selected class size groupings and whose parents were employed in sales, clerical, and kindred occupations. Also summarized are the comparisons with respect to pupil home mobility, parental education, percentage of pupils' teachers who were nonwhite, the academic knowledge of the pupils' teachers, and the years of teaching experience the pupils' teachers possessed.

White students in smaller classes and whose parents were employed in sales, clerical, and kindred occupations made significantly higher gains in reading and arithmetic over the 5-year period (1959-1964) in 31 comparisons to 4 for like students in larger classes. Thirteen comparisons did not significantly favor either smaller or larger classes. Thus, these statistics indicate that the ratio favoring the smaller

## TABLE 18

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were Between 80 and 94 and Whose Parents Were Employed in Sales, Clerical, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Pupil Mobility | | HOME FACTORS: Parental Education | | PUPIL ACHIEVEMENT FACTORS: Reading | | PUPIL ACHIEVEMENT FACTORS: Arithmetic | | FACULTY FACTORS: % Nonwhite Faculty | | FACULTY FACTORS: Faculty Knowledge | | FACULTY FACTORS: Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | .01 | .01 | — | .02 | — | — | — | — | .01 | — | — |
| 1-25 | 32-37 | — | .05 | — | — | .01 | — | — | — | | | — | — | — | .02 |
| 1-25 | 38 & over | | | | | .05 | — | .01 | — | | | .02 | — | — | — |
| 26-31 | 32-37 | — | — | .01 | — | — | .01 | — | .01 | .05 | — | .01 | — | — | — |
| 26-31 | 38 & over | .05 | — | .01 | — | .01 | — | .01 | — | .01 | — | — | — | — | .01 |
| 32-37 | 38 & over | — | — | .01 | — | .01 | — | .01 | — | .01 | — | — | .01 | — | .01 |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

over larger classes is almost 7.8 to 1. Perhaps, the 7.8 to 1 ratio favoring pupil performance in smaller over larger classes was achieved because the pupils in the smaller classes had a significant number of favorable supporting characteristics going for them. We arbitrarily made the assumption that too many home moves would exert a negative influence on pupil achievement and that parents with more formal years of education, teachers who scored high on academic knowledge tests, and teachers who had more years of teaching experience would exert positive influences on pupils with respect to academic achievement.

Out of a total of 22 comparisons, white students in smaller classes had significantly more home moves in 7 comparisons to 5 for their counterparts in larger classes. Ten comparisons were not statistically significant. These statistics indicate that white students in larger classes and whose parents were employed in sales, clerical, and kindred occupations were not more adversely affected than their fellow students in smaller classes. We would be hard put to draw the conclusion that the 7.8 to 1 ratio obtained here is the consequence of undue negative influences due to excessive home moves by the pupil in larger classes.

Let's analyze next the positive influences of parental education, faculty knowledge, and faculty teaching experience. Out of 71 comparisons, white students in smaller classes had favorable supporting characteristics in 11 instances, those in larger classes in 25 comparisons, and 35 comparisons favored neither smaller nor larger classes. Thus, white students in larger classes enjoyed an advantage of more than 2 to 1 over those in smaller classes with respect to favorable supporting characteristics. This ratio is distributed about evenly among the three separate characteristics as evidenced by the following ratios: (1) for parental education, pupils in larger classes had 9 favorable comparisons to 5 for those in smaller classes; 9 comparisons favored neither class size groupings; (2) for faculty knowledge, the ratio of larger to smaller classes was 9 to 3, with 12 comparisons favoring neither larger nor smaller classes; and (3) for faculty teaching experience, pupils in larger classes had the advantage over those in smaller classes by the ratio of 7 to 3, with 14 comparisons benefiting neither pupils in larger nor smaller classes.

We, therefore, can assert with great confidence that pupils in larger classes benefited more from such favorable characteristics as parental education, faculty academic knowledge, and faculty teaching experience than those in smaller classes. Consequently, the fact that white students in smaller classes whose parents were employed in sales, clerical, and kindred occupations made significantly greater gains in reading and arithmetic over like students in larger classes in a ratio of 7.8 to 1 cannot be attributed to the fact that the students in the smaller classes benefited significantly more from favorable supporting characteristics than their counterparts in larger classes.

An analysis of pupil academic performance involving only those in the smallest class size grouping (1-25 pupils) sheds further light on the class size and pupil learning question. Out of 24 comparisons, white students in smaller classes whose parents were employed in sales, clerical, and kindred occupations made significantly greater gains in reading and arithmetic in 17 comparisons to 0 for students in larger classes. Seven comparisons were not statistically significant.

In summary, class size is an important factor to be taken into consideration for white students whose parents are employed in sales, clerical, and kindred occupations. The chances are at least 7.8 to 1 that they will learn more arithmetic and read better as measured by standardized tests if they are in smaller rather than larger classes, even when the size of classes differs only by as little as 6 pupils.

## TABLE 19

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were Between 95 and 104 and Whose Parents Were Employed in Sales, Clerical, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Pupil Mobility | | HOME FACTORS: Parental Education | | PUPIL ACHIEVEMENT FACTORS: Reading | | PUPIL ACHIEVEMENT FACTORS: Arithmetic | | % Nonwhite Faculty | | FACULTY FACTORS: Faculty Knowledge | | Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 1-25 | 32-37 | — | — | — | — | .01 | — | .01 | — | — | — | — | — | — | — |
| 1-25 | 38 & over | — | — | — | — | .02 | — | .01 | — | — | — | — | — | — | — |
| 26-31 | 32-37 | .01 | — | — | .01 | .01 | — | .01 | — | — | .01 | — | — | — | — |
| 26-31 | 38 & over | — | — | — | .01 | .01 | — | .01 | — | — | .01 | — | .01 | — | — |
| 32-37 | 38 & over | — | .01 | — | — | .01 | — | — | — | — | — | — | .01 | .05 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 20

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were 105 and Above and Whose Parents Were Employed in Sales, Clerical, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | .01 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 1-25 | 32-37 | — | — | — | .02 | — | — | .01 | — | — | — | — | .01 | — | — |
| 1-25 | 38 & over | — | — | — | — | .01 | — | .02 | — | — | — | — | — | — | .02 |
| 26-31 | 32-37 | .01 | — | — | — | — | — | — | — | .01 | — | — | .01 | — | .05 |
| 26-31 | 38 & over | .01 | — | — | .01 | .01 | — | — | — | .01 | — | — | .01 | .01 | — |
| 32-37 | 38 & over | — | .05 | — | .01 | .01 | — | .02 | — | .05 | — | — | — | .01 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 21

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes and Whose Parents Were Employed in Sales, Clerical, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 1 | 1 | 2 | 0 | 2 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 0 | 0 | 4 | 0 | 1 | 3 | 0 | 0 | 4 |
| 1-25 | 32-37 | 0 | 1 | 3 | 1 | 1 | 2 | 3 | 0 | 1 | 3 | 0 | 1 | 0 | 0 | 3 | 0 | 1 | 3 | 0 | 1 | 3 |
| 1-25 | 38 & over | 0 | 0 | 3 | 0 | 1 | 2 | 3 | 0 | 1 | 4 | 0 | 0 | 0 | 0 | 3 | 1 | 1 | 2 | 0 | 2 | 2 |
| Sub-Total | | 1 | 2 | 8 | 1 | 4 | 6 | 8 | 0 | 4 | 9 | 0 | 3 | 0 | 0 | 10 | 1 | 3 | 8 | 0 | 3 | 9 |
| 26-31 | 32-37 | 3 | 0 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 3 | 1 | 0 | 1 | 2 | 1 | 0 | 2 | 2 |
| 26-31 | 38 & over | 3 | 0 | 1 | 1 | 3 | 0 | 3 | 1 | 0 | 2 | 1 | 1 | 3 | 1 | 0 | 0 | 2 | 2 | 1 | 1 | 2 |
| 32-37 | 38 & over | 0 | 3 | 0 | 2 | 1 | 1 | 3 | 0 | 1 | 2 | 0 | 2 | 3 | 0 | 1 | 1 | 2 | 1 | 2 | 1 | 1 |
| Total | | 7 | 5 | 10 | 5 | 9 | 9 | 16 | 2 | 6 | 15 | 2 | 7 | 9 | 2 | 11 | 3 | 9 | 12 | 3 | 7 | 14 |

S - Small Classes
L - Larger Classes
N - Neither

## TABLE 22

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were 79 and Below and Whose Parents Were Employed in Private Households and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS Pupil Mobility | | HOME FACTORS Parental Education | | PUPIL ACHIEVEMENT FACTORS Reading | | PUPIL ACHIEVEMENT FACTORS Arithmetic | | FACULTY FACTORS % Nonwhite Faculty | | FACULTY FACTORS Faculty Knowledge | | FACULTY FACTORS Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | .01 | — | — | .05 | — | .01 | — | — | .01 | .01 | — | .01 | — |
| 1-25 | 32-37 | — | — | — | .02 | — | — | .01 | — | — | .01 | .01 | — | .01 | — |
| 1-25 | 38 & over | — | — | — | .05 | — | — | .01 | — | — | .01 | — | .01 | .01 | — |
| 26-31 | 32-37 | .01 | — | — | — | — | .05 | — | .01 | .05 | — | .02 | — | — | — |
| 26-31 | 38 & over | .01 | — | — | — | — | .01 | — | .01 | — | .01 | — | .01 | .01 | — |
| 32-37 | 38 & over | .01 | — | — | — | — | — | — | .01 | — | .01 | — | .01 | .01 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 23

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were Between 80 and 94 and Whose Parents Were Employed in Private Households and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | .01 | — | — | — | — | — | .01 | — | — | — | — | .05 |
| 1-25 | 32-37 | — | — | .02 | — | .02 | — | .01 | — | .01 | — | — | — | — | .01 |
| 1-25 | 38 & over | .02 | — | — | .01 | — | — | — | — | .01 | — | — | — | — | |
| 26-31 | 32-37 | .05 | — | — | .01 | .01 | — | .05 | — | — | .05 | — | — | — | .01 |
| 26-31 | 38 & over | .01 | — | — | — | — | — | — | — | .01 | — | — | .01 | — | .01 |
| 32-37 | 38 & over | .05 | — | — | .01 | — | .01 | — | — | .01 | — | — | .05 | — | .01 |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

### Class Size Comparisons of White Students in Regular Curriculum Classes by the Occupational Grouping: Private Households and Kindred Occupations

Tables 22, 23, 24, and 25 report data on tests of statistical significance of the differences between means for selected class size groupings for white children in regular curriculum classes whose parents were employed in private households and kindred occupations. These four tables subdivide the occupational grouping into four ability groupings. Student gains in reading and arithmetic achievement are not, however, reported by ability grouping. This is done in the last section of this chapter. Student gains in reading and arithmetic are reported, however, in terms of selected class size groupings and with regard to favorable supporting characteristics as defined earlier.

*Reading Achievement.* White students in smaller classes and whose parents were employed in private households and kindred occupations made significantly higher gains in reading achievement over the 5-year period (1959-1964) in 8 comparisons to 6 for students in larger classes. Ten comparisons were not statistically significant, favoring neither larger nor smaller classes. These statistics indicate that the ratio favoring smaller over larger classes is 4 to 3, which is considerably less than the 8 to 1 found for white students whose parents were employed in sales, clerical, and kindred occupations.

An analysis of the statistics involving only white students whose parents were employed in private households and kindred occupations in the smallest class size grouping (1-25 pupils) reveals a more impressive ratio in favor of smaller classes. This is evidenced by the fact that out of 12 comparisons, white students in the smallest class size grouping (1-25 pupils) made significantly higher gains in reading in 5 comparisons to 1 for those in the larger class size groupings. Six comparisons were not statistically significant, favoring neither pupils in the smallest class size grouping nor those in the larger classes.

*Arithmetic Achievement.* White students in smaller classes and whose parents were employed in private households and kindred occupations made significantly greater gains in arithmetic over the 5-year period (1959-1964) in 9 comparisons to 7 for like students in larger classes. Eight comparisons were not statistically significant, favoring neither pupils in smaller nor in larger classes. With respect to gains in arithmetic achievement for pupils whose parents were employed in private households and kindred occupations the ratio favoring smaller over larger classes is 1.3 to 1, which is considerably less than the 7.5 to 1 found for pupils whose parents were employed in sales, clerical, and kindred occupations.

The ratio favoring smaller classes over larger classes is considerably different when an analysis is made of only the smallest class size grouping (1-25 pupils). Such an analysis reveals a ratio of 7 to 1 favoring the smallest class size grouping over the larger classes. For example, out of 12 comparisons, white students in the smallest class size grouping whose parents were employed in private households and kindred occupations made significantly higher gains in arithmetic in 7 comparisons to 1 for students in larger classes. Four comparisons were not statistically significant, favoring neither pupils in the smallest class size grouping nor those in the larger classes.

*Summary of Pupil Achievement by the Occupational Grouping: Private Households and Kindred Occupations.* Table 26 summarizes pupil achievement gains in arithmetic and reading for white students in selected class size groupings and whose parents were employed in private households and kindred occupations. Also summarized in Table 26 are the statistical comparisons with respect to pupil home mobility, parental education, percentage of pupils' teachers who were nonwhite, the academic knowledge of the pupils' teachers, and the years of teaching experience the pupils' teachers possessed.

White students in smaller classes and whose parents were employed in private households and kindred occupations made significantly higher gains in reading and arithmetic over the 5-year period (1959-

## TABLE 24

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were Between 95 and 104 and Whose Parents Were Employed in Private Households and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Pupil Mobility | | HOME FACTORS: Parental Education | | PUPIL ACHIEVEMENT FACTORS: Reading | | PUPIL ACHIEVEMENT FACTORS: Arithmetic | | FACULTY FACTORS: % Nonwhite Faculty | | FACULTY FACTORS: Faculty Knowledge | | FACULTY FACTORS: Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | .01 | — | — | — | — | — | — | .01 |
| 1-25 | 32-37 | — | .01 | — | — | .01 | — | — | — | — | — | — | — | — | — |
| 1-25 | 38 & over | .02 | — | — | — | .02 | — | .02 | — | .01 | — | — | .05 | — | .02 |
| 26-31 | 32-37 | — | — | — | — | .01 | — | .01 | — | .01 | — | — | — | — | .01 |
| 26-31 | 38 & over | — | — | — | — | .01 | — | — | — | .01 | — | .01 | — | — | .05 |
| 32-37 | 38 & over | — | — | .01 | — | — | .01 | — | .01 | — | — | .01 | — | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 25

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were 105 and Above and Whose Parents Were Employed in Private Households and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pupil Groupings | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | .01 | — | .02 | — | .01 | — | — | — | — | — | — |
| 1-25 | 32-37 | — | .01 | — | — | — | — | — | — | — | — | — | .02 | — | .01 |
| 1-25 | 38 & over | — | — | — | .05 | .01 | — | .01 | — | — | — | — | — | — | .01 |
| 26-31 | 32-37 | — | .01 | — | — | — | — | — | .02 | — | — | — | .01 | — | .01 |
| 26-31 | 38 & over | — | — | — | — | — | — | — | .01 | — | — | — | .01 | — | .01 |
| 32-37 | 38 & over | .01 | — | .01 | — | — | .02 | — | — | — | — | — | — | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 26

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes and Whose Parents Were Employed in Private Households and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 0 | 1 | 3 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 0 | 3 | 1 | 1 | 2 |
| 1-25 | 32-37 | 0 | 2 | 2 | 1 | 1 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 1 |
| 1-25 | 38 & over | 2 | 0 | 2 | 0 | 3 | 1 | 2 | 0 | 2 | 3 | 0 | 1 | 2 | 1 | 1 | 0 | 2 | 2 | 1 | 3 | 0 |
| Sub-Total | | 2 | 3 | 7 | 2 | 5 | 5 | 5 | 1 | 6 | 7 | 1 | 4 | 4 | 3 | 5 | 2 | 3 | 7 | 3 | 6 | 3 |
| 26-31 | 32-37 | 2 | 1 | 1 | 0 | 1 | 3 | 2 | 1 | 1 | 2 | 2 | 0 | 2 | 1 | 1 | 1 | 1 | 2 | 0 | 3 | 1 |
| 26-31 | 38 & over | 2 | 0 | 2 | 0 | 0 | 4 | 1 | 1 | 2 | 0 | 2 | 2 | 2 | 1 | 1 | 1 | 3 | 0 | 1 | 3 | 0 |
| 32-37 | 38 & over | 3 | 0 | 1 | 2 | 1 | 1 | 0 | 3 | 1 | 0 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 |
| Total | | 9 | 4 | 11 | 4 | 7 | 13 | 8 | 6 | 10 | 9 | 7 | 8 | 9 | 6 | 9 | 5 | 9 | 10 | 5 | 13 | 6 |

S - Small Classes
L - Larger Classes
N - Neither

1964) in 17 comparisons to 13 for students in larger classes. Eighteen comparisons were not statistically significant, favoring neither pupils in smaller nor in larger classes. These statistics indicate that the ratio favoring smaller over larger classes for white students whose parents were employed in private households and kindred occupations is 1.3 to 1, which is considerably less than the 7.8 to 1 ratio found for white pupils whose parents were employed in sales, clerical, and kindred occupations. Let's investigate both negative and positive influences on pupil achievement to see whether or not pupils in larger classes had significantly more favorable supporting characteristics going for them than pupils in smaller classes.

White students in smaller classes had significantly more home moves in 9 comparisons to 4 for students in larger classes. Eleven comparisons were not statistically significant. Earlier we had indicated that we had arbitrarily made the assumption that pupils with the greater home mobility would be more disadvantaged with respect to academic achievement than pupils with less home mobility. If this be true, then the pupils in smaller classes will be more disadvantaged than those in larger classes by a ratio of about 2 to 1. We do not wish to intimate, however, that the low ratio found favoring pupils in smaller classes over those in larger classes was the resultant of the undue negative influence of excessive home moves by the pupils in smaller classes. Variations in pupil academic achievement are too complex to be explained by a simple measure such as excessive home moves.

Let's move on to an analysis of the positive influences of parental education, faculty knowledge, and faculty teaching experience to see whether or not such positive influences will shed some light on why there was such a low ratio favoring smaller over larger classes for white students whose parents were employed in private households and kindred occupations. Out of 72 comparisons, white students in smaller classes whose parents were employed in private households and kindred occupations had favorable supporting characteristics in 14 instances, those in larger classes in 29 comparisons, and 29 comparisons favored neither pupils in smaller nor in larger classes. Thus, white students in larger classes enjoyed an advantage of more than 2 to 1 over those in smaller classes with respect to favorable supporting characteristics. Moreover, this ratio is distributed about evenly among the three separate characteristics as evidenced by the following statistics: (1) for parental education, pupils in larger classes had 7 favorable comparisons to 4 for those in smaller classes; 13 comparisons favored neither pupils in larger nor smaller class size groupings; (2) for faculty knowledge, the ratio of favorable supporting characteristics of larger to smaller classes was 9 to 5, with 10 comparisons favoring neither pupils in larger nor smaller classes; and (3) for faculty teaching experience, pupils in larger classes had the advantage over those in smaller classes by the ratio of 13 to 5, with 6 comparisons benefiting neither pupils in larger nor in smaller classes.

These statistics indicate that the pupils in larger classes whose parents were employed in private households and kindred occupations had less negative influences and more positive influences going for them than did pupils in smaller classes. The fact that pupils in the larger classes benefited significantly more from these favorable supporting characteristics — by a 2 to 1 ratio — than the pupils in smaller classes probably helps to explain why such a low ratio favoring smaller over larger classes was found.

The results are entirely different when statistics are analyzed involving only pupils in the smallest class size grouping (1-25 pupils). Out of 24 comparisons, white students in smaller classes whose parents were employed in private households and kindred occupations made significantly greater gains in reading and arithmetic achievement in 12 comparisons to 2 for students in larger classes. Ten comparisons were not statistically significant, favoring neither pupils in larger nor in smaller classes. These findings indicate a ratio of 6 to 1 in favor of pupils in the smallest class size grouping.

## TABLE 27

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were 79 and Below and Whose Parents Were Employed in Service, Labor, Operative, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Pupil Mobility | | HOME FACTORS: Parental Education | | PUPIL ACHIEVEMENT FACTORS: Reading | | PUPIL ACHIEVEMENT FACTORS: Arithmetic | | % Nonwhite Faculty | | FACULTY FACTORS: Faculty Knowledge | | FACULTY FACTORS: Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | .01 | — | — | .01 | — | .01 | — | — | — | .01 | — | .01 | — |
| 1-25 | 32-37 | — | .05 | — | .01 | .01 | — | .01 | — | — | — | .05 | — | .01 | — |
| 1-25 | 38 & over | — | — | | | .01 | — | — | — | .01 | — | — | — | — | — |
| 26-31 | 32-37 | — | — | — | — | — | — | .01 | — | — | — | — | — | — | — |
| 26-31 | 38 & over | .05 | — | | | — | — | — | — | .01 | — | — | .01 | — | .05 |
| 32-37 | 38 & over | — | — | | | — | — | — | .05 | .01 | — | — | .05 | — | .02 |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 28

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were Between 80 and 94 and Whose Parents Were Employed in Service, Labor, Operative, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | .01 | — | — | .01 | — | .01 | .01 | — | — | .01 | — | .01 |
| 1-25 | 32-37 | .01 | — | — | .01 | — | .01 | — | .01 | .02 | — | — | .01 | — | .01 |
| 1-25 | 38 & over | — | — | — | .01 | — | .01 | — | .01 | .01 | — | — | .01 | — | .02 |
| 26-31 | 32-37 | — | — | — | .01 | — | — | .05 | — | — | .02 | — | — | — | — |
| 26-31 | 38 & over | .05 | — | — | .01 | .01 | — | .01 | — | — | — | — | .01 | — | — |
| 32-37 | 38 & over | .01 | — | — | .01 | .01 | — | .01 | — | — | — | — | .01 | .01 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 29

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were Between 95 and 104 and Whose Parents Were Employed in Service, Labor, Operative, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Pupil Mobility | | HOME FACTORS: Parental Education | | PUPIL ACHIEVEMENT FACTORS: Reading | | PUPIL ACHIEVEMENT FACTORS: Arithmetic | | % Nonwhite Faculty | | FACULTY FACTORS: Faculty Knowledge | | Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | .01 | — | .02 | — | — | — | — | — | — |
| 1-25 | 32-37 | — | — | — | — | .01 | — | .02 | — | — | — | — | .02 | — | — |
| 1-25 | 38 & over | — | — | — | — | .01 | — | .01 | — | — | — | — | — | — | — |
| 26-31 | 32-37 | — | — | — | .01 | .05 | — | .01 | — | — | — | .01 | — | — | .01 |
| 26-31 | 38 & over | .01 | — | — | .01 | .02 | — | .01 | — | .01 | — | — | .01 | — | — |
| 32-37 | 38 & over | .01 | — | — | .01 | — | — | .01 | — | .01 | — | — | .01 | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05 at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

In summary, class size appears to be a more important factor taken into consideration for white students whose parents are employed in private households and kindred occupations than for white students whose parents are employed in sales, clerical, and kindred occupations. Class size then is tremendously important to white students whose parents were employed in private households and kindred occupations. If classes are made small enough the chances are about 6 to 1 that they will learn more arithmetic and read better as measured by standardized tests if they are in the smallest rather than in larger class sizes even when supporting characteristics are more favorable to pupils in larger classes.

### Class Size Comparisons of White Students in Regular Curriculum Classes by the Occupation Grouping: Service, Labor, Operative, and Kindred Occupations

Tables 27, 28, 29, and 30 contain data on tests of statistical significance on the differences between means for selected class size groupings for white children in regular curriculum classes whose parents were employed in service, labor, operative, and kindred occupations. Similar to the two previously discussed occupational groupings, these tables are also divided into four intelligence quotient groupings. However, in this section, student gains in reading and arithmetic achievement are analyzed without regard for ability, but with regard to selected class size groupings and with regard to both negative and positive influences.

*Reading Achievement.* White students in smaller classes and whose parents were employed in service, labor, operative, and kindred occupations made significantly higher gains in reading achievement over the 5-year period (1959-1964) in 12 comparisons to 4 for students in larger classes—a 3 to 1 ratio favoring smaller over larger classes. Eight comparisons were not statistically significant.

Interestingly when the statistics involving only white students in the smallest class size grouping (1-25 pupils) are examined, the results are not as impressive as they were for children whose parents were employed in sales, clerical and kindred occupations or for pupils whose parents were employed in private households and kindred occupations. This is evidenced by the fact that out of 12 comparisons, white students in the smallest class size grouping (1-25 pupils) made significantly higher gains in reading in 6 comparisons to 4 for those in the larger class size groupings. Two comparisons were not statistically significant. These statistics indicate that the ratio favoring the smallest class size grouping over larger classes is 1.5 to 1. This is considerably less than 8 to 0 ratio found for white students whose parents were employed in sales, clerical, and kindred occupations; it is also considerably less than the ratio 5 to 1 found for white students whose parents were employed in private households and kindred occupations.

*Arithmetic Achievement.* White students in smaller classes and whose parents were employed in service, labor, operative, and kindred occupations made significantly greater gains in arithmetic over the 5-year period (1959-1964) in 13 comparisons to 5 for students in larger classes. This represents a ratio of almost 3 to 1 in favor of smaller classes over larger classes. Six comparisons were not statistically significant, favoring neither pupils in smaller nor in larger classes. The ratio favoring pupils in smaller classes is substantial even though it is considerably less than the ratio 7.5 to 1 found for those pupils in smaller classes whose parents were employed in sales, clerical, and kindred occupations; however, it is considerably more than the 1.3 to 1 ratio found for children in smaller classes whose parents were employed in private households and kindred occupations.

When the results involving only white students in the smallest class size grouping (1-25 pupils) are analyzed, the white students in the smallest class size grouping made significantly higher gains in arithmetic in 6 comparisons to 4 for those students in larger classes. Two comparisons were not statistically significant, favoring neither smaller nor larger classes. The ratio favoring

## TABLE 30

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were 105 and Above and Whose Parents Were Employed in Service, Labor, Operative, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | — | — | — | — | — | — | — | .01 |
| 1-25 | 32-37 | — | — | — | — | — | — | .01 | — | — | — | — | .02 | — | .02 |
| 1-25 | 38 & over | | | | | .02 | — | .01 | — | — | — | — | — | — | — |
| 26-31 | 32-37 | .01 | — | .01 | — | — | — | — | — | .05 | — | — | — | — | — |
| 26-31 | 38 & over | .01 | — | — | — | .01 | — | — | — | — | — | — | — | — | — |
| 32-37 | 38 & over | — | .01 | — | — | .01 | — | — | — | — | — | — | .05 | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 31

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were 105 and Above and Whose Parents Were Employed in Service, Labor, Operative, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 0 | 1 | 3 | 1 | 0 | 3 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 0 | 3 | 1 | 1 | 2 | 1 | 2 | 1 |
| 1-25 | 32-37 | 1 | 1 | 2 | 0 | 2 | 2 | 2 | 1 | 1 | 3 | 1 | 0 | 1 | 0 | 3 | 1 | 3 | 0 | 1 | 2 | 1 |
| 1-25 | 38 & over | 0 | 0 | 3 | 0 | 1 | 1 | 3 | 1 | 0 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 1 | 3 | 0 | 1 | 3 |
| Sub-Total | | 1 | 2 | 8 | 1 | 3 | 6 | 6 | 4 | 2 | 6 | 4 | 2 | 4 | 0 | 8 | 2 | 5 | 5 | 2 | 5 | 5 |
| 26-31 | 32-37 | 1 | 0 | 3 | 1 | 2 | 1 | 1 | 0 | 3 | 3 | 0 | 1 | 1 | 1 | 2 | 1 | 0 | 3 | 0 | 1 | 3 |
| 26-31 | 38 & over | 4 | 0 | 0 | 0 | 2 | 1 | 3 | 0 | 1 | 2 | 0 | 2 | 2 | 0 | 2 | 0 | 3 | 1 | 0 | 1 | 3 |
| 32-37 | 38 & over | 2 | 1 | 1 | 0 | 2 | 1 | 2 | 0 | 2 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 4 | 0 | 1 | 1 | 2 |
| Total | | 8 | 3 | 12 | 2 | 9 | 9 | 12 | 4 | 8 | 13 | 5 | 6 | 9 | 1 | 14 | 3 | 12 | 9 | 3 | 8 | 13 |

S - Small Classes
L - Larger Classes
N - Neither

## TABLE 32

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were 79 and Below and Whose Parents Were Employed in Professional, Technical, Skilled, Supervisory, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Pupil Mobility | | HOME FACTORS: Parental Education | | PUPIL ACHIEVEMENT FACTORS: Reading | | PUPIL ACHIEVEMENT FACTORS: Arithmetic | | % Nonwhite Faculty | | FACULTY FACTORS: Faculty Knowledge | | FACULTY FACTORS: Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | .01 | — | — | — | .01 | .05 | — | .01 | — | — | — | — | .01 |
| 1-25 | 32-37 | .01 | — | — | — | — | .01 | .05 | — | .01 | — | — | — | .01 | — |
| 1-25 | 38 & over | — | — | | | .01 | — | .02 | — | — | .02 | — | .01 | — | — |
| 26-31 | 32-37 | — | — | — | — | — | — | — | — | — | .01 | — | — | .01 | — |
| 26-31 | 38 & over | — | — | | | — | — | .02 | — | — | .02 | — | — | — | — |
| 32-37 | 38 & over | — | — | | | .02 | — | — | — | — | — | — | .02 | — | .05 |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

pupils in the smallest class size grouping over those in larger classes is 1.5 to 1. This ratio is considerably less than the 9 to 0 ratio found for the students in the smallest class size grouping whose parents were employed in sales, clerical, and kindred occupations; it is also considerably less than the ratio of 7 to 1 found for white students in the smallest class size grouping whose parents were employed in private households and kindred occupations.

*Summary of Pupil Achievement by the Occupational Grouping: Service, Labor, Operative, and Kindred Occupations.* Table 31 summarizes pupil achievement gains in reading and arithmetic for white students in selected class size groupings and whose parents were employed in service, sales, operative, and kindred occupations. Table 31 also summarizes the statistical comparisons with respect to pupil home mobility, parental education, faculty knowledge, and teachers' years of experience.

White students in smaller classes and whose parents were employed in service, labor, operative, and kindred occupations made significantly higher gains in reading and arithmetic over the 5-year period (1959-1964) in 25 comparisons to 9 for students in larger classes—a 2.8 to 1 ratio. Fourteen comparisons were not statistically significant, favoring neither smaller nor larger classes. This ratio of 2.8 to 1 favoring white students in smaller over larger classes whose parents were employed in service, labor, operative, and kindred occupations is considerably less than the ratio of 7.8 to 1 found for white students whose parents were employed in sales, clerical, and kindred occupations; however, it is slightly more than the 1.3 to 1 ratio found for white students whose parents were employed in private households and kindred occupations. Let's examine next the negative and positive influences which could have unduly affected pupil performance in either the larger or in the smaller classes.

Out of a total of 23 comparisons, white students in smaller classes whose parents were employed in service, labor, operative, and kindred occupations had significantly more home moves in 8 comparisons to 3 for those students in larger classes. Twelve comparisons were not statistically significant. These statistics indicate that the white students in smaller classes were probably more adversely affected by changes in home addresses than those students in larger classes.

Consider next the positive influences of parental education, faculty knowledge, and faculty teaching experience. Out of 68 comparisons, white students in smaller classes had more favorable supporting characteristics in 8 instances, those in larger classes in 29 comparisons, and 31 comparisons favored neither smaller nor larger classes. With respect to the advantages to be gained from favorable supporting characteristics, white students in larger classes enjoyed an advantage of 3.6 to 1 over those in smaller classes. When each of the three favorable supporting characteristics is analyzed separately the following ratios prevail: (1) for parental education, pupils in larger classes had 9 favorable comparisons to 2 for those in smaller classes; 9 comparisons favored neither class size groupings; (2) for faculty knowledge, 12 comparisons favored students in larger classes, 3 comparisons favored students in smaller classes, and 9 comparisons favored neither pupils in larger nor in smaller classes; and (3) for faculty teaching experience, white students in larger classes had the advantage over those in smaller classes by the ratio of 8 to 3, with 13 comparisons not statistically significant.

Such statistics indicate with reasonably great confidence that the pupils in larger classes whose parents were employed in service, labor, operative, and kindred occupations benefited more from such favorable characteristics as parental education, faculty academic knowledge, and faculty teaching experience than those students in smaller classes. Consequently, the fact that white students in smaller classes whose parents were employed in service, labor, operative, and kindred occupations made significantly greater gains in reading and arithmetic over their counterparts in larger classes in a ratio of 2.8 to 1 should not be attributed to the fact that the students in the smaller classes benefited significantly more from favorable supporting characteristics than their counterparts in larger classes.

## TABLE 33

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were Between 80 and 94 and Whose Parents Were Employed in Professional, Technical, Skilled, Supervisory, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Pupil Mobility | | HOME FACTORS: Parental Education | | PUPIL ACHIEVEMENT FACTORS: Reading | | PUPIL ACHIEVEMENT FACTORS: Arithmetic | | % Nonwhite Faculty | | FACULTY FACTORS: Faculty Knowledge | | Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | — | — | .02 | — | .01 | — | .05 | — |
| 1-25 | 32-37 | — | — | — | — | .01 | — | — | — | .01 | — | — | .01 | — | .02 |
| 1-25 | 38 & over | — | — | — | — | .01 | — | — | — | — | — | — | .01 | — | .01 |
| 26-31 | 32-37 | — | — | — | — | .01 | — | .01 | — | .01 | — | — | .01 | — | .01 |
| 26-31 | 38 & over | — | — | — | — | .01 | — | — | — | — | — | — | .01 | — | .01 |
| 32-37 | 38 & over | — | — | .01 | — | — | — | — | — | — | .01 | .05 | — | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## Class Size Comparisons of White Students in Regular Curriculum Classes by the Occupational Grouping: Professional, Technical, Skilled, Supervisory, and Kindred Occupations

Tables 32, 33, 34, and 35 contain data on tests of statistical significance of the differences between means for selected class size groupings for white children in regular curriculum classes whose parents were employed in professional, technical, skilled, supervisory, and kindred occupations. Similar to the three previous occupational groupings these tables divide the pupils into four intelligence quotient groupings. However, student achievement with respect to ability is reported on in the last section of this chapter. Instead, the paragraphs which follow deal only with student gains in reading and arithmetic achievement and are analyzed with respect to selected class size groupings and with regard to the influence of favorable supporting characteristics.

*Reading Achievement.* White students in regular curriculum classes and whose parents were employed in professional and kindred occupations and who were in the smaller classes made significantly higher gains in reading achievement over the 5-year period (1959-1964) in 10 comparisons to 4 for those students in larger classes. Ten comparisons were not statistically significant, favoring neither pupils in larger nor in smaller classes. These statistics indicate that the ratio favoring smaller over larger classes for white students whose parents were employed in professional and kindred occupations is 2.5 to 1. This ratio is considerably less than the 8 to 1 found for pupils whose parents were employed in sales, clerical, and kindred occupations; however, it is slightly more than the 1.3 to 1 ratio found for those white students whose parents were employed in private households and kindred occupations; and it was slightly less than the 3 to 1 ratio found for those students whose parents were employed in service, labor, operative, and kindred occupations.

When the statistics involving only white students in the smallest class size grouping (1-25 pupils) are analyzed, the results indicate a 3 to 1 ratio favoring the smallest class size grouping. Out of 12 comparisons, white students in the smallest class size grouping whose parents were employed in professional and kindred occupations made significantly higher gains in reading in 6 comparisons to 2 for those in the larger classes. Four comparisons were not statistically significant.

*Arithmetic Achievement.* White students in regular curriculum classes and whose parents were employed in professional and kindred occupations and who were in smaller classes made significantly greater gains in arithmetic over the 5-year period (1959-1964) in 10 comparisons to 4 for students in larger classes. Ten comparisons were not statistically significant, favoring neither pupils in smaller nor in larger classes. With respect to gains in arithmetic achievement the ratio favoring smaller over larger classes for pupils whose parents were employed in professional and kindred occupations is 2.5 to 1. An examination of the findings with respect to class size comparisons involving only those white students in the smallest class size grouping (1-25 pupils) indicates that out of 12 comparisons the students in the smallest class size grouping made significantly higher gains in arithmetic in 6 comparisons to 1 for students in larger classes. Five comparisons were not statistically significant, favoring neither pupils in the smallest class size grouping nor in larger classes. This ratio is considerably less than that found for white students whose parents were employed in sales, clerical, and kindred occupations (9 to 0 in favor of smaller classes). However, it is almost equal to the ratio found for white students whose parents were employed in private households and kindred occupations (7 to 1 ratio favoring the smallest class size grouping). And it was considerably greater than the 1.5 to 1 ratio found for those students in the smallest class size grouping whose parents were employed in service, labor, operative, and kindred occupations.

*Summary of Pupil Achievement by the Occupational Grouping: Professional, Technical, Skilled, Supervisory, and Kindred Occupations.* Table 36 summarizes pupil achievement gains in arithmetic and reading for white students in selected class size groupings and whose parents were employed in professional, technical, skilled, supervisory,

## TABLE 34

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were Between 95 and 104 and Whose Parents Were Employed in Professional, Technical, Skilled, Supervisory, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Pupil Mobility | | HOME FACTORS: Parental Education | | PUPIL ACHIEVEMENT FACTORS: Reading | | PUPIL ACHIEVEMENT FACTORS: Arithmetic | | % Nonwhite Faculty | | FACULTY FACTORS: Faculty Knowledge | | FACULTY FACTORS: Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | .01 | — | — | — | — | | | — | .02 | — | — |
| 1-25 | 32-37 | — | — | — | — | .01 | — | .01 | — | | | — | — | — | .05 |
| 1-25 | 38 & over | — | — | — | .01 | .02 | — | .01 | — | | | .05 | — | — | .02 |
| 26-31 | 32-37 | .01 | — | .01 | — | — | — | .02 | — | .01 | — | — | — | — | — |
| 26-31 | 38 & over | .01 | — | — | — | — | — | — | — | .01 | — | — | .05 | — | .01 |
| 32-37 | 38 & over | .01 | — | — | .01 | — | — | — | .01 | — | — | — | .05 | — | .01 |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

and kindred occupations. Also, class size comparisons are analyzed with respect to the positive or negative influences of pupil home mobility, parental education, faculty knowledge, and faculty teaching experience.

Out of 48 comparisons, white students in smaller classes and whose parents were employed in professional and kindred occupations made significantly higher gains in reading and arithmetic over the 5-year period (1959-1964) in 20 comparisons to 8 for students in larger classes. Twenty comparisons favored neither pupils in smaller nor in larger classes. These statistics indicate that the ratio favoring smaller over larger classes is 2.5 to 1. Let's examine the findings with respect to negative and positive influences in order to ascertain whether or not pupil performance in smaller over larger classes is achieved because the pupils in the smaller classes had a significant number of favorable supporting characteristics going for them.

Out of a total of 24 comparisons, white students in smaller classes whose parents were employed in professional and kindred occupations had significantly more home moves in 5 comparisons to 2 for students in larger classes. Seventeen comparisons were not statistically significant. With respect to the positive influences of parental education, faculty knowledge, and faculty teaching experience, out of 69 comparisons, white students in smaller classes whose parents were employed in professional and kindred occupations had favorable supporting characteristics in 15 comparisons to 26 for those in larger classes. Twenty-eight comparisons were not statistically significant, favoring neither the pupils in smaller nor in larger classes. Thus, the students in the larger classes enjoyed a ratio of 1.7 to 1 over those in the smaller classes with respect to favorable supporting characteristics. When these favorable supporting characteristics are reported separately the following ratios prevail: (1) for parental education, pupils in larger classes had 5 favorable comparisons to 3 for those in smaller classes; 13 comparisons were not statistically significant and favored neither the pupils in smaller nor in larger classes; (2) for faculty knowledge, the students in larger classes had the advantage of favorable supporting characteristics in 10 comparisons to 7 for those in smaller classes, and 7 comparisons favored neither the pupils in smaller nor in larger classes; (3) for faculty teaching experience, white students in larger classes enjoyed the advantages of favorable supporting characteristics in 11 comparisons to 5 for those students in smaller classes; 8 comparisons were not statistically significant.

The statistics indicate that the pupils in larger classes benefited more from such favorable characteristics as parental education, faculty academic knowledge, and faculty teaching experience than did white students in smaller classes. We can conclude, therefore, that the ratio of 2.5 to 1 favoring white students in smaller classes whose parents were employed in professional and kindred occupations over those in larger classes was not due to the fact that the pupils in smaller classes benefited more from the favorable supporting characteristics enumerated previously. Consider next pupil academic performance involving only students in the smallest class size grouping (1-25 pupils). Out of 24 comparisons, white students in the smallest class size grouping and whose parents were employed in professional and kindred occupations made significantly greater gains in reading and in arithmetic in 12 comparisons to 3 for white students in larger classes. Nine comparisons were not statistically significant. These statistics indicate a 4 to 1 ratio favoring pupil achievement in the smallest class size groupings over larger classes.

In summary, with respect to pupils whose parents were employed in professional and kindred occupations the chances are 2.5 to 1 that the pupils in the smaller classes will learn more arithmetic and read better than those in the larger classes. Moreover, when the smallest class size grouping is considered, the chances are 4 to 1 that the pupils in this smallest class size grouping will learn more arithmetic and reading than those pupils in larger classes. Consequently, we draw the conclusion that class size is an important factor to be taken into consideration for white students whose parents are at the highest socioeconomic level, that is at the professional, technical, skilled, supervisory, and kindred occupations.

## TABLE 35

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes Whose I.Q. Scores Were 105 and Above and Whose Parents Were Employed in Professional, Technical, Skilled, Supervisory, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Pupil Mobility | | HOME FACTORS: Parental Education | | PUPIL ACHIEVEMENT FACTORS: Reading | | PUPIL ACHIEVEMENT FACTORS: Arithmetic | | FACULTY FACTORS: % Nonwhite Faculty | | FACULTY FACTORS: Faculty Knowledge | | FACULTY FACTORS: Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | — | .01 | | | — | — | — | — |
| 1-25 | 32-37 | — | — | — | .01 | — | — | — | — | | | .02 | — | — | — |
| 1-25 | 38 & over | — | — | — | — | .02 | — | .01 | — | | | — | .01 | — | — |
| 26-31 | 32-37 | — | .01 | — | .01 | .01 | — | .01 | — | — | — | .01 | — | — | .01 |
| 26-31 | 38 & over | — | — | — | — | — | .01 | — | .01 | — | — | .05 | — | .05 | — |
| 32-37 | 38 & over | .01 | — | .01 | — | — | .01 | — | .01 | — | .05 | .01 | — | .01 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

# ANALYSIS OF CLASS SIZE COMPARISONS FOR WHITE STUDENTS IN REGULAR CURRICULUM CLASSES BY ABILITY GROUPINGS

Data on white students enrolled in regular curriculum classes are reported in 16 tables by 4 occupational and 4 intelligence quotient groupings. Mean differences and critical ratios were computed for each cell matrix. However, in some instances the results of these tests for a given cell are not reported because that cell did not have an acceptable minimum level of cases. As was the situation with respect to the comparisons by occupational groupings, any cell which did not have at least 30 cases was considered as not having an acceptable minimum level and therefore the results of tests of statistical significance between mean values were not reported, regardless of whether or not mean differences were statistically significant.

As indicated previously ability has been divided into four subdivisions. These four ability groupings are as follows: (1) I.Q.'s of 79 and below; (2) I.Q.'s of 80 to 94; (3) I.Q.'s of 95 to 104; and (4) I.Q.'s of 105 and above. These I.Q. groupings have been arbitrarily entitled as follows: (1) lowest ability grouping; (2) slow learner ability grouping; (3) average ability grouping; and (4) the highest ability grouping.

## Class Size Comparisons of White Students in Regular Curriculum Classes by the Lowest Ability Grouping: I.Q. Scores of 79 and Below

Tables 17, 22, 27, and 32 report data on tests of statistical significance of the differences between means for selected class size groupings for white students in regular curriculum classes by the lowest ability grouping. The gains in reading and arithmetic achievement are reported without regard for parental occupation but with regard to ability level and to favorable and unfavorable supporting characteristics such as pupil home moves, parental education, faculty knowledge, and faculty teaching experience.

*Reading Achievement.* White students in the lowest ability grouping and in smaller classes made significantly higher gains in reading achievement over the 5-year period (1959-1964) in 9 comparisons to 5 for white students in larger classes. The results of 10 comparisons indicated that there were no statistically significant differences in the academic performance of white students in larger or smaller classes. These statistics indicate that the ratio favoring smaller over larger classes is 1.8 to 1.

When the statistics involving only white students in the smallest class size grouping (1-25 pupils) are analyzed, the following results are evident: out of 12 comparisons, the white students in the smallest class size grouping made significantly higher gains in reading in 7 comparisons to 2 for those in the larger class size groupings; the results of 3 comparisons indicate that mean reading differences were not statistically significant.

*Arithmetic Achievement.* White students in the lowest ability grouping (I.Q. scores of 79 and below) and in the smaller classes made significantly greater gains in arithmetic over the 5-year period (1959-1964) in 14 comparisons to 5 for students in larger classes. Five comparisons were not statistically significant. With respect to gains in arithmetic achievement for white students in the lowest ability grouping, the ratio favoring smaller over larger classes is 2.8 to 1.

An analysis of the results involving only white students in the smallest class size grouping (1-25 pupils) and in the lowest ability grouping indicates that out of 12 comparisons, the white students in the smallest class size grouping made significantly higher gains in arithmetic in 11 comparisons to 0 for white students in larger classes. One comparison indicated no statistically significant mean difference in arithmetic achievement between pupils in larger and smaller classes.

## TABLE 36

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes and Whose Parents Were Employed in Professional, Technical, Skilled, Supervisory, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Pupil Groupings | | | | | | | | | | | | | | | | | | | | | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 0 | 1 | 3 | 0 | 1 | 3 | 0 | 1 | 3 | 1 | 1 | 2 | 2 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 2 |
| 1-25 | 32-37 | 1 | 0 | 3 | 0 | 1 | 3 | 2 | 1 | 1 | 2 | 0 | 2 | 2 | 0 | 0 | 1 | 1 | 2 | 1 | 2 | 1 |
| 1-25 | 38 & over | 0 | 0 | 4 | 0 | 1 | 2 | 4 | 0 | 0 | 3 | 0 | 1 | 0 | 1 | 1 | 1 | 3 | 0 | 0 | 2 | 2 |
| Sub-Total | | 1 | 1 | 10 | 0 | 3 | 8 | 6 | 2 | 4 | 6 | 1 | 5 | 4 | 1 | 1 | 3 | 5 | 4 | 2 | 5 | 5 |
| 26-31 | 32-37 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 0 | 2 | 3 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 |
| 26-31 | 38 & over | 1 | 0 | 3 | 0 | 0 | 3 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 1 |
| 32-37 | 38 & over | 2 | 0 | 2 | 2 | 1 | 0 | 1 | 1 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 2 | 2 | 0 | 1 | 2 | 1 |
| Total | | 5 | 2 | 17 | 3 | 5 | 13 | 10 | 4 | 10 | 10 | 4 | 10 | 7 | 5 | 6 | 7 | 10 | 7 | 5 | 11 | 8 |

S - Small Classes
L - Larger Classes
N - Neither

*Summary of Pupil Achievement by the Lowest Ability Grouping: I.Q. Scores of 79 and Below.* Table 37 summarizes pupil achievement gains in arithmetic and reading for white students in the lowest ability grouping and in selected class size groupings. Also, class size comparisons with respect to pupil home mobility, parental education, faculty knowledge, and faculty teaching experience are summarized and their influences upon the class size results obtained are discussed.

White students in smaller classes and in the lowest ability grouping made significantly higher gains in reading and arithmetic over the 5-year period (1959-1964) in 23 comparisons to 10 for those students in larger classes. This indicates a ratio of 2.3 to 1 in favor of students in smaller classes. The important question to try to answer here is whether or not this ratio was obtained because pupils in smaller classes had a preponderance of favorable supporting characteristics.

From the statistics available on home mobility, it appears that neither white students in smaller nor in larger classes had significantly more home moves. This is evidenced from the fact that out of a total of 24 comparisons with respect to pupil home mobility, white students in smaller classes had significantly more home moves in 7 comparisons to 6 for those in larger classes. Eleven comparisons indicated that differences in home moves between pupils in larger and smaller classes were not statistically significant. An analysis of favorable supporting characteristics indicates that out of 66 comparisons, white students in smaller classes and in the lowest ability grouping had more significantly favorable supporting characteristics in 16 comparisons to 22 for those students in larger classes. Twenty-eight comparisons yielded results which were not statistically significant and therefore favored neither the white students in larger nor in smaller classes. These statistics indicate then the favorable ratio with respect to supporting characteristics in favor of white students in the larger classes of 1.4 to 1. Breaking these results into their separate components reveals the following ratios prevailing for favorable supporting characteristics: (1) for parental education, white students in larger classes had 6 favorable comparisons to 2 for those in smaller classes, and 10 comparisons did not benefit either students in larger or in smaller classes; (2) for faculty knowledge, the students in larger classes had 10 favorable comparisons to 5 for those in smaller classes, 9 comparisons favored neither students in larger nor in smaller classes; and (3) for faculty teaching experience, the white students in smaller classes had 9 favorable comparisons to 6 for those in larger classes, and 9 comparisons were not statistically significant.

These results of the favorable and unfavorable factors discussed here indicate that the white students in smaller classes and in the lowest ability grouping made significantly greater gains in reading and arithmetic over like students in larger classes in a ratio of 2.3 to 1, and these gains should not be attributed to the fact that the students in the smaller classes benefited significantly more from favorable supporting characteristics than their counterparts in larger classes.

When the academic performance of white students in the smallest class size grouping (1-25 pupils) and in the lowest ability grouping is compared to similar students in larger classes, the results are even more impressive than those found previously. For example, out of 24 comparisons, the white students in the smallest classes and in the lowest ability grouping made significantly higher gains in reading and in arithmetic in 18 comparisons to 2 for similar students in larger classes. This indicates a ratio of 9 to 1 in favor of reading and arithmetic gains in the smallest classes over the larger classes. Four comparisons were not statistically significant.

In summary, chances are greater that white students in the lowest ability grouping if placed in smaller rather than in larger classes will learn more arithmetic and read better, even when the size of classes differs only by as little as six pupils.

## TABLE 37

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes and Whose I.Q. Scores Were 79 and Below**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Pupil Groupings | | | | | | | | | | | | | | | | | | | | | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 0 | 4 | 0 | 0 | 1 | 3 | 3 | 1 | 0 | 4 | 0 | 0 | 1 | 1 | 2 | 2 | 0 | 2 | 2 | 1 | 1 |
| 1-25 | 32-37 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 4 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 0 | 1 |
| 1-25 | 38 & over | 0 | 0 | 4 | 0 | 2 | 0 | 2 | 0 | 2 | 3 | 0 | 1 | 1 | 2 | 1 | 0 | 3 | 1 | 1 | 1 | 2 |
| Sub-Total | | 1 | 5 | 6 | 1 | 5 | 4 | 7 | 2 | 3 | 11 | 0 | 1 | 3 | 4 | 5 | 3 | 4 | 5 | 6 | 2 | 4 |
| 26-31 | 32-37 | 2 | 0 | 2 | 0 | 0 | 4 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 |
| 26-31 | 38 & over | 3 | 0 | 1 | 0 | 1 | 1 | 0 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 0 | 0 | 2 | 2 | 1 | 1 | 2 |
| 32-37 | 38 & over | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 0 | 3 | 0 | 2 | 2 | 2 | 1 | 1 | 1 | 3 | 0 | 1 | 2 | 1 |
| Total | | 7 | 6 | 11 | 2 | 6 | 10 | 9 | 5 | 10 | 14 | 5 | 5 | 9 | 8 | 7 | 5 | 10 | 9 | 9 | 6 | 9 |

S - Small Classes
L - Large Classes
N - Neither

## Class Size Comparisons of White Students in Regular Curriculum Classes by the Slow Learning Ability Grouping: I.Q. Scores Between 80 and 94

Tables 18, 23, 28, and 33 contain data on tests of statistical significance of the differences between means for selected class size groupings for white students in regular curriculum classes in the slow learning ability grouping: I.Q. scores of 80 to 94. Similar to white students in the lowest ability grouping, white student gains in reading and arithmetic achievement are reported here with regard for ability and with regard to favorable and unfavorable influences emanating from such supporting characteristics as pupil home mobility, parental education, faculty knowledge, and faculty teaching experience.

*Reading Achievement.* White students subsumed under the slow learning ability grouping and in smaller classes made significantly higher gains in reading achievement over the 5-year period (1959-1964) in 13 comparisons to 5 for those in larger classes. Six comparisons were not statistically significant, indicating that neither students in smaller nor in larger classes made significantly larger gains in reading. These results indicate that the ratio favoring pupil performance in smaller over larger classes is 2.6 to 1. This ratio is slightly larger than the 1.8 to 1 found for white students in smaller classes but in the lowest ability grouping.

When the statistics involving only white students in the slow learning ability grouping and in the smallest class size grouping (1-25 pupils) are analyzed, the ratio favoring smaller over larger classes is 2 to 1. This ratio is less than the 3.5 to 1 found for white students in regular curriculum classes in the lowest ability grouping and in the smallest class size grouping. The line statistics indicate that out of 12 comparisons, white students in the smallest class size grouping and with I.Q.'s between 80 and 94 made significantly higher gains in reading in 6 comparisons to 3 for students in larger classes. Three comparisons indicated that students in the smallest classes did not make significantly greater reading gains than those in the larger classes; nor did the students in the larger classes make significantly greater gains in reading than those students in the smallest classes. Moreover, the 2 to 1 ratio found for white students in the slow learning ability group was slightly less than the 3.5 to 1 ratio found for white students in the lowest ability group.

*Arithmetic Achievement.* With respect to gains in arithmetic achievement, the ratio of smaller over larger classes was 2.5 to 1. Thus, it appears that white students in smaller classes and in the slow learning ability grouping made significantly greater gains in arithmetic over similar students in larger classes. The line statistics are as follows: out of 24 comparisons, 10 favored students in smaller classes and 4 favored students in larger classes. Ten comparisons were not statistically significant favoring neither smaller nor larger classes.

*Summary of Pupil Achievement by the Slow Learning Ability Grouping: I.Q. Scores Between 80 and 94.* Table 38 summarizes pupil achievement gains in arithmetic and reading for white students in the slow learning ability grouping and in selected class size groupings over the 5-year period (1959-1964). Since many factors other than class size affect pupil learning, the positive and negative influences of the following measures are also tabulated and analyzed: pupil home mobility, parental education, faculty knowledge, and faculty teaching experience.

White students in smaller classes and in the slow learning ability grouping made significantly higher gains in reading and in arithmetic over the 5-year period (1959-1964) in 23 class size comparisons to 9 for students in larger classes. Sixteen comparisons favored neither pupils in larger nor in smaller classes. These statistics indicate that the ratio favoring smaller over larger classes is 2.6 to 1. This ratio is slightly higher than the 2.3 to 1 found for white students in the lowest ability grouping. It is incumbent upon us to examine the pleasantness or unpleasantness of the teaching environment

## TABLE 38

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes and Whose I.Q. Scores Were Between 80 and 94**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 0 | 0 | 4 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 2 |
| 1-25 | 32-37 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 1 | 0 | 1 | 1 | 2 | 3 | 0 | 0 | 0 | 2 | 2 | 0 | 4 | 0 |
| 1-25 | 38 & over | 1 | 0 | 2 | 0 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 0 | 1 | 1 | 2 | 1 | 0 | 3 | 1 |
| Sub-Total | | 2 | 1 | 8 | 3 | 4 | 4 | 6 | 3 | 3 | 3 | 3 | 6 | 8 | 0 | 2 | 2 | 6 | 4 | 1 | 8 | 3 |
| 26-31 | 32-37 | 1 | 0 | 3 | 1 | 2 | 1 | 2 | 1 | 1 | 3 | 1 | 0 | 2 | 2 | 0 | 1 | 1 | 2 | 0 | 2 | 2 |
| 26-31 | 38 & over | 3 | 0 | 1 | 1 | 1 | 2 | 3 | 0 | 1 | 2 | 0 | 2 | 2 | 0 | 2 | 0 | 3 | 1 | 0 | 3 | 1 |
| 32-37 | 38 & over | 2 | 0 | 2 | 2 | 2 | 0 | 2 | 1 | 1 | 2 | 0 | 2 | 2 | 1 | 1 | 1 | 3 | 0 | 1 | 2 | 1 |
| Total | | 8 | 1 | 14 | 7 | 9 | 7 | 13 | 5 | 6 | 10 | 4 | 10 | 14 | 3 | 5 | 4 | 13 | 7 | 2 | 15 | 7 |

S - Small Classes
L - Larger Classes
N - Neither

## TABLE 39

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes and Whose I.Q. Scores Were Between 95 and 104**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Number of Pupil Mobility Comparisons Favoring | | | HOME FACTORS: Number of Parental Education Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Reading Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Arithmetic Comparisons Favoring | | | FACULTY FACTORS: Number of % Nonwhite Faculty Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Knowledge Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Teaching Experience Comparisons Favoring | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 0 | 0 | 4 | 0 | 1 | 3 | 0 | 1 | 3 | 1 | 1 | 2 | 0 | 0 | 3 | 0 | 1 | 3 | 0 | 1 | 3 |
| 1-25 | 32-37 | 0 | 1 | 3 | 0 | 1 | 3 | 4 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 3 | 0 | 1 | 3 | 0 | 1 | 3 |
| 1-25 | 38 & over | 1 | 0 | 3 | 0 | 1 | 3 | 4 | 0 | 0 | 4 | 0 | 0 | 1 | 0 | 2 | 1 | 1 | 2 | 0 | 2 | 2 |
| Sub-Total | | 1 | 1 | 10 | 0 | 3 | 9 | 8 | 1 | 3 | 8 | 1 | 3 | 1 | 0 | 8 | 1 | 3 | 8 | 0 | 4 | 8 |
| 26-31 | 32-37 | 2 | 0 | 2 | 1 | 2 | 1 | 3 | 0 | 1 | 4 | 0 | 0 | 2 | 1 | 1 | 1 | 0 | 3 | 0 | 2 | 2 |
| 26-31 | 38 & over | 2 | 0 | 2 | 0 | 2 | 2 | 3 | 0 | 1 | 2 | 0 | 2 | 3 | 1 | 0 | 1 | 3 | 0 | 0 | 2 | 2 |
| 32-37 | 38 & over | 2 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 0 | 3 | 1 | 3 | 0 | 1 | 1 | 2 |
| Total | | 7 | 2 | 15 | 2 | 9 | 13 | 15 | 2 | 7 | 15 | 3 | 6 | 7 | 2 | 12 | 4 | 9 | 11 | 1 | 9 | 14 |

S - Small Classes
L - Larger Classes
N - Neither

to ascertain whether or not the ratio obtained favoring smaller over larger classes was not primarily due to a preponderance of favorable supporting characteristics.

An examination of pupil home mobility reveals that white students in the slow learning ability grouping and in smaller classes had significantly more home moves in 8 comparisons to 1 for their counterparts in larger classes. Fourteen comparisons indicated that neither pupils in smaller nor larger classes had sufficiently more home moves. An analysis of such favorable supporting characteristics as parental education, faculty knowledge, and faculty teaching experience shows that out of 71 comparisons, white students in smaller classes had 13 favorable comparisons to 37 for those in larger classes—a 2.8 to 1 ratio in favor of the pupils in larger classes. Twenty-one comparisons indicated that neither the pupils in larger nor in smaller classes had significantly more favorable supporting characteristics. Breaking the teaching environment down into its separate components reveals the following ratios: (1) for parental education, pupils in larger classes had 9 favorable comparisons to 7 for those in smaller classes; 7 comparisons favored neither pupils in smaller nor in larger classes; (2) for faculty knowledge, white students in larger classes had enjoyed the advantage of 13 favorable comparisons to 4 for students in smaller classes; 7 comparisons were not statistically significant; and (3) for faculty teaching experience, the white students in larger classes benefited from 15 favorable comparisons to 2 for students in smaller classes, and 7 comparisons favored neither pupils in smaller nor in larger classes. We can reasonably conclude, therefore, that the 2.6 to 1 ratio obtained by white students in the slow learning ability grouping and in the smaller classes was not due primarily to a preponderance of favorable supporting characteristics.

What is surprising with respect to pupil achievement for those white students in the smallest class size grouping is a lack of decided gains in reading and in arithmetic over the pupils in larger classes.[1] While the 1.5 to 1 ratio favors the white students in the smallest class size grouping, nevertheless it is not as high as we might reasonably expect it to be. It by no means approaches the 9 to 1 ratio found for white students in the smallest class size and who possessed I.Q. scores of 79 and below. The line statistics indicate that out of 24 comparisons, white students in the smallest class size grouping (1-25 pupils) and with I.Q. scores between 80 and 94 made significantly greater gains in reading and arithmetic in 9 comparisons to 6 for those in larger classes. Nine comparisons were not statistically significant.

In summary, the odds are almost 3 to 1 that the white students in regular curriculum classes who have I.Q. scores between 80 and 94 will learn more arithmetic and read better if they are in smaller rather than in larger classes, but those students in the smallest class size groupings did not do as well as the overall comparison of smaller and larger classes.

## Class Size Comparisons of White Students in Regular Curriculum Classes by the Average Ability Grouping: I.Q. Scores Between 95 and 104

Tables 19, 24, 29, and 34 possess data on tests of statistical significance of the differences between means for selected class size groupings for white students in regular curriculum classes with intelligence quotients between 95 and 104. Student gains in reading and arithmetic achievement are discussed utilizing the same format as that for students in the lowest ability grouping as well as in the slow learning ability grouping.

*Reading Achievement*. White students of average ability and in smaller classes made significantly higher gains in reading achieve-

[1]Note: It is possible that the white students in the slow learning ability group with a ratio of 2.6 to 1 for supporting characteristics which favors the larger classes had an undue influence in unique combinations when compared to the 2.3 to 1 ratio favoring larger classes for children in the lowest ability grouping.

ment over the 5-year period (1959-1964) in 15 comparisons to 2 for their counterparts in larger classes. Seven comparisons were not statistically significant, which meant that the students in the smaller classes did not make significantly larger gains in reading than the students in the larger classes and also that the students in the larger classes did not make significantly greater reading gains than the students in the smaller classes. These statistics indicate that the ratio favoring smaller over larger classes with respect to reading is 7.5 to 1 for students with average ability. This ratio is considerably higher than the 1.8 to 1 found for students in the lowest ability grouping and the 2.6 to 1 found for students in the slow learning ability grouping.

When the statistics involving only white students of average ability in the smallest class size grouping (1-25 pupils) are analyzed, the ratio favoring the smallest class size grouping over the larger classes is 8 to 1. With respect to gains in reading, this ratio is considerably better than the 3.5 to 1 obtained for students in the lowest ability grouping and vastly superior to the 2 to 1 ratio found for students in the slow learning ability grouping. The line statistics are as follows: out of 12 comparisons, white students of average ability in the smallest class size grouping made significantly higher gains in reading in 8 comparisons to 1 for those in the larger class size groupings. Three comparisons were not statistically significant.

*Arithmetic Achievement*. The class size comparison results are as equally impressive for arithmetic as they were for reading. This is evidenced by the fact that white students of average ability and in smaller classes made significantly greater gains in arithmetic over the 5-year period (1959-1964) in 15 comparisons to 3 for students in larger classes—a 5 to 1 ratio. Six comparisons were not statistically significant. With respect to gains in arithmetic achievement for pupils of average ability in smaller classes, the 5 to 1 ratio is double that of the 2.5 to 1 found for pupils with I.Q.'s between 80 and 94 and almost double that of the 2.8 to 1 found for white students in the lowest ability grouping.

The results with respect to arithmetic gains for students in the smallest classes are equally as impressive. The statistics indicate that for white students of average ability in the smallest class size grouping (1-25 pupils), out of 12 comparisons the students in the smallest class size grouping made significantly higher gains in 8 comparisons to 1 for students in larger classes. Three comparisons were not statistically significant. This ratio is considerably better than the 1 to 1 ratio found for students in the slow learning ability grouping but not quite as high as the 11 to 0 ratio found for students in the smallest class size grouping who had I.Q. scores of 79 and below.

*Summary of Pupil Achievement by the Average Ability Grouping: I.Q. Scores Between 95 and 104*. Table 39 contains the various statistics on pupil achievement gains in arithmetic and reading for white students of average ability in selected class size groupings. The negative and positive influences of pupil home mobility, parental education, faculty knowledge, and faculty teaching experience are also tabulated and assessed in the same table.

White students of average mental ability and in smaller classes made significantly higher gains in reading and arithmetic over the 5-year period (1959-1964) in 30 comparisons to 5 for those white students in larger classes. Thirteen comparisons indicated that neither students in larger nor in smaller classes made significantly greater gains in reading and arithmetic than the other group. These statistics, then, indicate a ratio of 6 to 1 favoring smaller over larger classes for pupils of average ability. Before attributing these gains in pupil achievement to class size, let's examine whether or not pupils in smaller classes had a significantly larger number of favorable supporting characteristics than pupils in larger classes.

With respect to changes in home addresses, out of 24 comparisons white students of average ability and in smaller classes had significantly more home moves in 7 comparisons to 2 for students in larger classes. Fifteen comparisons were not statistically significant. These statistics

indicate that white students in smaller classes were certainly not more disadvantaged due to moving about more than white students in larger classes. With respect to favorable supporting characteristics, the facts indicate that students in larger classes probably benefited more from a favorable set of supporting characteristics than white students in smaller classes. This conclusion is gleaned from the fact that out of 72 comparisons 27 favored pupils in larger classes, 7 those in smaller classes and 38 comparisons favored neither students in larger nor in smaller classes. Thus, white students in larger classes enjoyed an advantage of almost 4 to 1 over those in smaller classes with respect to favorable supporting characteristics.

When these favorable characteristics are broken down into their three components, the following ratios prevail: (1) for parental education, white students in larger classes had 9 favorable comparisons to 2 for those in smaller classes, and 13 comparisons favored neither white students in smaller nor in larger classes; (2) for faculty knowledge, 9 comparisons favored the white students in larger classes and 4 those in smaller classes, and 11 comparisons favored neither students in larger nor in smaller classes; and (3) for faculty teaching experience, the white students of average ability in larger classes enjoyed the advantage of 9 favorable comparisons to 1 for those in smaller classes; 14 comparisons favored neither students in larger nor in smaller classes. These statistics indicate, then, that the evidence is heavily weighted in the direction that students in smaller classes did not benefit considerably more than those in larger classes with respect to a favorable set of supporting characteristics.

This 6 to 1 ratio favoring white students of average ability in smaller classes is more than twice as large as the 2.6 to 1 ratio favoring white students with I.Q.'s between 80 and 94 and was also more than twice as large as the 2.3 to 1 ratio found for white students with I.Q.'s of 79 and below. With respect to statistics involving the academic performance of students in the smallest class size grouping (1-25 pupils), a ratio of 8 to 1 was found favoring students in smaller classes. This ratio is of the same order of magnitude as that found for students in the lowest I.Q. grouping. An analysis of the statistics involving only those white students in the smallest class size grouping indicates that out of 24 comparisons, the white students of average ability in the smallest class size grouping made significantly greater gains in reading and arithmetic in 16 comparisons to 2 for those in larger classes. Six comparisons yielded statistics which indicated that neither white students of average ability in larger nor in smaller classes made significantly greater gains than the other.

In summary, the chances are at least 6 to 1 that students of average ability will learn more in smaller classes than they will in larger classes even if a favorable set of characteristics favors pupils in the larger classes. Thus, class size is as important to white students of average ability as it is to students who possess slow learning ability and also as it is to students in the lowest ability grouping.

### Class Size Comparisons of White Students in Regular Curriculum Classes by the Highest Ability Grouping: I.Q. Scores of 105 and Above

Tables 20, 25, 30, and 35 contain the data on tests of statistical significance of the differences between means for white children in regular curriculum classes and in the highest ability grouping by selected class size groupings. Student gains in reading and arithmetic achievement are analyzed and reported as they were for students in the preceding groupings.

*Reading Achievement.* White students in the highest ability grouping and in smaller classes made significantly higher gains in reading achievement over the 5-year period (1959-1964) in 9 comparisons to 4 for like students in larger classes. Eleven comparisons were not statistically significant. Thus, for students in the highest ability grouping (I.Q. scores of 105 and above), the ratio

favoring smaller over larger classes is 2.25 to 1. This ratio is comparable to the 2.6 to 1 found for students with I.Q. scores between 80 and 94 and slightly more than the 1.8 to 1 found for students in the lowest ability grouping, but significantly lower than the 7.5 to 1 found for students of average ability.

Consideration of the statistics involving only students in the smallest class size grouping (1-25 pupils) reveals that out of 12 comparisons, the white students in the highest ability grouping and in the smallest class size grouping made significantly higher gains in reading in 4 comparisons to 1 for those in the larger class size groupings. Seven comparisons were not statistically significant. This is of the same order of magnitude as that ratio found for white students in the lowest ability grouping and in the smallest classes. It is larger however than the 2 to 1 ratio found for students with I.Q. scores between 80 and 94. And it is considerably less than the 8 to 1 ratio found for students who had average ability.

*Arithmetic Achievement.* White students in the highest ability grouping and who were in smaller classes made significantly greater gains in arithmetic over the 5-year period (1959-1964) in 8 comparisons to 6 for like students in larger classes. Ten comparisons were not statistically significant. With respect to gains in arithmetic achievement for students of highest ability the ratio favoring smaller over larger classes is 1.3 to 1.

This ratio is considerably improved when only white students in the smallest class size grouping are considered. An analysis of the results involving only white students in the highest ability grouping and in the smallest class size grouping (1-25 pupils) indicates that out of 12 comparisons, students in the smallest class size grouping made significantly higher gains in arithmetic in 6 comparisons to 2 for students in larger classes. Four comparisons favored neither students in larger nor in smaller classes. This ratio is considerably less than the 8 to 1 found for students with average ability and the 11 to 0 ratio found for students with the lowest mental ability.

*Summary of Pupil Achievement by the Highest Ability Grouping: I.Q. Scores of 105 and Above.* Table 40 presents a summary of pupil achievement gains in arithmetic and reading for white students of highest ability in selected class size groupings. Also, the negative and positive influences of pupil home mobility, parental education, faculty knowledge, and faculty teaching experience are tabulated and discussed.

White students with I.Q. scores of 105 and above and in smaller classes made significantly higher gains in reading and arithmetic over the 5-year period (1959-1964) in 17 comparisons to 10 for students in larger classes. Twenty-one comparisons favored neither students in smaller nor in larger classes. The resulting 1.7 to 1 ratio represents the lowest found for any of the four ability groupings. Perhaps these results indicate that students in the highest ability grouping when they are favored by a set of favorable supporting characteristics will do as well as like pupils in smaller classes who benefit less from a favorable set of supporting characteristics.

In general, pupils in smaller classes had slightly more home moves than those in larger classes. Out of a total of 23 comparisons, 7 comparisons indicated that the pupils in smaller classes had significantly more home moves, 5 comparisons indicated that the pupils in the larger classes had a significantly greater number of home moves, and 11 comparisons indicated that neither pupils in larger nor in smaller classes had a significantly larger number of home moves. With respect to the positive influences of parental education, faculty knowledge, and faculty teaching experience, out of 71 comparisons, white students in the highest ability grouping and in larger classes benefited significantly more from a favorable set of supporting characteristics in 25 comparisons to 11 for students in smaller classes. Thirty-five comparisons indicated that neither pupils in larger nor in smaller classes benefited significantly more. Breaking the set of favorable supporting characteristics into its separate components indicates the

## TABLE 40

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes and Whose I.Q. Scores Were 105 and Above**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 1 | 0 | 3 | 0 | 1 | 3 | 0 | 1 | 3 | 0 | 2 | 2 | 0 | 0 | 3 | 0 | 0 | 4 | 0 | 1 | 3 |
| 1-25 | 32-37 | 0 | 1 | 3 | 0 | 2 | 2 | 0 | 0 | 4 | 2 | 0 | 2 | 0 | 0 | 3 | 1 | 3 | 0 | 0 | 2 | 2 |
| 1-25 | 38 & over | 0 | 0 | 3 | 0 | 1 | 2 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 3 | 0 | 2 | 2 |
| Sub-Total | | 1 | 1 | 9 | 0 | 4 | 7 | 4 | 1 | 7 | 6 | 2 | 4 | 0 | 0 | 9 | 1 | 4 | 7 | 0 | 5 | 7 |
| 26-31 | 32-37 | 2 | 2 | 0 | 1 | 1 | 2 | 1 | 0 | 3 | 1 | 1 | 2 | 2 | 0 | 2 | 1 | 2 | 1 | 0 | 3 | 1 |
| 26-31 | 38 & over | 2 | 0 | 2 | 0 | 1 | 3 | 2 | 1 | 1 | 0 | 2 | 2 | 2 | 0 | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| 32-37 | 38 & over | 2 | 2 | 0 | 2 | 1 | 1 | 2 | 2 | 0 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 0 | 2 |
| Total | | 7 | 5 | 11 | 3 | 7 | 13 | 9 | 4 | 11 | 8 | 6 | 10 | 5 | 1 | 15 | 4 | 9 | 11 | 4 | 9 | 11 |

S - Small Classes
L - Larger Classes
N - Neither

following prevailing ratios: (1) for parental education, 7 comparisons favored pupils in larger classes, 3 comparisons favored students in smaller classes, and 13 comparisons favored neither pupils in larger nor in smaller classes; (2) for faculty knowledge, white students in the highest ability grouping enjoyed the advantages of 9 favorable comparisons to 4 for like students in smaller classes, and 11 comparisons indicated that neither students in larger nor in smaller classes were significantly favored; and (3) for faculty teaching experience, the identical ratios that were reported for faculty knowledge also prevailed with respect to faculty teaching experience.

Interestingly, an analysis of pupil academic performance involving only white students in the smallest class size grouping (1-25 pupils) and in the highest ability grouping showed significantly greater gains in reading and arithmetic in 10 comparisons to 3 for students in larger classes. Eleven comparisons were not statistically significant, indicating that neither pupils in larger nor in smaller classes made significantly greater gains in reading and arithmetic than the other. The ratio 3.3 to 1 favoring white students in the highest ability grouping and in the smallest class size grouping compares very favorably to the 1.5 to 1 obtained for students with I.Q.'s between 80 and 94. This ratio however is considerably less than the 9 to 1 obtained for students in the lowest ability grouping and the 8 to 1 ratio obtained for students of average ability.

In summary, class size is relatively important even to students in the highest ability grouping.

## ANALYSIS OF CLASS SIZE COMPARISONS FOR NONWHITE STUDENTS IN REGULAR CURRICULUM CLASSES BY OCCUPATIONAL GROUPINGS

Class size comparisons on nonwhite students enrolled in regular curriculum classes are reported in 16 basic tables divided into 4 occupational groupings and 4 intelligence quotient groupings. It is important to point out that in no instance were students compared by race. Mean differences and critical ratios were computed for each cell matrix involving nonwhite students; those cells without an acceptable minimum level of cases were not statistically utilized nor reported in the various 16 basic tables. For nonwhite students as well as for white students, any cell which did not have at least 30 cases was considered as not having an acceptable minimum level and, therefore, the results of tests of statistical significance between mean values were not reported, regardless of whether or not the mean differences were statistically significant. The four occupational groupings into which nonwhite students were subdivided are as follows: (1) sales, clerical, and kindred occupations; (2) private households and kindred occupations; (3) service, labor, operative, and kindred occupations; and (4) professional, technical, skilled, supervisory, and kindred occupations.

### Class Size Comparisons of Nonwhite Students in Regular Curriculum Classes by the Occupational Grouping: Sales, Clerical, and Kindred Occupations

Tables 41, 42, 43, and 44 contain the results on tests of statistical significance of the differences between means for selected class size groupings for nonwhite students in regular curriculum classes whose parents were employed in sales, clerical, and kindred occupations. In the paragraphs which

## TABLE 41

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose I.Q. Scores Were 79 and Below and Whose Parents Were Employed in Sales, Clerical, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 1-25 | 32-37 | — | — | — | .01 | .01 | — | — | — | — | — | .02 | — | — | .02 |
| 1-25 | 38 & over | — | — | — | — | .02 | — | .01 | — | — | — | — | — | — | .01 |
| 26-31 | 32-37 | .01 | — | — | — | — | — | — | — | — | .01 | — | .02 | — | .01 |
| 26-31 | 38 & over | — | — | .02 | — | — | — | — | — | — | — | — | — | — | — |
| 32-37 | 38 & over | — | — | — | — | — | .01 | — | .02 | — | — | — | — | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

follow, nonwhite student gains in reading and arithmetic achievement are reported without regard for ability (this is done in the last section of this chapter) but with regard to such favorable and unfavorable supporting characteristics as pupil home mobility, parental education, faculty knowledge, and faculty teaching experience.

*Reading Achievement.* Nonwhite students whose parents were employed in sales, clerical, and kindred occupations and who were in smaller classes made significantly higher gains in reading achievement over the 5-year period (1959-1964) in 9 comparisons to 4 for nonwhite students in larger classes. These statistics indicate that the ratio favoring smaller over larger classes is almost 2.3 to 1. Eleven comparisons indicated that neither nonwhite students in larger classes nor in smaller classes made significantly greater gains in reading than the other.

Another way to analyze the results of class size comparisons is to consider the statistics involving only the nonwhite students in the smallest class size grouping (1-25 pupils). When these statistics are tabulated, the following results may be noted: out of 12 comparisons, the nonwhite students in the smallest class size grouping made significantly greater reading gains in 7 comparisons to 0 for the nonwhite students in the larger class size groupings. Five comparisons yielded results which indicated that neither the pupils in the larger classes nor in the smaller classes made significantly greater reading gains than the other.

*Arithmetic Achievement.* The statistical results with respect to arithmetic achievement are not as impressive as they were for reading. This is evidenced by the fact that nonwhite students in smaller classes and whose parents were employed in sales, clerical, and kindred occupations made significantly greater gains in arithmetic over the 5-year period (1959-1964) in 7 comparisons to 5 for students in larger classes. With respect to gains in arithmetic achievement, the ratio favoring the nonwhite students in smaller over those in larger classes is 1.4 to 1. Twelve comparisons yielded results which indicated that neither the nonwhite students in smaller nor those in larger classes made significantly greater gains in arithmetic achievement than the other.

A look at the results of class size comparisons involving only the smallest class size grouping (1-25 pupils) reveals a different and more impressive picture. For example, the nonwhite students in the smallest class size grouping made significantly higher gains in arithmetic in 6 comparisons to 1 for those students in larger classes. This indicates a ratio of 6 to 1 in favor of smallest class size over larger classes. Five comparisons did not yield statistically significant mean differences in arithmetic gains by either the nonwhite students in smaller or in larger classes.

*Summary of Pupil Achievement by the Occupational Grouping: Sales, Clerical, and Kindred Occupations.* Pupil achievement gains in arithmetic and reading for nonwhite students in selected class size groupings and whose parents were employed in sales, clerical, and kindred occupations are summarized in Table 45. Also noted, analyzed, and discussed are the negative and positive influences of such variables as pupil home mobility, parental education, faculty knowledge, and faculty teaching experience.

Nonwhite students in smaller classes and whose parents were employed in sales, clerical, and kindred occupations made significantly higher gains in reading and arithmetic over the 5-year period (1959-1964) in 16 comparisons to 9 for nonwhite students in larger classes. This indicates for pupil achievement an overall ratio of 1.8 to 1 in favor of smaller over larger classes. Twenty-three comparisons, however, yielded results which indicated that neither the nonwhite students in smaller nor in larger classes made significantly greater gains in reading and arithmetic over this five-year period than the other. An analysis of the favorable and unfavorable influences of several supporting characteristics might indicate why the ratio favoring smaller over larger classes has a relatively low rather than high value.

With respect to pupil home mobility, the

## TABLE 42

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose I.Q. Scores Were Between 80 and 94 and Whose Parents Were Employed in Sales, Clerical, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 1-25 | 32-37 | — | — | — | — | — | — | — | — | — | — | — | .05 | — | — |
| 1-25 | 38 & over | — | — | — | — | .01 | | .01 | — | .02 | — | — | — | — | — |
| 26-31 | 32-37 | — | .01 | — | .01 | — | — | — | — | — | — | — | .01 | — | .01 |
| 26-31 | 38 & over | .01 | — | — | — | — | — | — | — | .01 | — | — | .01 | .01 | — |
| 32-37 | 38 & over | .01 | — | — | — | — | .01 | — | .01 | .01 | — | — | .01 | .01 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 43

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose I.Q. Scores Were Between 95 and 104 and Whose Parents Were Employed in Sales, Clerical, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | — | .01 | — | — | — | — | — | .02 |
| 1-25 | 32-37 | — | — | — | — | .01 | — | .02 | — | — | — | — | .02 | — | — |
| 1-25 | 38 & over | — | — | — | — | .02 | — | .02 | — | — | — | .01 | — | — | .01 |
| 26-31 | 32-37 | .05 | — | — | — | .01 | — | .01 | — | .01 | — | — | — | — | — |
| 26-31 | 38 & over | .01 | — | — | .01 | .01 | — | — | — | .01 | — | — | .01 | .01 | — |
| 32-37 | 38 & over | .01 | — | — | .02 | — | — | — | .05 | .01 | — | — | .01 | .01 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 44

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose I.Q. Scores Were 105 and Above and Whose Parents Were Employed in Sales, Clerical, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | — | — | — | — | — | — | — | .02 |
| 1-25 | 32-37 | — | — | — | .01 | .01 | — | .02 | — | — | — | — | — | — | — |
| 1-25 | 38 & over | — | — | — | — | .01 | — | .01 | — | — | — | — | .02 | — | — |
| 26-31 | 32-37 | — | .01 | — | — | — | .01 | — | — | .01 | — | — | — | — | .01 |
| 26-31 | 38 & over | — | — | — | .01 | — | — | — | — | — | — | — | — | — | — |
| 32-37 | 38 & over | — | .02 | — | — | — | .02 | — | .01 | — | — | — | — | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

nonwhite students in the smaller classes had slightly more home changes than those in the larger classes. This is evidenced by the fact that out of 24 comparisons, the nonwhite students in smaller classes had significantly more home moves in 6 comparisons to 3 for those in larger classes. Fifteen comparisons were not statistically significant. Considering next the positive influences of parental education, faculty knowledge, and faculty teaching experience reveals that out of 72 comparisons, the nonwhite students in the larger classes had favorable supporting characteristics in 23 comparisons to 7 for those in smaller classes. Forty-two comparisons reveal that neither the nonwhite students in larger nor in smaller classes benefited more than the other from a favorable set of supporting characteristics. Thus the overall ratio favoring the pupils in the larger classes over those in the smaller classes with respect to benefiting more from a favorable set of supporting characteristics is 3.3 to 1.

An analysis of the separate components of favorable supporting characteristics reveals the following statistics: (1) for parental education, the nonwhite pupils in the larger classes had 6 favorable comparisons to 1 for those in smaller classes, and 17 comparisons did not significantly benefit more either the students in the larger or in smaller classes; (2) for faculty knowledge, the nonwhite students in larger classes had 9 comparisons favorable to them to 2 for those in smaller classes, with 13 comparisons indicating that neither the students in smaller nor in larger classes benefited more than the other from a set of favorable characteristics; and (3) for faculty teaching experience, the students in larger classes enjoyed the advantages of 8 favorable comparisons to 4 for those in smaller classes, and 12 comparisons favored neither the students in larger nor in smaller classes. All in all, then, the nonwhite students in larger classes tended to be favored more by having parents with slightly more formal education, a faculty with slightly more academic knowledge, and teachers who had more years of teaching experience. Thus, the fact that the nonwhite students in smaller classes whose parents were employed in sales, clerical, and kindred occupations made significantly greater gains in reading and arithmetic over the nonwhite counterparts in larger classes in only a ratio of 1.8 to 1 should not be surprising, since the nonwhite students in larger classes probably benefited more from a favorable set of supporting characteristics than did the nonwhite students in smaller classes.

Perhaps nonwhite students whose parents were employed in clerical, sales, and kindred occupations require exceedingly small classes if they are to make significant gains in reading and arithmetic achievement. This might be evidenced by the fact that when only the nonwhite students in the smallest class size grouping (1-25 pupils) are analyzed, the ratio favoring the smallest class size grouping over larger classes is 13 to 1. For example, out of 24 comparisons, the nonwhite students in the smallest class size grouping and whose parents were employed in sales, clerical, and kindred occupations made significantly greater gains in reading and arithmetic achievement in 13 comparisons to 1 for those students in larger classes. Ten comparisons yielded results which indicated that neither the pupils in the smallest class size grouping nor in larger classes made significantly greater gains in reading and arithmetic than the other.

In summary, it appears that if nonwhite students whose parents are employed in sales, clerical, and kindred occupations are to read better and compute more accurately they should be placed in classes of less than 25 pupils rather than in classes of 26 and more.

## TABLE 45

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes and Whose Parents Were Employed in Sales, Clerical, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 1 | 3 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 2 | 2 |
| 1-25 | 32-37 | 0 | 0 | 4 | 0 | 2 | 2 | 3 | 0 | 1 | 2 | 0 | 2 | 0 | 0 | 4 | 1 | 2 | 1 | 0 | 1 | 3 |
| 1-25 | 38 & over | 0 | 0 | 4 | 0 | 0 | 4 | 4 | 0 | 0 | 4 | 0 | 0 | 1 | 0 | 3 | 1 | 1 | 2 | 0 | 2 | 2 |
| Sub-Total | | 0 | 0 | 12 | 0 | 2 | 10 | 7 | 0 | 5 | 6 | 1 | 5 | 1 | 0 | 11 | 2 | 3 | 7 | 0 | 5 | 7 |
| 26-31 | 32-37 | 2 | 2 | 0 | 0 | 1 | 3 | 1 | 1 | 2 | 1 | 0 | 3 | 2 | 1 | 1 | 0 | 2 | 2 | 0 | 3 | 1 |
| 26-31 | 38 & over | 2 | 0 | 2 | 1 | 2 | 1 | 1 | 0 | 3 | 0 | 0 | 4 | 2 | 0 | 2 | 0 | 2 | 2 | 2 | 0 | 2 |
| 32-37 | 38 & over | 2 | 1 | 1 | 0 | 1 | 3 | 0 | 3 | 1 | 0 | 4 | 0 | 2 | 0 | 2 | 0 | 2 | 2 | 2 | 0 | 2 |
| Total | | 6 | 3 | 15 | 1 | 6 | 17 | 9 | 4 | 11 | 7 | 5 | 12 | 7 | 1 | 16 | 2 | 9 | 13 | 4 | 8 | 12 |

S - Small Classes
L - Larger Classes
N - Neither

## TABLE 46

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose I.Q. Scores Were 79 and Below and Whose Parents Were Employed in Private Households and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | — | — | — | .01 | — | — | — | — |
| 1-25 | 32-37 | — | — | — | — | .01 | — | .05 | — | — | — | — | .01 | .02 | — |
| 1-25 | 38 & over | .01 | — | — | — | .02 | — | .01 | — | — | — | — | .01 | .01 | — |
| 26-31 | 32-37 | — | — | — | — | — | — | — | — | .01 | — | — | .05 | — | — |
| 26-31 | 38 & over | .01 | — | — | — | — | — | — | — | .01 | — | — | .01 | .01 | — |
| 32-37 | 38 & over | .01 | — | — | — | — | — | — | — | — | — | — | — | .01 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 47

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose I.Q. Scores Were Between 80 and 94 and Whose Parents Were Employed in Private Households and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | .01 | — | — | — | .01 | — | — | .01 | .01 | — | .01 | — |
| 1-25 | 32-37 | — | — | .01 | — | .01 | — | .01 | — | — | .01 | — | — | — | — |
| 1-25 | 38 & over | .05 | — | .01 | — | .01 | — | .01 | — | — | .01 | — | .01 | — | — |
| 26-31 | 32-37 | — | — | — | — | .01 | — | .01 | — | — | .01 | — | .02 | — | .01 |
| 26-31 | 38 & over | .01 | — | — | — | .01 | — | .01 | — | — | — | — | .01 | — | — |
| 32-37 | 38 & over | .01 | — | — | .01 | — | — | — | — | — | — | — | .01 | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## Class Size Comparisons of Nonwhite Students in Regular Curriculum Classes by the Occupational Grouping: Private Households and Kindred Occupations

Tests of statistical significance of the differences between means for selected class size groupings for nonwhite students in regular curriculum classes whose parents were employed in private households and kindred occupations are detailed in Tables 46, 47, 48, and 49. Similar to the nonwhite students whose parents were employed in sales, clerical, and kindred occupations, nonwhite student gains in reading and arithmetic achievement over the 5-year period (1959-1964) are reported without regard for ability but with regard to the number of favorable supporting characteristics such as teachers' academic knowledge, teachers' years of teaching experience, and parental education.

*Reading Achievement.* Nonwhite students whose parents were employed in private households and kindred occupations and who were in smaller classes made significantly higher gains in reading achievement over the 5-year period (1959-1964) in 13 comparisons to 0 for those students in larger classes. Eleven comparisons were not statistically significant indicating that neither nonwhite students in larger nor in smaller classes made significantly greater gains in reading than the other. This ratio of 13 to 0 favoring smaller over larger classes is considerably higher than the 2.3 to 1 found for nonwhite students whose parents were employed in sales, clerical, and kindred occupations.

Apparently, both nonwhite students whose parents were employed in sales, clerical, and kindred occupations and nonwhite students whose parents were employed in private households and kindred occupations fare better in the smallest class size grouping than in any other class size. For example, when the statistics involving only the nonwhite students in the smallest class size grouping (1-25 pupils) are analyzed, the results indicated a ratio of 7 to 0 for the nonwhite students whose parents were employed in sales, clerical, and kindred occupations and an 8 to 0 ratio for nonwhite students whose parents were employed in private households and kindred occupations. For the latter students, out of 12 comparisons the nonwhite students in the smallest class size grouping made significantly greater gains in reading in 8 comparisons to 0 for those students in the larger class size groupings. Four comparisons indicated that neither the pupils in the larger classes nor those in the smallest class size grouping made significantly greater reading gains than the other.

*Arithmetic Achievement.* The ratio obtained for arithmetic was not as impressive as that obtained for reading. For example, nonwhite students in smaller classes and whose parents were employed in private households and kindred occupations made significantly greater gains in arithmetic over the 5-year period (1959-1964) in 11 comparisons to 3 for those students in larger classes. Ten comparisons were not statistically significant favoring neither nonwhite students in smaller nor in larger classes. However this ratio of 3.7 to 1 favoring the nonwhite students in smaller classes whose parents were employed in private households and kindred occupations is greater than the 1.4 to 1 ratio found for the nonwhite students in smaller classes whose parents were employed in sales, clerical, and kindred occupations.

When only nonwhite students in the smallest class size grouping (1-25 pupils) are considered, the results of the class size comparisons are as follows: out of 12 comparisons, the nonwhite students in the smallest class size grouping made significantly greater gains in arithmetic in 7 comparisons to 2 for those students in larger classes. Three comparisons were not statistically significant. The ratio thus obtained was 3.5 to 1. This ratio is considerably less than the 6 to 1 ratio found for nonwhite students in the smallest class size grouping but whose parents were employed in sales, clerical, and kindred occupations.

## TABLE 48

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose I.Q. Scores Were Between 95 and 104 and Whose Parents Were Employed in Private Households and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | — | — | — | — | — | .01 | .02 | — |
| 1-25 | 32-37 | — | — | — | .02 | .01 | — | .01 | — | .01 | — | .01 | — | — | .05 |
| 1-25 | 38 & over | — | — | — | — | .01 | — | — | — | .02 | — | — | .05 | .01 | — |
| 26-31 | 32-37 | — | — | — | .01 | .01 | — | .01 | — | .01 | — | .01 | — | — | .01 |
| 26-31 | 38 & over | .01 | — | — | — | .05 | — | — | — | — | — | — | — | .01 | — |
| 32-37 | 38 & over | .01 | — | — | — | — | — | — | .01 | — | — | — | .02 | .01 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2 If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

*Summary of Pupil Achievement by the Occupational Grouping: Private Households and Kindred Occupations.* Table 50 summarizes pupil achievement gains in arithmetic and reading for nonwhite students in selected class size groupings and whose parents were employed in private households and kindred occupations. The positive and negative effects of pupil home mobility, parental education, teachers' academic knowledge, and faculty teaching experience are also duly noted and analyzed.

Nonwhite students in smaller classes and whose parents were employed in private households and kindred occupations made significantly greater gains in reading and arithmetic achievement over the 5-year period (1959-1964) in 24 comparisons to 3 for nonwhite students in larger classes. Twenty-one comparisons revealed that neither the nonwhite students in larger classes nor those in smaller classes made significantly greater gains over the others in reading and arithmetic over the same 5-year period. The ratio, then, favoring students in smaller over the larger classes is 8 to 1. Of course, it behooves us to examine both negative and positive influences on teaching environment to see whether or not the pupils in the smaller classes benefited more from a favorable set of supporting characteristics than those in larger classes.

In general, students in smaller classes were not unduly favored by a set of favorable supporting characteristics as indicated by the following statistics: out of a total of 24 comparisons, the nonwhite students in smaller classes whose parents were employed in private households and kindred occupations had significantly more home moves in 8 comparisons to 1 for the students in larger classes. Fifteen comparisons were not statistically significant, favoring neither the students in larger nor in smaller classes. Also, with respect to the favorable characteristics of parental education, faculty knowledge, and faculty teaching experience, nonwhite students in smaller classes whose parents were employed in private households and kindred occupations benefited significantly more in 16 comparisons but the nonwhite students in larger classes benefited more in 21 comparisons; 35 comparisons were not statistically significant indicating, therefore, that neither the students in the larger nor in the smaller classes benefited more than the other.

Ratios for each of the separate characteristics are as follows: (1) for parental education, the nonwhite students in smaller classes had 3 favorable comparisons to 3 for those in larger classes, and 18 comparisons favored neither students in larger nor in smaller classes; (2) for faculty knowledge, nonwhite students in larger classes benefited significantly from 12 comparisons to 4 for students in smaller classes: 8 comparisons were not statistically significant, indicating that neither the students in larger nor in smaller classes benefited more than the other; and (3) for faculty teaching experience, nonwhite students in smaller classes benefited significantly more in 9 comparisons to 6 for students in larger classes, and 9 comparisons favored neither the nonwhite students in smaller nor in larger classes. From such statistics we can probably conclude that the 8 to 1 ratio favoring the nonwhite students in smaller classes and whose parents were employed in private households and kindred occupations over their like counterparts in larger classes was achieved not because these students in smaller classes benefited unduly from a favorable set of supporting characteristics.

While the 7.5 to 1 ratio obtained by nonwhite students in the smallest class size grouping (1-25 pupils) and whose parents were employed in private households and kindred occupations is not as great as the 13 to 1 ratio obtained by nonwhite students in the smallest class size grouping and whose parents were employed in sales, clerical, and kindred occupations, it is nevertheless a substantial ratio favoring the smallest class size grouping over the larger classes. An analysis of the statistics involving only the smallest class size grouping indicates that for the nonwhite students in the smallest class size grouping and whose parents were employed in private households and kindred occupations, out of 24 comparisons the nonwhite students in the smallest class size grouping made significantly greater

## TABLE 49

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose I.Q. Scores Were 105 and Above and Whose Parents Were Employed in Private Households and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Pupil Mobility | | HOME FACTORS: Parental Education | | PUPIL ACHIEVEMENT FACTORS: Reading | | PUPIL ACHIEVEMENT FACTORS: Arithmetic | | FACULTY FACTORS: % Nonwhite Faculty | | FACULTY FACTORS: Faculty Knowledge | | FACULTY FACTORS: Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | .05 | — | — | — | — | — | .01 | .01 | — | — | — | — | .01 |
| 1-25 | 32-37 | — | — | — | — | .01 | — | — | .01 | .01 | — | — | — | — | .01 |
| 1-25 | 38 & over | — | — | — | — | .01 | — | .01 | — | — | — | — | .01 | — | .02 |
| 26-31 | 32-37 | — | — | — | — | .01 | — | — | — | .01 | — | .02 | — | — | — |
| 26-31 | 38 & over | — | — | — | — | — | — | .02 | — | — | .02 | — | — | — | — |
| 32-37 | 38 & over | — | — | — | — | — | — | — | — | .01 | — | — | — | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 50

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes and Whose Parents Were Employed in Private Households and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 0 | 1 | 3 | 1 | 0 | 3 | 0 | 0 | 4 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 |
| 1-25 | 32-37 | 0 | 0 | 4 | 1 | 1 | 2 | 4 | 0 | 0 | 3 | 1 | 0 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 |
| 1-25 | 38 & over | 2 | 0 | 2 | 1 | 0 | 3 | 4 | 0 | 0 | 3 | 0 | 1 | 1 | 1 | 2 | 0 | 4 | 0 | 2 | 1 | 1 |
| Sub-Total | | 2 | 1 | 9 | 3 | 1 | 8 | 8 | 0 | 4 | 7 | 2 | 3 | 4 | 4 | 4 | 2 | 6 | 4 | 5 | 4 | 3 |
| 26-31 | 32-37 | 0 | 0 | 4 | 0 | 1 | 3 | 3 | 0 | 1 | 2 | 0 | 2 | 3 | 1 | 0 | 2 | 2 | 0 | 0 | 2 | 2 |
| 26-31 | 38 & over | 3 | 0 | 1 | 0 | 0 | 4 | 2 | 0 | 2 | 2 | 0 | 2 | 1 | 1 | 2 | 0 | 2 | 2 | 2 | 0 | 2 |
| 32-37 | 38 & over | 3 | 0 | 1 | 0 | 1 | 3 | 0 | 0 | 4 | 0 | 1 | 3 | 1 | 0 | 3 | 0 | 2 | 2 | 2 | 0 | 2 |
| Total | | 8 | 1 | 15 | 3 | 3 | 18 | 13 | 0 | 11 | 11 | 3 | 10 | 9 | 6 | 9 | 4 | 12 | 8 | 9 | 6 | 9 |

S - Small Classes
L - Larger Classes
N - Neither

## TABLE 51

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose I.Q. Scores Were 79 and Below and Whose Parents Were Employed in Service, Labor, Operative, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Pupil Mobility | | HOME FACTORS: Parental Education | | PUPIL ACHIEVEMENT FACTORS: Reading | | PUPIL ACHIEVEMENT FACTORS: Arithmetic | | FACULTY FACTORS: % Nonwhite Faculty | | FACULTY FACTORS: Faculty Knowledge | | FACULTY FACTORS: Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | .01 | — | — | — | .01 | — | .01 | — | .05 | — | .02 | — | — | — |
| 1-25 | 32-37 | .01 | — | .01 | — | .01 | — | .01 | — | — | — | .01 | — | — | — |
| 1-25 | 38 & over | — | — | | | — | — | — | — | .01 | — | — | .01 | .01 | — |
| 26-31 | 32-37 | — | — | — | .01 | — | — | — | — | — | .01 | — | — | — | — |
| 26-31 | 38 & over | — | .01 | | | — | .01 | — | .01 | — | — | — | .01 | .01 | — |
| 32-37 | 38 & over | — | .01 | | | — | — | — | .01 | .01 | — | — | .01 | .01 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

gains in reading and arithmetic in 15 comparisons to 2 for their counterparts in larger classes. Seven comparisons indicated that neither the students in the smallest class size groupings nor those in the larger classes made significantly greater gains in reading and in arithmetic than the other.

In summary, for nonwhite students whose parents were employed in private households and kindred occupations, class size is an important contributor to pupil learning in arithmetic and reading. In fact, since the ratio is substantially greater for those nonwhite students in the smallest classes we can conclude that the odds are even greater that they will learn to read better and compute more accurately if they are in the smallest classes that the school district can afford.

## Class Size Comparisons of Nonwhite Students in Regular Curriculum Classes by the Occupational Grouping: Service, Labor, Operative, and Kindred Occupations

Tables 51, 52, 53, and 54 contain data on tests of statistical significance of the differences between means for selected class size groupings for nonwhite students in regular curriculum classes whose parents were employed in service, labor, operative, and kindred occupations. As in the case of the two previously discussed occupational groupings, nonwhite student gains in reading and arithmetic achievement over the 5-year period (1959-1964) are reported without regard for ability but with regard to the number of favorable or unfavorable influences of such characteristics as pupil home mobility, parental education, faculty academic knowledge, and faculty teaching experience.

*Reading Achievement.* Nonwhite students whose parents were employed in service, labor, operative, and kindred occupations and who were in smaller classes made significantly greater gains in reading achievement over the 5-year period (1959-1964) in 11 comparisons to 2 for those nonwhite students in larger classes. Eleven comparisons yielded results which indicated that neither the pupils in larger nor in smaller classes made significantly greater gains in reading achievement than the other. The ratio thus obtained favoring smaller over larger classes is 5.5 to 1. This ratio is greater than the 2.3 to 1 ratio that nonwhite students whose parents were employed in clerical, sales, and kindred occupations made but considerably smaller than the 13 to 0 ratio made by nonwhite students in smaller classes whose parents were employed in private households and kindred occupations.

The ratio obtained for nonwhite students in the smallest class size grouping (1-25 pupils) over larger classes is of the same order of magnitude as those obtained by nonwhite students whose parents were employed in private households and kindred occupations and in sales, clerical, and kindred occupations. Thus, out of 12 comparisons the nonwhite students, whose parents were employed in service, labor, operative, and kindred occupations, in the smallest class size grouping (1-25 pupils) made significantly greater gains in reading achievement in 8 comparisons to 0 for their nonwhite counterparts in larger classes. Four comparisons indicated that neither the nonwhite students in larger nor in smaller classes made significantly greater gains in reading than the other.

*Arithmetic Achievement.* With respect to arithmetic achievement, the nonwhite students whose parents were employed in service, labor, operative, and kindred occupations did better than those nonwhite students whose parents were employed in private households, clerical, sales, and kindred occupations. This is evidenced by the fact that nonwhite students in smaller classes made significantly greater gains in arithmetic over the 5-year period (1959-1964) in 15 comparisons to 2 for their nonwhite counterparts in larger classes. Seven comparisons were not statistically significant, indicating that neither the students in smaller nor in larger classes made significantly greater gains in arithmetic than the other. With respect to gains in arithmetic achievement, then, the ratio favoring smaller over larger classes is 7.5 to 1.

Consider next an analysis of the results

## TABLE 52

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose IQ Scores Were Between 80 and 94 and Whose Parents Were Employed in Service, Labor, Operative, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | .01 | — | .05 | — | .02 | — | .01 | — | — | — | — | .01 | — | — |
| 1-25 | 32-37 | — | — | — | — | .01 | — | .01 | — | — | .01 | — | .01 | — | — |
| 1-25 | 38 & over | — | — | — | — | .01 | — | .01 | — | — | — | — | .01 | .01 | — |
| 26-31 | 32-37 | .01 | — | — | .01 | .01 | — | .02 | — | — | — | — | — | — | — |
| 26-31 | 38 & over | .01 | — | — | .01 | .01 | — | .05 | — | — | — | — | .01 | .01 | — |
| 32-37 | 38 & over | — | — | — | .01 | — | — | — | — | .02 | — | — | .01 | .01 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 53

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose I.Q. Scores Were Between 95 and 104 and Whose Parents Were Employed in Service, Labor, Operative, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | — | — | — | .02 | — | — | .02 | — |
| 1-25 | 32-37 | .02 | — | — | — | .01 | — | .01 | — | — | .01 | .01 | — | — | — |
| 1-25 | 38 & over | .01 | — | — | .05 | — | — | .01 | — | — | .01 | — | — | .01 | — |
| 26-31 | 32-37 | .01 | — | — | — | .05 | — | .01 | — | — | .01 | .01 | — | — | .01 |
| 26-31 | 38 & over | .01 | — | — | .01 | — | — | .01 | — | — | .01 | — | .01 | .01 | — |
| 32-37 | 38 & over | — | — | — | .01 | — | .01 | .01 | — | — | .02 | — | .01 | .01 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 54

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose I.Q. Scores Were 105 and Above and Whose Parents Were Employed in Service, Labor, Operative, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Pupil Mobility | | HOME FACTORS: Pa.ental Education | | PUPIL ACHIEVEMENT FACTORS: Reading | | PUPIL ACHIEVEMENT FACTORS: Arithmetic | | % Nonwhite Faculty | | FACULTY FACTORS: Faculty Knowledge | | FACULTY FACTORS: Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | .01 | — | — | — | — | .01 | — | — |
| 1-25 | 32-37 | — | — | — | — | .02 | — | .01 | — | — | — | — | — | — | .02 |
| 1-25 | 38 & over | — | — | — | .02 | .05 | — | .02 | — | — | — | .02 | — | — | .01 |
| 26-31 | 32-37 | — | — | .01 | — | — | — | — | — | - | — | .02 | — | — | — |
| 26-31 | 38 & over | — | — | — | .01 | — | — | — | — | — | — | — | — | — | — |
| 32-37 | 38 & over | — | — | — | .01 | — | — | — | — | .01 | — | — | .01 | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

involving only the smallest class sizes. Nonwhite students in the smallest class size grouping (1-25 pupils) made significantly higher gains in arithmetic in 10 comparisons to 0 for those students in larger classes. Two comparisons favored neither students in larger nor in smaller classes, not being statistically significant.

*Summary of Pupil Achievement by the Occupational Grouping: Service, Labor, Operative, and Kindred Occupations*. Table 55 summarizes pupil achievement gains in arithmetic and in reading for nonwhite students in selected class size groupings and whose parents were employed in service, labor, operative and kindred occupations. The results obtained are those covering the 5-year period (1959-1964). In addition, the negative and positive influences of four environmental factors are also tabulated and discussed. These factors deal with pupil home mobility, parental education, faculty academic knowledge, and faculty teaching experience.

All in all, the nonwhite students in smaller classes and whose parents were employed in service, labor, operative, and kindred occupations made significantly greater gains in reading and arithmetic achievement over the 5-year period (1959-1964) in 26 comparisons to 4 for those nonwhite students in larger classes. This works out to a ratio of 6.5 to 1 favoring smaller over larger classes. Eighteen class size comparisons indicated that neither the nonwhite students in larger nor those in smaller classes made significantly greater gains than the other in reading or in arithmetic. This 6.5 to 1 ratio is considerably larger than the 1.8 to 1 obtained for nonwhite students whose parents were employed in clerical, sales, and kindred occupations and of about the same order of magnitude as the 8 to 1 obtained by the nonwhite students whose parents were employed in private households and kindred occupations. Moreover, as the statistics on favorable and unfavorable influences indicate in the following paragraph, the nonwhite students in smaller classes did not unduly benefit from a set of favorable supporting characteristics.

Out of a total of 24 comparisons, the nonwhite students in smaller classes whose parents were employed in service, labor, operative, and kindred occupations had significantly more home moves in 9 comparisons to 2 for those in larger classes. Thirteen comparisons were not statistically significant. With respect to the three individual characteristics involving parental education, faculty knowledge, and faculty teaching experience the following ratios prevail: (1) for parental education, the nonwhite pupils in larger classes had 10 favorable comparisons to 3 for those in smaller classes, and 8 comparisons were not statistically significant; (2) for faculty knowledge, the nonwhite students in larger classes benefited significantly more in 12 comparisons to 6 for those in smaller classes, and 6 comparisons were not statistically significant; and (3) for faculty teaching experience, the nonwhite students in smaller classes benefited significantly more in 10 comparisons to 3 for those in larger classes, and 11 comparisons yielded results which indicated that neither the nonwhite students in larger nor in smaller classes benefited more from a more experienced teaching faculty. Summing these components in the one set of statistics reveals that the nonwhite students in larger classes benefited more from a favorable set of supporting characteristics in 25 comparisons to 19 for those in smaller classes, and 25 comparisons favored neither the students in larger nor in smaller classes.

Taking a look at only class size comparisons involving the smallest class size grouping reveals the following: the nonwhite students in the smallest class size grouping (1-25 pupils) made significantly greater gains in both reading and arithmetic achievement in 18 comparisons to 0 for nonwhite students in larger classes. Six comparisons were not statistically significant which indicated that neither the nonwhite students whose parents were employed in service, labor, operative, and kindred occupations or their nonwhite counterparts in larger classes made significantly greater gains in reading and arithmetic achievement.

The ratios obtained for the smallest class size grouping over larger classes is consider-

## TABLE 55

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes and Whose Parents Were Employed in Service, Labor, Operative,and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 2 | 0 | 2 | 1 | 0 | 3 | 2 | 0 | 2 | 3 | 0 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 0 | 3 |
| 1-25 | 32-37 | 2 | 0 | 2 | 1 | 0 | 3 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 2 | 2 | 2 | 1 | 1 | 0 | 1 | 3 |
| 1-25 | 38 & over | 1 | 0 | 3 | 0 | 2 | 1 | 2 | 0 | 2 | 3 | 0 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 3 | 1 | 0 |
| Sub-Total | | 5 | 0 | 7 | 2 | 2 | 7 | 8 | 0 | 4 | 10 | 0 | 2 | 2 | 4 | 6 | 4 | 5 | 3 | 4 | 2 | 6 |
| 26-31 | 32-37 | 2 | 0 | 2 | 1 | 2 | 1 | 2 | 0 | 2 | 2 | 0 | 2 | 0 | 2 | 2 | 2 | 0 | 2 | 0 | 1 | 3 |
| 26-31 | 38 & over | 2 | 1 | 1 | 0 | 3 | 0 | 1 | 1 | 2 | 2 | 1 | 1 | 0 | 1 | 3 | 0 | 3 | 1 | 3 | 0 | 1 |
| 32-37 | 38 & over | 0 | 1 | 3 | 0 | 3 | 0 | 0 | 1 | 3 | 1 | 1 | 2 | 3 | 1 | 0 | 0 | 4 | 0 | 3 | 0 | 1 |
| Total | | 9 | 2 | 13 | 3 | 10 | 8 | 11 | 2 | 11 | 15 | 2 | 7 | 5 | 8 | 11 | 6 | 12 | 6 | 10 | 3 | 11 |

S - Small Classes
L - Larger Classes
N - Neither

ably higher than the 7.5 to 1 obtained by nonwhite students whose parents were employed in private households and kindred occupations and slightly more than 13 to 1 ratio obtained by nonwhite students whose parents were employed in clerical, sales, and kindred occupations.

In summary, nonwhite students whose parents were employed in service, labor, operative, and kindred occupations will learn more arithmetic and read better if placed in smaller rather than larger classes.

## Class Size Comparisons of Nonwhite Students in Regular Curriculum Classes by the Occupational Grouping: Professional, Technical, Skilled, Supervisory, and Kindred Occupations

Data on tests of statistical significance of the differences between means for selected class size groupings for nonwhite students in regular curriculum classes whose parents were employed in professional, technical, skilled, supervisory, and kindred occupations are contained in 4 basic tables: Tables 56, 57, 58, and 59. As in the case for previously discussed occupational groupings, nonwhite student gains in reading and arithmetic achievement are reported here in this section without regard for ability but with regard to such favorable and unfavorable influences as pupil home mobility, parental education, faculty knowledge, and faculty teaching experience.

*Reading Achievement*. Surprisingly, class size appears to be as important for nonwhite students whose parents are in professional and kindred occupations as for nonwhite children whose parents are employed in the lower socioeconomic levels. For example, with respect to reading achievement the nonwhite students whose parents were employed in professional and kindred occupations made significantly greater gains in reading achievement over the 5-year period (1959-1964) in 13 comparisons to 4 for nonwhite students in larger classes. Seven comparisons were not statistically significant, indicating that neither the nonwhite students in larger nor in smaller classes made significantly greater gains in reading than the other. While the ratio 3.3 to 1 obtained for nonwhite students whose parents were employed in professional and kindred occupations is considerably less than the 13 to 0 ratio obtained by nonwhite students whose parents were employed in private households and kindred occupations, nevertheless, it is almost as much as the 5.5 to 1 ratio obtained by nonwhite children whose parents were employed in service, labor, operative, and kindred occupations, and more than the 2.3 to 1 ratio obtained by nonwhite students whose parents were employed in clerical, sales, and kindred occupations.

Another surprising finding is that the nonwhite students in the smallest class size grouping whose parents were employed in the highest occupational level made as high a ratio over larger classes as did the nonwhite students whose parents were employed at lower socioeconomic levels. This is evidenced by the fact that when the statistics involving only the nonwhite students in the smallest class size grouping (1-25 pupils) and whose parents were employed in professional and kindred occupations are analyzed, out of 12 comparisons the nonwhite students in the smallest class size grouping made significantly higher gains in reading in 8 comparisons to 0 for their nonwhite counterparts in the larger class size groupings. Four comparisons indicated that neither the students in larger nor in the smallest class size grouping made significantly greater gains in reading than the other.

*Arithmetic Achievement*. The nonwhite students in smaller classes and whose parents were employed in professional and kindred occupations made significantly greater gains in arithmetic achievement over the 5-year period (1959-1964) in 16 comparisons to 1 for their nonwhite counterparts in larger classes. Seven comparisons indicated that neither the students in larger nor in smaller classes made significantly greater gains in arithmetic achievement than the other. Surprisingly, this represents a ratio of 16 to 1 which is considerably higher than any ratio obtained by nonwhite students of any other occupational grouping.

## TABLE 56

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose I.Q. Scores Were 79 and Below and Whose Parents Were Employed in Professional, Technical, Skilled, Supervisory, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | .01 | — | .01 | — | — | .01 | .01 | — | — | .01 |
| 1-25 | 32-37 | — | — | — | .02 | .01 | — | .01 | — | — | .01 | — | .05 | — | — |
| 1-25 | 38 & over | .01 | — | | | — | — | .01 | — | — | .01 | — | .01 | — | .02 |
| 26-31 | 32-37 | — | — | — | .01 | — | .01 | — | — | — | — | — | .02 | — | — |
| 26-31 | 38 & over | .01 | — | — | — | — | .01 | .05 | — | — | .01 | — | .01 | — | — |
| 32-37 | 38 & over | .01 | — | — | — | — | .05 | .05 | — | — | .01 | — | — | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

The results obtained by nonwhite students in the smallest class size grouping (1-25 pupils) are just as impressive for this occupational grouping as for any other previously discussed For example the nonwhite students in the smallest class size grouping and whose parents were employed in professional and kindred occupations made significantly greater gains in arithmetic achievement in 10 comparisons to 0 for those in larger classes. Two comparisons indicated that neither the students in larger nor in smaller classes made significantly greater gains than the other in arithmetic achievement.

*Summary of Pupil Achievement by the Occupational Grouping: Professional, Technical, Skilled, Supervisory, and Kindred Occupations*. Pupil achievement gains in both arithmetic and reading are summarized in Table 60 for nonwhite students in selected class size groupings and whose parents were employed in professional, technical, skilled, supervisory, and kindred occupations. Also found in Table 60 are summaries of the class size comparisons with respect to pupil home mobility, parental education, faculty academic knowledge, and faculty teaching experience.

Nonwhite students in smaller classes and whose parents were employed in professional and kindred occupations made significantly higher gains in reading and arithmetic over the 5-year period (1959-1964) in 29 comparisons to 5 for nonwhite students in larger classes. Fourteen comparisons yielded results which indicated that neither the nonwhite students in larger nor in smaller classes made significantly greater gains in reading and in arithmetic than the other. The 5.8 to 1 ratio obtained by the nonwhite students whose parents were employed in professional and kindred occupations is almost as great as the 6.5 to 1 ratio of smaller over larger classes obtained by nonwhite students in service, labor, operative, and kindred occupations and almost as great as the 8 to 1 ratio obtained by nonwhite students whose parents were employed in private households and kindred occupations. It is considerably greater than the 1.8 to 1 ratio obtained by the nonwhite students whose parents were employed in clerical, sales, and kindred occupations. An examination of favorable supporting characteristics indicates that the nonwhite students in the larger classes benefited significantly more from a favorable set of supporting characteristics than the nonwhite students in smaller classes. The evidence for this is contained in the paragraph which follows.

Out of a total of 24 comparisons, nonwhite students in smaller classes had significantly more home moves in 10 comparisons to 1 for nonwhite students in larger classes. Thirteen comparisons indicated that neither students in larger nor in smaller classes had a significantly larger number of home moves. When the statistics involving parental education are analyzed, the nonwhite students in larger classes benefited more in 6 comparisons to 3 for those in smaller classes. Fourteen comparisons were not statistically significant, indicating that neither the parents of pupils in smaller nor in larger classes had significantly greater formal education. With respect to faculty knowledge, the nonwhite students in larger classes had 10 favorable comparisons to 7 for those in smaller classes. Six comparisons were not statistically significant, indicating that neither the teachers of the nonwhite students in larger nor in smaller classes had significantly different academic knowledge test scores.

Finally, with respect to faculty teaching experience, the nonwhite students whose parents were employed in professional and kindred occupations were advantaged significantly more in 9 comparisons to 3 for those in smaller classes. Twelve comparisons yielded results which indicated that neither the teachers for the nonwhite students in larger nor in smaller classes were significantly more experienced. When these separate characteristics are summed into a single favorable set of characteristics the results are as follows: out of 70 comparisons, nonwhite students in larger classes and whose parents were employed in professional and kindred occupations benefited significantly more in 25 comparisons to 13 for those nonwhite students in smaller classes. Thirty-two comparisons indicated that neither students in larger nor in smaller

## TABLE 57

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose IQ.Scores Were Between 80 and 94 and Whose Parents Were Employed in Professional, Technical, Skilled, Supervisory, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | .01 | — | — | .01 | — | — | — | .01 | — | — | — |
| 1-25 | 32-37 | .01 | — | — | .01 | .01 | — | .01 | — | — | — | .01 | — | — | .01 |
| 1-25 | 38 & over | — | — | — | .01 | .01 | — | .01 | — | — | .05 | — | — | — | .01 |
| 26-31 | 32-37 | .01 | — | — | — | .01 | — | .01 | — | — | .01 | — | — | — | .01 |
| 26-31 | 38 & over | — | — | — | — | .01 | — | .01 | — | — | .01 | — | .01 | — | .05 |
| 32-37 | 38 & over | — | .01 | — | — | .01 | — | .05 | — | — | — | — | .02 | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 58

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose I.Q. Scores Were Between 95 and 104 and Whose Parents Were Employed in Professional, Technical, Skilled, Supervisory, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | — | — | — | — | — | — | — | .01 |
| 1-25 | 32-37 | — | — | — | — | .05 | — | .01 | — | — | — | — | .02 | — | — |
| 1-25 | 38 & over | — | — | — | .02 | .02 | — | .01 | — | — | — | — | — | — | .02 |
| 26-31 | 32-37 | .01 | — | .01 | — | — | — | — | — | — | .05 | .05 | — | — | — |
| 26-31 | 38 & over | .01 | — | .01 | — | — | — | — | — | — | .02 | — | .01 | — | — |
| 32-37 | 38 & over | — | — | .01 | — | — | — | — | — | — | — | — | .01 | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 59

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes Whose I.Q. Scores Were 105 and Above and Whose Parents Were Employed in Professional, Technical, Skilled, Supervisory, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-25 | 26-31 | — | — | — | — | — | — | — | — | — | — | — | .01 | — | — |
| 1-25 | 32-37 | — | — | — | — | .01 | — | .02 | — | — | — | — | — | .02 | — |
| 1-25 | 38 & over | — | — | — | — | .01 | — | .01 | — | — | — | .02 | — | — | .05 |
| 26-31 | 32-37 | .01 | — | — | — | .01 | — | .05 | — | — | .02 | — | — | — | — |
| 26-31 | 38 & over | .01 | — | — | — | .05 | — | — | — | — | — | .01 | — | .05 | — |
| 32-37 | 38 & over | .01 | — | — | — | — | .02 | — | .01 | .01 | — | .01 | — | .02 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

classes benefited significantly more than the other. Thus, we can safely surmise that the 5.8 to 1 ratio obtained by nonwhite students in the smaller classes and whose parents were employed in professional and kindred occupations was not due to the fact that the students in smaller classes had significantly more favorable characteristics than the students in larger classes.

When only those class size comparisons involving the smallest class size grouping are analyzed, the learning gains made by the nonwhite students in the smallest class size grouping and whose parents were employed in professional and kindred occupations are just as great as that made by the nonwhite students whose parents were in other occupational groupings. For example, out of 24 comparisons the nonwhite students in the smallest class size grouping (1-25 pupils) made significantly greater gains in reading and in arithmetic over the 5-year period (1959-1964) in 18 comparisons to 0 for those nonwhite students in larger classes. Six comparisons yielded results which indicated that neither the students in the smallest class size grouping nor those in larger classes made significantly greater gains in reading and in arithmetic than the other.

In summary, then, class size appears to be just as important for nonwhite students whose parents are employed in professional and kindred occupations as it is for nonwhite students whose parents are employed in private households, service, labor, operative, and kindred occupations, as well as for nonwhite students whose parents are employed in clerical, sales, and kindred occupations.

## ANALYSIS OF CLASS SIZE COMPARISONS OF NONWHITE STUDENTS IN REGULAR CURRICULUM CLASSES BY ABILITY GROUPINGS

As noted previously, pupils in this study were subsumed under four ability groupings. Data on nonwhite students enrolled in regular curriculum classes are reported in 16 tables by 4 intelligence quotient groupings. These groupings are the same as those for white students. Although mean differences and critical ratios were computed for each cell matrix, those cells without an acceptable minimum level of cases were not statistically utilized nor reported in the various 16 tables. Any cell which did not have at least 30 cases was considered as not having an acceptable minimum level and, therefore, the results of tests of statistical significance between mean values were not reported, regardless of whether or not mean differences were statistically significant.

### Class Size Comparisons of Nonwhite Students in Regular Curriculum Classes by the Ability Grouping: I.Q. of 79 and Below

Tables 41, 46, 51, and 56 contain data on tests of statistical significance of the differences between means for selected class size groupings for nonwhite students in regular curriculum classes whose mental ability qualified them for the lowest ability grouping: I.Q. of 79 and below. Nonwhite student gains in reading and arithmetic achievement are reported with regard for for ability but not with regard to parental occupational grouping. In addition, class size statistics are analyzed with respect to both favorable and unfavorable supporting characteristics such as pupil home mobility, teachers' academic knowledge, faculty teaching experience, and parental educational level.

*Reading Achievement.* For nonwhite students in the lowest ability grouping: I.Q. scores of 79 and below, the nonwhite students in smaller classes made significantly higher gains in reading achievement over the 5-year period (1959-1964) in 8 comparisons to 5 for nonwhite students in larger classes. Eleven comparisons were not statistically significant, favoring neither larger nor smaller classes. These statistics indicate that the ratio favoring nonwhite

## TABLE 60

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes and Whose Parents Were Employed in Professional, Technical, Skilled, Supervisory, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 0 | 0 | 4 | 0 | 1 | 3 | 1 | 0 | 3 | 2 | 0 | 2 | 0 | 1 | 3 | 2 | 1 | 1 | 0 | 2 | 2 |
| 1-25 | 32-37 | 1 | 0 | 3 | 0 | 2 | 2 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 1 | 3 | 1 | 2 | 1 | 1 | 1 | 2 |
| 1-25 | 38 & over | 1 | 0 | 3 | 0 | 2 | 1 | 3 | 0 | 1 | 4 | 0 | 0 | 0 | 2 | 2 | 1 | 1 | 2 | 0 | 4 | 0 |
| Sub-Total | | 2 | 0 | 10 | 0 | 5 | 6 | 8 | 0 | 4 | 10 | 0 | 2 | 0 | 4 | 8 | 4 | 4 | 4 | 1 | 7 | 4 |
| 26-31 | 32-37 | 3 | 0 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 3 | 1 | 1 | 1 | 2 | 0 | 1 | 3 |
| 26-31 | 38 & over | 3 | 0 | 1 | 1 | 0 | 3 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 3 | 1 | 1 | 3 | 0 | 1 | 1 | 2 |
| 32-37 | 38 & over | 2 | 1 | 1 | 1 | 0 | 3 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 0 | 1 | 0 | 3 |
| Total | | 10 | 1 | 13 | 3 | 6 | 14 | 13 | 4 | 7 | 16 | 1 | 7 | 1 | 11 | 12 | 7 | 10 | 6 | 3 | 9 | 12 |

S - Small Classes
L - Larger Classes
N - Neither

pupils in smaller classes over those in larger classes is 1.6 to 1.

When the statistics involving only nonwhite students in the smallest class size grouping (1-25 pupils) are analyzed, the results are interesting and impressive. Out of 12 comparisons, the nonwhite students in the smallest class size grouping made significantly higher gains in reading in 8 comparisons to 0 for those in the larger class size groupings. Four comparisons were not statistically significant.

*Arithmetic Achievement*. Nonwhite students in smaller classes and in the lowest ability grouping made significantly greater gains in arithmetic over the 5-year period (1959-1964) in 10 comparisons to 3 for nonwhite students with lowest abilities but in the larger classes. Eleven comparisons were not statistically significant, favoring neither smaller nor larger classes. With respect to gains in arithmetic achievement, the ratio favoring smaller over larger classes is 3.3 to 1.

An analysis of the results involving only nonwhite students in the smallest class size grouping (1-25 pupils) indicates that out of 12 comparisons, the nonwhite students in the smallest class size grouping made significantly higher gains in arithmetic in 8 comparisons to 0 for like students in larger classes. Four comparisons were not statistically significant, favoring neither smaller nor larger classes.

*Summary of Pupil Achievement by the Ability Grouping: I.Q. 79 and Below*. Table 61 summarizes pupil achievement gains in arithmetic and reading over the 5-year period (1959-1964) for nonwhite students in selected class size groupings. Also, results are summarized and analyzed with respect to pupil home mobility, parental education, faculty knowledge, and faculty teaching experience.

Nonwhite students in smaller classes and in the lowest ability grouping made significantly higher gains in reading and arithmetic over the 5-year period (1959-1964) in 18 comparisons to 8 for nonwhite students in larger classes. Twenty-two comparisons did not statistically favor either smaller or larger classes. These statistics indicate that for nonwhite students in the lowest ability grouping the ratio favoring smaller over larger classes is 2.5 to 1. Let us examine favorable and unfavorable supporting characteristics to see whether or not this ratio favoring smaller over larger classes was achieved because the pupils in the smaller classes had more favorable supporting characteristics going for them than those in the larger classes.

Out of a total of 24 comparisons, nonwhite students in smaller classes had significantly more home moves in 9 comparisons to 2 for nonwhite students in larger classes. Thirteen comparisons were not statistically significant. We cannot attribute, then, the higher ratio that nonwhite students in smaller classes achieved over those in larger classes because those students in larger classes were more adversely affected by greater numbers of home moves. The evidence indicates that it was the nonwhite students in smaller classes who were more adversely affected by the home moves than those in larger classes. With respect to the positive influences of parental education, faculty knowledge, and faculty teaching experience, nonwhite students in larger classes enjoyed the advantage of more favorable characteristics to the ratio 1.6 to 1. For example, out of 68 comparisons, nonwhite students in the lowest ability grouping and in smaller classes had favorable supporting characteristics in 13 comparisons, those in larger classes in 21 comparisons, and 34 comparisons favored neither students in smaller nor in larger classes.

When these favorable supporting characteristics are broken down into their separate components the following ratios prevail: (1) for parental education, pupils in larger classes had 4 favorable comparisons to 2 for those in smaller classes; 14 comparisons favored neither students in larger nor in smaller classes; (2) for faculty knowledge, nonwhite students in larger classes enjoyed the advantages of 12 comparisons to 4 for students in smaller classes; 8 comparisons were not statistically significant and, therefore, neither pupils in larger nor in smaller classes were favored; and (3) for faculty teaching experience, the nonwhite students in larger classes

## TABLE 61

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes and Whose I.Q. Scores Were 79 and Below**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 1 | 0 | 3 | 0 | 0 | 4 | 2 | 0 | 2 | 2 | 0 | 2 | 1 | 2 | 1 | 2 | 0 | 2 | 0 | 1 | 3 |
| 1-25 | 32-37 | 1 | 0 | 3 | 1 | 2 | 1 | 4 | 0 | 0 | 3 | 0 | 1 | 0 | 1 | 3 | 2 | 2 | 0 | 1 | 1 | 2 |
| 1-25 | 38 & over | 2 | 0 | 2 | 0 | 0 | 2 | 2 | 0 | 2 | 3 | 0 | 1 | 1 | 1 | 2 | 0 | 3 | 1 | 2 | 2 | 0 |
| Sub-Total | | 4 | 0 | 8 | 1 | 2 | 7 | 8 | 0 | 4 | 8 | 0 | 4 | 2 | 4 | 6 | 4 | 5 | 3 | 3 | 4 | 5 |
| 26-31 | 32-37 | 1 | 0 | 3 | 0 | 2 | 2 | 0 | 1 | 3 | 0 | 0 | 4 | 1 | 2 | 1 | 0 | 3 | 1 | 0 | 1 | 3 |
| 26-31 | 38 & over | 2 | 1 | 1 | 1 | 0 | 2 | 0 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 0 | 3 | 1 | 2 | 0 | 2 |
| 32-37 | 38 & over | 2 | 1 | 1 | 0 | 0 | 3 | 0 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 0 | 1 | 3 | 2 | 0 | 2 |
| Total | | 9 | 2 | 13 | 2 | 4 | 14 | 8 | 5 | 11 | 10 | 3 | 11 | 5 | 8 | 11 | 4 | 12 | 8 | 7 | 5 | 12 |

S - Small Classes
L - Larger Classes
N - Neither

had 5 comparisons in their favor to 7 for students in smaller classes; 12 comparisons favored neither students in larger nor smaller classes. These statistics probably indicate that the nonwhite students in larger classes benefited more from such favorable characteristics as parental education and faculty knowledge than those nonwhite students in smaller classes. Granted that the nonwhite students in smaller classes benefited slightly more from experienced teachers than did those in larger classes. But this advantage is certainly not the main cause that the nonwhite students in the lowest ability grouping and in smaller classes made significantly greater gains in reading and arithmetic over like students in larger classes in a ratio of 2.5 to 1. When class size statistics are examined involving only those nonwhite students in the smallest class size grouping (1-25 pupils), the ratio favoring the smallest class size grouping over the larger classes is 16 to 0. This is evidenced by the fact that out of 24 comparisons, the nonwhite students in the smallest class size grouping made significantly greater gains in reading achievement in 16 comparisons to 0 for students in larger classes. Eight comparisons were not statistically significant.

In summary, class size is an important factor to be taken into consideration for nonwhite students in the lowest ability grouping. The chances are at least 2.5 to 1 that they will learn more arithmetic and read better as measured by standardized tests if they are in smaller rather than larger classes, and if these students are in the smallest class size grouping the odds are even greater that they will learn more arithmetic and read better.

**Class Size Comparisons of Nonwhite Students in Regular Curriculum Classes by the Ability Grouping: I.Q. of 80 to 94.**

Tables 42, 47, 52, and 57 possess the data on tests of statistical significance of the differences between means for selected class size groupings for nonwhite children in regular curriculum classes subsumed under the ability grouping: I.Q. between 80 and 94. The same procedures for analyzing pupil performance with respect to reading achievement is followed here as was followed for the nonwhite students subsumed under the ability grouping: I.Q. of 79 and below.

*Reading Achievement.* Nonwhite students with intelligence quotients between 80 and 94 and in smaller classes made significantly higher gains in reading achievement over the 5-year period (1959-1964) in 15 comparisons to 1 for their counterparts in larger classes. Eight comparisons were not statistically significant, and favored neither nonwhite students in larger nor in smaller classes. These statistics indicate that the ratio favoring smaller over larger classes is 15 to 1. Probably as expected, this ratio is considerably higher than the 1.6 to 1 found for the nonwhite students in the lowest ability grouping.

When the statistics involving only the nonwhite students in the smallest class size grouping (1-25 pupils) are analyzed, the results are again rather impressive. Out of 12 comparisons, the nonwhite students with intelligence quotients between 80 and 94 and in the smallest class size grouping made significantly higher gains in reading in 8 comparisons to 0 for those students in the larger class size groupings. Four comparisons were not statistically significant.

*Arithmetic Achievement.* Results for arithmetic are just as impressive as those found for reading. This is evidenced by the fact that nonwhite students in smaller classes and in the ability grouping considered here made significantly greater gains in arithmetic over the 5-year period (1959-1964) in 17 comparisons to 1 for students in larger classes. Six comparisons were not statistically significant and favored neither nonwhite students in smaller nor in larger classes. Similarly impressive results were found when the statistics involving only the nonwhite students in the smallest class size grouping (1-25 pupils) were analyzed. The nonwhite students in the smallest class size grouping made significantly higher gains in 10 comparisons to 0 for those in larger classes. Two comparisons were not statisti-

## TABLE 62

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes and Whose I.Q. Scores Were Between 80 and 94**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Number of Pupil Mobility Comparisons Favoring | | | HOME FACTORS: Number of Parental Education Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Reading Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Arithmetic Comparisons Favoring | | | FACULTY FACTORS: Number of % Nonwhite Faculty Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Knowledge Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Teaching Experience Comparisons Favoring | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 1 | 0 | 3 | 2 | 1 | 1 | 1 | 0 | 3 | 3 | 0 | 1 | 0 | 1 | 3 | 2 | 1 | 1 | 1 | 0 | 3 |
| 1-25 | 32-37 | 1 | 0 | 3 | 1 | 1 | 2 | 3 | 0 | 1 | 3 | 0 | 1 | 0 | 2 | 2 | 1 | 2 | 1 | 0 | 1 | 3 |
| 1-25 | 38 & over | 1 | 0 | 3 | 1 | 1 | 2 | 4 | 0 | 0 | 4 | 0 | 0 | 1 | 2 | 1 | 0 | 2 | 2 | 1 | 1 | 2 |
| Sub-Total | | 3 | 0 | 9 | 4 | 3 | 5 | 8 | 0 | 4 | 10 | 0 | 2 | 1 | 5 | 6 | 3 | 5 | 4 | 2 | 2 | 8 |
| 26-31 | 32-37 | 2 | 1 | 1 | 0 | 2 | 2 | 3 | 0 | 1 | 3 | 0 | 1 | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 3 | 1 |
| 26-31 | 38 & over | 3 | 0 | 1 | 0 | 1 | 3 | 3 | 0 | 1 | 3 | 0 | 1 | 1 | 1 | 2 | 0 | 4 | 0 | 2 | 1 | 1 |
| 32-37 | 38 & over | 2 | 1 | 1 | 0 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 0 | 2 | 0 | 4 | 0 | 2 | 0 | 2 |
| Total | | 10 | 2 | 12 | 4 | 8 | 12 | 15 | 1 | 8 | 17 | 1 | 6 | 4 | 8 | 12 | 3 | 15 | 6 | 6 | 6 | 12 |

S - Small Classes
L - Larger Classes
N - Neither

cally significant and therefore neither favored nonwhite students in smaller nor in larger classes.

*Summary of Pupil Achievement by the Ability Grouping: I.Q. Between 80 and 94.* Table 62 summarizes pupil achievement gains in arithmetic and reading for nonwhite students in selected class size groupings and who were in the ability grouping: I.Q. between 80 and 94. The negative and positive influences for the following factors are discussed and analyzed: pupil home mobility, parental education, faculty knowledge, and faculty teaching experience.

Nonwhite students in this ability grouping and in smaller classes made significantly higher gains in reading and in arithmetic over the 5-year period (1959-1964) in 32 comparisons to 2 for nonwhite students in larger classes. Fourteen comparisons were not statistically significant and, therefore, favored neither nonwhite students in smaller nor in larger classes. These statistics indicate a ratio of 16 to 1 favoring nonwhite students in smaller over nonwhite students in larger classes. Let us look into the favorable and unfavorable supporting characteristics before attributing to class size an important role.

With respect to pupil home mobility, nonwhite students in smaller classes had significantly more home moves in 10 comparisons to 2 for students in larger classes. Twelve comparisons were not statistically significant. With respect to the favorable characteristics of parental education, faculty knowledge, and faculty teaching experience, nonwhite students in larger classes enjoyed a ratio of 2.2 to 1 over those in smaller classes. This is evidenced by the fact that out of 72 comparisons, 29 favored students in the larger classes, 13 those in the smaller classes, and 30 comparisons were not statistically significant and, therefore, favored neither students in larger nor in smaller classes. When the favorable characteristics are broken down into the separate components, the following varying ratios prevail: (1) for parental education, students in larger classes had 8 favorable comparisons to 4 for those in smaller classes; 12 comparisons were not statistically significant; (2) for faculty knowledge, the ratio favoring larger to smaller classes was 15 to 3, with 6 comparisons favoring neither nonwhite students in larger nor in smaller classes; and (3) for faculty teaching experience, nonwhite students in larger classes had 6 favorable comparisons; the nonwhite students in smaller classes had also 6 comparisons in their favor; 12 comparisons were not statistically significant and, therefore, neither favored the nonwhite students in larger nor in smaller classes. Surely, the fact that the nonwhite students in smaller classes and in the ability grouping with I.Q. scores between 80 and 94 made significantly greater gains in reading and arithmetic over their nonwhite counterparts in larger classes in a ratio of 16 to 1 cannot be attributed to the fact that the students in the smaller classes benefited significantly more from favorable supporting characteristics than the students in larger classes.

When an analysis of the statistics involving only nonwhite students in the smallest class size grouping (1-25 pupils) is made, the ratio prevailing is just as impressive as that found for students in the smallest class size grouping but with lowest ability. Out of 24 comparisons, the nonwhite students in the smallest class size grouping made significantly greater gains in reading and arithmetic in 18 comparisons to 0 for students in the larger classes. Six comparisons were not statistically significant.

In summary, class size appears to be as an important factor to be taken into consideration for nonwhite students in the lowest ability level as it is for students in the ability level between 80 and 94 I.Q. The odds are about 16 to 1 that they will learn more arithmetic and read better if they are in smaller rather than in larger classes, even when the size of classes differs only as little as 6 pupils.

## Class Size Comparisons of Nonwhite Students in Regular Curriculum Classes by the Ability Grouping: I.Q. Between 95 and 104

Tables 43, 48, 53, and 58 report data on tests of statistical significance of the dif-

## TABLE 63

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes and Whose I.Q. Scores Were Between 95 and 104**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 4 | 0 | 1 | 3 | 0 | 1 | 3 | 0 | 1 | 3 | 2 | 2 | 0 |
| 1-25 | 32-37 | 1 | 0 | 3 | 0 | 1 | 3 | 4 | 0 | 0 | 4 | 0 | 0 | 1 | 1 | 2 | 2 | 2 | 0 | 0 | 1 | 3 |
| 1-25 | 38 & over | 1 | 0 | 3 | 0 | 2 | 2 | 3 | 0 | 1 | 3 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 0 |
| Sub-Total | | 2 | 0 | 10 | 0 | 3 | 9 | 7 | 0 | 5 | 7 | 1 | 4 | 2 | 3 | 7 | 3 | 4 | 5 | 4 | 5 | 3 |
| 26-31 | 32-37 | 3 | 0 | 1 | 1 | 1 | 2 | 3 | 0 | 1 | 3 | 0 | 1 | 2 | 2 | 0 | 3 | 0 | 1 | 0 | 2 | 2 |
| 26-31 | 38 & over | 4 | 0 | 0 | 1 | 2 | 1 | 2 | 0 | 2 | 1 | 0 | 3 | 1 | 2 | 1 | 0 | 3 | 1 | 3 | 0 | 1 |
| 32-37 | 38 & over | 2 | 0 | 2 | 1 | 2 | 1 | 0 | 1 | 3 | 1 | 2 | 1 | 1 | 1 | 2 | 0 | 4 | 0 | 3 | 0 | 1 |
| Total | | 11 | 0 | 13 | 3 | 8 | 13 | 12 | 1 | 11 | 12 | 3 | 9 | 6 | 8 | 10 | 6 | 11 | 7 | 10 | 7 | 7 |

S - Small Classes
L - Larger Classes
N - Neither

ferences between means for selected class size groupings for nonwhite children in regular curriculum classes in the ability grouping: I.Q. between 95 and 104. Nonwhite student gains in reading and arithmetic achievement are analyzed in the same manner as was done for the two previous ability groupings, that is, with regard to the number of favorable and unfavorable supporting characteristics.

*Reading Achievement*. Nonwhite students in smaller classes and in the ability grouping I.Q. between 95 and 104 made significantly higher gains in reading achievement over the 5-year period (1959-1964) in 12 comparisons to 1 for nonwhite students in larger classes. Eleven comparisons were not statistically significant and thereby favored neither nonwhite students in larger nor in smaller classes. Thus, the ratio favoring smaller over larger classes is 12 to 1.

Consider next the statistics involving only nonwhite students in the smallest class size grouping (1-25 pupils). Out of 12 comparisons, the nonwhite students in the smallest class size grouping made significantly higher gains in reading in 7 comparisons to 0 for those in the larger class size groupings. Five comparisons were not statistically significant.

*Arithmetic Achievement*. Nonwhite students in smaller classes and in the ability grouping with I.Q. scores between 95 and 104 made significantly greater gains in arithmetic achievement over the 5-year period (1959-1964) in 12 comparisons to 3 for nonwhite students in larger classes. Nine comparisons were not statistically significant, favoring neither pupils in smaller nor in larger classes. With respect to gains in arithmetic achievement, the ratio favoring smaller over larger classes is 4 to 1.

An analysis of the statistics involving only the nonwhite students in the smallest class size grouping (1-25 pupils) and in this ability grouping indicates that out of 12 comparisons, the nonwhite students in the smallest class size grouping made significantly higher gains in arithmetic in 7 comparisons to 1 for students in larger classes. Four comparisons were not statistically significant.

*Summary of Pupil Achievement by the Ability Grouping: I.Q. Scores Between 95 and 104*. Table 63 summarizes the pupil achievement gains in both arithmetic and reading for nonwhite students in selected class size groupings and with ability level between 95 and 104. In addition, the negative and positive effects of pupil home mobility, parental education, faculty knowledge, and faculty teaching experience upon the class size ratios obtained are also investigated and discussed.

Nonwhite students in smaller classes and in the ability grouping, I.Q. scores between 95 and 104, made significantly higher gains in reading and arithmetic over the 5-year period (1959-1964) in 24 comparisons to 4 for nonwhite students in larger classes. Twenty comparisons did not significantly favor either smaller or larger classes. These statistics indicate that the ratio favoring smaller over larger classes for nonwhite students in this ability grouping is 6 to 1. This ratio is considerably higher than the 2.5 to 1 found for nonwhite students in regular curriculum classes and whose ability level was 79 and below. It is considerably less, however, than the 16 to 1 ratio found for nonwhite students in regular curriculum classes and whose ability level was between 80 and 94.

Consider next the statistics on the negative and positive influences of pupil achievement with respect to the variables, pupil home mobility, parental education, faculty knowledge, and faculty teaching experience. Out of a total of 24 comparisons, the nonwhite students in smaller classes had significantly more home moves in 11 comparisons to 0 for their counterparts in larger classes. Thirteen comparisons were not statistically significant. Insofar as pupil home mobility is concerned, we can safely conclude that the nonwhite pupils in larger classes were not more disadvantaged with respect to this measure than were pupils in the smaller classes. With respect to the positive influences of parental education, faculty knowledge, and faculty teaching experience, out of 72 comparisons the nonwhite students in the larger classes had favorable supporting characteristics in 26 comparisons to 19 for nonwhite students in smaller classes. Twenty-seven comparisons benefited neither the

nonwhite students in larger nor in smaller classes.

An analysis of these favorable supporting characteristics in terms of the separate components indicates the following ratios: (1) for parental education, the nonwhite students in larger classes had 8 favorable comparisons to 3 for those in smaller classes; 13 comparisons did not benefit either nonwhite students in larger or in smaller classes; (2) for faculty knowledge, the nonwhite students in larger classes enjoyed the benefits of 11 comparisons to 6 for those in smaller classes; 7 comparisons were not statistically significant and did not benefit either the students in larger or in smaller classes; and (3) for faculty teaching experience, 7 comparisons favored pupils in larger classes, 10 students in smaller classes, and 7 comparisons did not benefit either students in larger or in smaller classes. The overall ratio of favorable supporting characteristics benefited the nonwhite students in larger classes more than those in smaller classes. These benefits were derived principally from parents with higher educational levels and from teachers who scored higher on academic tests. The pupils in the smaller classes had teachers with greater faculty teaching experience. From these statistics, it is logical to assume that the 6 to 1 ratio favoring smaller over larger classes was not obtained because the nonwhite pupils in the smaller classes benefited tremendously more than those in the larger classes because of more favorable supporting characteristics.

Statistics on pupil academic performance involving only those students in the smallest class size grouping (1-25 pupils) reveal that out of 24 comparisons, the nonwhite students in the smallest class size grouping and in the ability grouping with I.Q. scores between 95 and 104 made significantly higher gains in reading and arithmetic in 14 comparisons to 1 for the nonwhite students in larger classes. Nine comparisons were not statistically significant. This ratio is on the order of that found for the nonwhite students with I.Q. scores of 79 and below, as well as the ratio found for the nonwhite students with I.Q. scores between 80 and 94.

In summary, the chances are at least 6 to 1 that nonwhite students in the ability grouping: I.Q. scores between 95 and 104, will learn more arithmetic and read better as measured by standardized tests in both reading and arithmetic if the nonwhite students are in smaller rather than in larger classes. And the chances are even greater that the nonwhite students will achieve better scores on arithmetic and reading tests if they are placed in the smallest class size grouping (1-25 pupils).

### Class Size Comparisons of Nonwhite Students in Regular Curriculum Classes by the Ability Grouping: I.Q. of 105 and Above

Tables 44, 49, 54, and 59 report data on tests of statistical significance of the differences between means for selected class size groupings from nonwhite students in regular curriculum classes without regard to parental education but with regard to the ability grouping: I.Q. of 105 and above. Also in the paragraphs which follow, nonwhite student gains in reading and arithmetic achievement are reported separately with regard to this ability grouping and also with regard to the influence of favorable or unfavorable supporting characteristics upon the class size findings obtained.

*Reading Achievement.* Nonwhite students in regular curriculum classes and in the highest ability grouping (I.Q. 105 and above) and in the smaller classes made significantly higher gains in reading achievement over the 5-year period (1959-1964) in 11 comparisons to 3 for those students in larger classes. Ten comparisons favored neither the nonwhite students in larger nor in smaller classes. The ratio favoring smaller over larger classes is 3.7 to 1. This ratio is considerably less than the 15 to 1 found for nonwhite children with I.Q.'s between 80 and 94 and the 12 to 1 found for nonwhite children with I.Q.'s between 95 and 104. It is, however, higher than the 1.6 to 1 found for nonwhite children with I.Q. scores of 79 and below.

When the statistics involving only the nonwhite students in this I.Q. grouping and in the smallest class size grouping (1-25

pupils) are analyzed, the ratio favoring the nonwhite students in the smallest class size grouping over those in larger classes is 8 to 0. Four comparisons were not statistically significant. Insofar as this ratio is concerned with respect to making significantly higher gains in reading achievement, the ratio is of the same order as that found for students in the other three ability groupings and in the smallest class size groupings.

*Arithmetic Achievement.* With respect to student performance in arithmetic achievement the ratio favoring smaller over larger classes is 2.5 to 1 which is slightly lower than the 3.7 found for reading. Out of 24 comparisons the nonwhite students in smaller classes and in the ability grouping with I.Q. scores of 105 and above made significantly greater gains in arithmetic over the 5-year period (1959-1964) in 10 comparisons to 4 for those in larger classes. Ten comparisons were not statistically significant and therefore favored neither pupils in smaller nor in larger classes. For nonwhite students in the highest ability grouping and in regular curriculum classes, the 2.5 to 1 ratio favoring smaller over larger classes insofar as gains in arithmetic achievement are concerned is considerably less than the 17 to 1 found for nonwhite students in the ability grouping: I.Q. scores between 80 and 94, and the 4 to 1 ratio found for nonwhite students in the regular curriculum classes with ability between 95 and 104, but almost that found for the nonwhite children in the lowest ability grouping which was 3.3 to 1.

Analyzing the statistics involving only nonwhite students in the smallest class size grouping (1-25 pupils) indicates that out of 12 comparisons, the nonwhite students in the smallest class size grouping made significantly higher gains in arithmetic in 8 comparisons to 2 for those in larger classes. Two comparisons were not statistically significant. These statistics indicate a ratio of 4 to 1 favoring the nonwhite students in smaller classes over those in larger classes. While this represents a substantial difference in performance of nonwhite students in smaller classes over those in larger classes, it by no means represents the arithmetic gains achieved by students in the three other ability groupings. The ratios for these three ability groupings were approximately 8 to 0.

*Summary of Pupil Achievement by the Ability Grouping: I.Q. of 105 and Above.* Table 64 summarizes pupil achievement gains in both arithmetic and reading for nonwhite students in selected class size groupings and who had I.Q.'s of 105 and above. Also in the table are summarized the positive and negative influences of pupil home mobility, parental education, faculty knowledge, and faculty teaching experience upon class size.

Nonwhite students in smaller classes who had I.Q.'s of 105 and above made significantly higher gains in reading and in arithmetic over the 5-year period (1959-1964) in 21 comparisons to 7 for nonwhite students in larger classes. This represents a 3 to 1 ratio in favor of smaller over larger classes. Twenty comparisons were not statistically significant. The ratio 3 to 1 found for nonwhite students in the highest ability grouping approximates the 2.5 to 1 ratio found for nonwhite students in the lowest ability grouping. However, this ratio is less than the 6 to 1 found for nonwhite children who had I.Q.'s between 95 and 104, and it is considerably less than the 16 to 1 ratio found for nonwhite students who had I.Q.'s between 80 and 94.

Perhaps an examination of the negative and positive influences on pupil achievement with respect to pupil home mobility, parental education, faculty knowledge, and faculty teaching experience will shed more light on the 3 to 1 ratio obtained. With respect to pupil home mobility, it appears that neither nonwhite pupils in larger nor in smaller classes had more address changes. This is evidenced by the following statistics: Out of a total of 24 comparisons, nonwhite students with I.Q.'s of 105 and above and in smaller classes had significantly more home moves in 3 comparisons, which is the same number for students in larger classes; 18 comparisons however were not statistically significant, indicating that neither pupils in larger nor in smaller classes had more home moves. However, with respect to favorable supporting characteristics, nonwhite students in this ability grouping

## TABLE 64

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes and Whose I.Q. Scores Were 105 and Above**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 0 | 1 | 3 | 0 | 0 | 4 | 0 | 0 | 4 | 1 | 1 | 2 | 1 | 0 | 3 | 0 | 2 | 2 | 0 | 2 | 2 |
| 1-25 | 32-37 | 0 | 0 | 4 | 0 | 1 | 3 | 4 | 0 | 0 | 3 | 1 | 0 | 1 | 0 | 3 | 0 | 0 | 4 | 1 | 2 | 1 |
| 1-25 | 38 & over | 0 | 0 | 4 | 0 | 1 | 3 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 4 | 2 | 2 | 0 | 0 | 3 | 1 |
| Sub-Total | | 0 | 1 | 11 | 0 | 2 | 10 | 8 | 0 | 4 | 8 | 2 | 2 | 2 | 0 | 10 | 2 | 4 | 6 | 1 | 7 | 4 |
| 26-31 | 32-37 | 1 | 1 | 2 | 1 | 0 | 3 | 2 | 1 | 1 | 1 | 0 | 3 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 1 | 3 |
| 26-31 | 38 & over | 1 | 0 | 3 | 0 | 2 | 2 | 1 | 0 | 3 | 1 | 0 | 3 | 0 | 1 | 3 | 1 | 0 | 3 | 1 | 0 | 3 |
| 32-37 | 38 & over | 1 | 1 | 2 | 0 | 1 | 3 | 0 | 2 | 2 | 0 | 2 | 2 | 3 | 0 | 1 | 1 | 1 | 2 | 1 | 0 | 3 |
| Total | | 3 | 3 | 18 | 1 | 5 | 16 | 11 | 3 | 10 | 10 | 4 | 10 | 7 | 2 | 15 | 6 | 5 | 13 | 3 | 8 | 13 |

S - Small Classes
L - Larger Classes
N - Neither

achieved an advantage of 1.8 to 1 over the nonwhite students in smaller classes. Thus out of 72 comparisons, 18 favored the nonwhite students in larger classes and 10 those in smaller classes, with 44 comparisons not statistically significant. These facts probably indicate that the nonwhite students in this ability grouping in smaller classes were not materially benefited from a favorable set of supporting characteristics.

An examination of the separate components of these favorable supporting characteristics reveals the following facts: (1) for parental education, the nonwhite students in larger classes had 5 favorable comparisons to 1 for those in smaller classes, with 18 comparisons favoring neither students in larger nor in smaller classes; (2) for faculty knowledge, 5 comparisons favored the nonwhite students in larger classes and 6 those in smaller classes; 13 comparisons indicated that neither the pupils in larger nor in smaller classes materially benefited from having a faculty with decidedly more academic knowledge; and (3) for faculty teaching experience, the nonwhite students in larger classes had 8 favorable comparisons to 3 for those in smaller classes; 13 comparisons favored neither pupils in larger nor in smaller classes. These statistics indicate, then, that the nonwhite students in the highest ability grouping and in the smaller classes did not materially benefit more from a set of favorable characteristics than the nonwhite students in larger classes. Thus, the 3 to 1 ratio favoring smaller over larger classes could be attributed more to smaller class size than to a set of unfavorable supporting characteristics for the pupils in the larger classes.

Consideration of academic performance involving only the nonwhite students in the smallest class size grouping (1-25 pupils) indicates a ratio of 8 to 1 in favor of the nonwhite students in the smallest class size grouping. This is evidenced by the fact that out of 24 comparisons, the nonwhite students with I.Q.'s of 105 and above and in the smallest class size grouping made significantly greater gains in reading and in arithmetic in 16 comparisons to 2 for students in larger classes. Six comparisons were not statistically significant. However, this ratio of 8 to 1 favoring the smallest class size grouping over larger classes is considerably less than those that prevailed for the nonwhite children in the other three ability groupings. For example, it's considerably less than the 16 to 0 found for nonwhite children with I.Q.'s of 79 and below, the 18 to 0 ratio found for nonwhite children with I.Q.'s between 80 and 94, and the 14 to 1 ratio found for nonwhite children with I.Q.'s between 95 and 104.

In summary, class size is extremely important for nonwhite students regardless of their ability level. It is more important, however, for nonwhite students at the lowest end of the ability spectrum than it is for nonwhite students at the highest end of the ability spectrum.

## SUMMARY OF CLASS SIZE COMPARISONS FOR ALL STUDENTS IN REGULAR CURRICULUM CLASSES

This section is divided into three topics. The first deals with the class size comparisons of all students by occupational groupings. The second deals with the class size comparisons of all students by ability groupings. The third recapitulates by white and nonwhite students the various class size comparisons.

### Summary of All Students in Regular Curriculum Classes by Occupational Groupings

As stated earlier the class size comparisons for all students in regular curriculum classes are divided into four occupational groupings. Table 65 summarizes the results for all students by the occupational grouping: sales,

## TABLE 65

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for All Children in Regular Curriculum Classes and Whose Parents Were Employed in Sales, Clerical, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 1 | 1 | 6 | 0 | 2 | 6 | 2 | 0 | 6 | 2 | 1 | 5 | 0 | 0 | 8 | 0 | 1 | 7 | 0 | 2 | 6 |
| 1-25 | 32-37 | 0 | 1 | 7 | 1 | 3 | 4 | 6 | 0 | 2 | 5 | 0 | 3 | 0 | 0 | 7 | 1 | 3 | 4 | 0 | 2 | 6 |
| 1-25 | 38 & over | 0 | 0 | 7 | 0 | 1 | 6 | 7 | 0 | 1 | 8 | 0 | 0 | 1 | 0 | 6 | 2 | 2 | 4 | 0 | 4 | 4 |
| Sub-Total | | 1 | 2 | 20 | 1 | 6 | 16 | 15 | 0 | 9 | 15 | 1 | 8 | 1 | 0 | 21 | 3 | 6 | 15 | 0 | 8 | 16 |
| 26-31 | 32-37 | 5 | 2 | 1 | 1 | 2 | 5 | 3 | 2 | 3 | 3 | 1 | 4 | 5 | 2 | 1 | 1 | 4 | 3 | 0 | 5 | 3 |
| 26-31 | 38 & over | 5 | 0 | 3 | 2 | 5 | 1 | 4 | 1 | 3 | 2 | 1 | 5 | 5 | 1 | 2 | 0 | 4 | 4 | 3 | 1 | 4 |
| 32-37 | 38 & over | 2 | 4 | 1 | 2 | 2 | 4 | 3 | 3 | 2 | 2 | 4 | 2 | 5 | 0 | 3 | 1 | 4 | 3 | 4 | 1 | 3 |
| Total | | 13 | 8 | 25 | 6 | 15 | 26 | 25 | 6 | 17 | 22 | 7 | 19 | 16 | 3 | 27 | 5 | 18 | 25 | 7 | 15 | 26 |

S - Small Classes
L - Larger Classes
N - Neither

clerical, and kindred occupations. As indicated in Table 65 all students (both white and nonwhite) in smaller classes and whose parents were employed in sales, clerical, and kindred occupations, made significantly greater gains in reading in 25 comparisons to 6 for those students in larger classes. Seventeen comparisons yielded results which indicated that neither the students in the smaller nor in the larger classes made significantly greater gains in reading than the other. With respect to arithmetic, the students in the smaller classes made greater gains in 22 comparisons to 7 for those in larger classes. Nineteen comparisons indicated that neither the students in the larger nor in smaller classes made significantly greater gains in arithmetic than the other.

Table 66 contains the summary data for all students in regular curriculum classes whose parents were employed in private households and kindred occupations. These students in the smaller classes made significantly greater gains in reading over the 5-year period (1959-1964) in 21 comparisons to 6 for those students in the larger classes. Twenty-one comparisons indicated that neither the students in larger nor in the smaller classes made significantly greater gains in reading than the other. With respect to arithmetic, the picture is almost the same. The students in the smaller classes made greater gains in 20 comparisons to 10 for those in the larger classes.

Table 67 summarizes the class size comparisons for all students in regular curriculum classes whose parents were employed in service, labor, operative, and kindred occupations. With respect to reading, these students in the smaller classes made significantly greater gains in reading in 23 comparisons to 6 for those students in the larger classes. Nineteen comparisons were not statistically significant, yielding results which indicated that neither the students in the larger nor in the smaller classes made significantly greater gains in reading than the other. The ratio favoring smaller over larger classes was almost the same for arithmetic as it was for reading achievement. For example, the students in smaller classes made significantly greater gains in arithmetic in 28 comparisons to 7 for those in larger classes.

Table 68 recapitulates the class size comparisons for all students (both white and nonwhite) in regular curriculum classes and whose parents were employed in professional, technical, skilled, supervisory, and kindred occupations. Those students in smaller classes made significantly greater gains in reading over the 5-year period (1959-1964) in 23 comparisons to 8 for those students in larger classes. With respect to arithmetic the students in the smaller classes made significantly greater gains in arithmetic in 26 cornparisons to 5 for those in larger classes. In each instance, 17 comparisons indicated that neither the students in the larger nor in the smaller classes made significantly greater gains in either reading or in arithmetic than the other.

In summary, students in smaller classes made significantly greater gains in both reading and arithmetic than the students in larger classes. Although the individual statistics on favorable and unfavorable supporting characteristics were not discussed, Tables 65, 66, 67, and 68 nevertheless contained the necessary information to draw the conclusion that the students in the smaller classes were not unduly favored from an advantageous set of favorable supporting characteristics. Thus, we can say with rather great confidence that class size represents an important element in pupil learning and specifically in reading and arithmetic achievement.

### Class Size Comparisons of All Students in Regular Curriculum Classes by Ability Groupings

As in the situation with respect to occupational groupings the students with respect to ability groupings were divided into 4 categories. These categories are enumerated in Tables 69, 70, 71, and 72.

Table 69 indicates that students in regular curriculum classes whose I.Q. scores were 79 and below and who were in smaller classes made significantly greater gains in reading over the 5-year period (1959-1964)

## TABLE 66

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for All Children in Regular Curriculum Classes and Whose Parents Were Employed in Private Households and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 0 | 2 | 6 | 2 | 1 | 5 | 1 | 1 | 6 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 1 | 5 | 3 | 2 | 3 |
| 1-25 | 32-37 | 0 | 2 | 6 | 2 | 2 | 4 | 6 | 0 | 2 | 5 | 1 | 2 | 3 | 2 | 3 | 2 | 2 | 4 | 2 | 4 | 2 |
| 1-25 | 38 & over | 4 | 0 | 4 | 1 | 3 | 4 | 6 | 0 | 2 | 6 | 0 | 2 | 3 | 2 | 3 | 0 | 6 | 2 | 3 | 4 | 1 |
| Sub-Total | | 4 | 4 | 16 | 5 | 6 | 13 | 13 | 1 | 10 | 14 | 3 | 7 | 8 | 7 | 9 | 4 | 9 | 11 | 8 | 10 | 6 |
| 26-31 | 32-37 | 2 | 1 | 5 | 0 | 2 | 6 | 5 | 1 | 2 | 4 | 2 | 2 | 5 | 2 | 1 | 3 | 3 | 2 | 0 | 5 | 3 |
| 26-31 | 38 & over | 5 | 0 | 3 | 0 | 0 | 8 | 3 | 1 | 4 | 2 | 2 | 4 | 3 | 2 | 3 | 1 | 5 | 2 | 3 | 3 | 2 |
| 32-37 | 38 & over | 6 | 0 | 2 | 2 | 2 | 4 | 0 | 3 | 5 | 0 | 3 | 5 | 2 | 1 | 5 | 1 | 4 | 3 | 3 | 1 | 4 |
| Total | | 17 | 5 | 26 | 7 | 10 | 31 | 21 | 6 | 21 | 20 | 10 | 18 | 18 | 12 | 18 | 9 | 21 | 18 | 14 | 19 | 15 |

S - Small Classes
L - Larger Classes
N - Neither

## TABLE 67

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for All Children in Regular Curriculum Classes and Whose Parents were Employed in Service, Labor, Operative, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Number of Pupil Mobility Comparisons Favoring | | | HOME FACTORS: Number of Parental Education Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Reading Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Arithmetic Comparisons Favoring | | | FACULTY FACTORS: Number of % Nonwhite Faculty Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Knowledge Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Teaching Experience Comparisons Favoring | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 2 | 1 | 5 | 2 | 0 | 6 | 3 | 2 | 3 | 4 | 2 | 2 | 2 | 1 | 5 | 2 | 3 | 3 | 2 | 2 | 4 |
| 1-25 | 32-37 | 3 | 1 | 4 | 1 | 2 | 5 | 6 | 1 | 1 | 7 | 1 | 0 | 1 | 2 | 5 | 3 | 4 | 1 | 1 | 3 | 4 |
| 1-25 | 38 & over | 1 | 0 | 6 | 0 | 3 | 2 | 5 | 1 | 2 | 5 | 1 | 2 | 3 | 1 | 4 | 1 | 3 | 4 | 3 | 2 | 3 |
| Sub-Total | | 6 | 2 | 15 | 3 | 5 | 13 | 14 | 4 | 6 | 16 | 4 | 4 | 6 | 4 | 14 | 6 | 10 | 8 | 6 | 7 | 11 |
| 26-31 | 32-37 | 3 | 0 | 5 | 2 | 4 | 2 | 3 | 0 | 5 | 5 | 0 | 3 | 1 | 3 | 4 | 3 | 0 | 5 | 0 | 2 | 6 |
| 26-31 | 38 & over | 6 | 1 | 1 | 0 | 5 | 1 | 4 | 1 | 3 | 4 | 1 | 3 | 2 | 1 | 5 | 0 | 6 | 2 | 3 | 1 | 4 |
| 32-37 | 38 & over | 2 | 2 | 4 | 0 | 5 | 1 | 2 | 1 | 5 | 3 | 2 | 3 | 5 | 1 | 2 | 0 | 8 | 0 | 4 | 1 | 3 |
| Total | | 17 | 5 | 25 | 5 | 19 | 17 | 23 | 6 | 19 | 28 | 7 | 13 | 14 | 9 | 25 | 9 | 24 | 15 | 13 | 11 | 24 |

S - Small Classes
L - Larger Classes
N - Neither

## TABLE 68

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for All Children in Regular Curriculum Classes and Whose Parents Were Employed in Professional, Technical, Skilled, Supervisory, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Number of Pupil Mobility Comparisons Favoring | | | HOME FACTORS: Number of Parental Education Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Reading Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Arithmatic Comparisons Favoring | | | FACULTY FACTORS: Number of % Nonwhite Faculty Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Knowledge Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Teaching Experience Comparisons Favoring | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 0 | 1 | 7 | 0 | 2 | 6 | 1 | 1 | 6 | 3 | 1 | 4 | 2 | 1 | 3 | 3 | 2 | 3 | 1 | 3 | 4 |
| 1-25 | 32-37 | 2 | 0 | 6 | 0 | 3 | 5 | 6 | 1 | 1 | 6 | 0 | 2 | 2 | 1 | 3 | 2 | 3 | 3 | 2 | 3 | 3 |
| 1-25 | 38 & over | 1 | 0 | 7 | 0 | 3 | 3 | 7 | 0 | 1 | 7 | 0 | 1 | 0 | 3 | 3 | 2 | 4 | 2 | 0 | 6 | 2 |
| Sub-Total | | 3 | 1 | 20 | 0 | 8 | 14 | 14 | 2 | 8 | 16 | 1 | 7 | 4 | 5 | 9 | 7 | 9 | 8 | 3 | 12 | 9 |
| 26-31 | 32-37 | 4 | 1 | 3 | 2 | 2 | 4 | 4 | 1 | 3 | 5 | 0 | 3 | 2 | 4 | 2 | 2 | 2 | 4 | 1 | 3 | 4 |
| 26-31 | 38 & over | 4 | 0 | 4 | 1 | 0 | 6 | 3 | 2 | 3 | 3 | 1 | 4 | 1 | 4 | 3 | 2 | 5 | 1 | 2 | 3 | 3 |
| 32-37 | 38 & over | 4 | 1 | 3 | 3 | 1 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 1 | 3 | 4 | 3 | 4 | 0 | 2 | 2 | 4 |
| Total | | 15 | 3 | 30 | 6 | 11 | 27 | 23 | 8 | 17 | 26 | 5 | 17 | 8 | 16 | 18 | 14 | 20 | 13 | 8 | 20 | 20 |

S - Small Classes
L - Larger Classes
N - Neither

## TABLE 69

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for All Children in Regular Curriculum Classes and Whose I.Q. Scores Were 79 and Below**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 1 | 4 | 3 | 0 | 1 | 7 | 5 | 1 | 2 | 6 | 0 | 2 | 2 | 3 | 3 | 4 | 0 | 4 | 2 | 2 | 4 |
| 1-25 | 32-37 | 2 | 1 | 5 | 2 | 4 | 2 | 6 | 1 | 1 | 7 | 0 | 1 | 1 | 2 | 5 | 3 | 3 | 2 | 4 | 1 | 3 |
| 1-25 | 38 & over | 2 | 0 | 6 | 0 | 2 | 2 | 4 | 0 | 4 | 6 | 0 | 2 | 2 | 3 | 3 | 0 | 6 | 2 | 3 | 3 | 2 |
| Sub-Total | | 5 | 5 | 14 | 2 | 7 | 11 | 15 | 2 | 7 | 19 | 0 | 5 | 5 | 8 | 11 | 7 | 9 | 8 | 9 | 6 | 9 |
| 26-31 | 32-37 | 3 | 0 | 5 | 0 | 2 | 6 | 1 | 2 | 5 | 2 | 1 | 5 | 3 | 3 | 2 | 1 | 4 | 3 | 1 | 2 | 5 |
| 26-31 | 38 & over | 5 | 1 | 2 | 1 | 1 | 3 | 0 | 4 | 4 | 2 | 3 | 3 | 3 | 3 | 2 | 0 | 5 | 3 | 3 | 1 | 4 |
| 32-37 | 38 & over | 3 | 2 | 3 | 1 | 0 | 4 | 1 | 2 | 5 | 1 | 4 | 3 | 3 | 2 | 3 | 1 | 4 | 3 | 3 | 2 | 3 |
| Total | | 16 | 8 | 24 | 4 | 10 | 24 | 17 | 10 | 21 | 24 | 8 | 16 | 14 | 16 | 18 | 9 | 22 | 17 | 16 | 11 | 21 |

S - Small Classes
L - Larger Classes
N - Neither

## TABLE 70

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for All Children in Regular Curriculum Classes and Whose I.Q. Scores Were Between 80 and 94 Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Number of Pupil Mobility Comparisons Favoring | | | HOME FACTORS: Number of Parental Education Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Reading Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Arithmetic Comparisons Favoring | | | FACULTY FACTORS: Number of Nonwhite Faculty Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Knowledge Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Teaching Experience Comparisons Favoring | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 1 | 0 | 7 | 4 | 2 | 2 | 2 | 1 | 5 | 4 | 1 | 3 | 3 | 1 | 4 | 3 | 3 | 2 | 2 | 1 | 5 |
| 1-25 | 32-37 | 2 | 1 | 5 | 2 | 2 | 4 | 6 | 1 | 1 | 4 | 1 | 3 | 3 | 2 | 2 | 1 | 4 | 3 | 0 | 5 | 3 |
| 1-25 | 38 & over | 2 | 0 | 5 | 1 | 3 | 3 | 6 | 1 | 1 | 5 | 1 | 2 | 3 | 2 | 2 | 1 | 4 | 3 | 1 | 4 | 3 |
| Sub-Total | | 5 | 1 | 17 | 7 | 7 | 9 | 14 | 3 | 7 | 13 | 3 | 8 | 9 | 5 | 8 | 5 | 11 | 8 | 3 | 10 | 11 |
| 26-31 | 32-37 | 3 | 1 | 4 | 1 | 4 | 3 | 5 | 1 | 2 | 6 | 1 | 1 | 2 | 4 | 2 | 1 | 3 | 4 | 0 | 5 | 3 |
| 26-31 | 38 & over | 6 | 0 | 2 | 1 | 2 | 5 | 6 | 0 | 2 | 5 | 0 | 3 | 3 | 1 | 4 | 0 | 7 | 1 | 2 | 4 | 2 |
| 32-37 | 38 & over | 4 | 1 | 3 | 2 | 4 | 2 | 3 | 2 | 3 | 3 | 1 | 4 | 4 | 1 | 3 | 1 | 7 | 0 | 3 | 2 | 3 |
| Total | | 18 | 3 | 26 | 11 | 17 | 19 | 28 | 6 | 14 | 27 | 5 | 16 | 18 | 11 | 17 | 7 | 28 | 13 | 8 | 21 | 19 |

S - Small Classes
L - Larger Classes
N - Neither

in 17 comparisons to 10 for those students in larger classes. Twenty-one comparisons indicated that neither the students in the larger nor in the smaller classes made significantly greater gains in reading than the other. The ratios with respect to arithmetic are slightly better than they were for reading. For example, the students in the smaller classes made significantly greater gains in arithmetic in 24 comparisons to 8 for those in the larger classes. Sixteen comparisons indicated that neither the students in the smaller nor in the larger classes made significantly greater gains in arithmetic than the other.

Table 70 contains the class size comparisons for all students in regular curriculum classes whose I.Q. scores were between 80 and 94. For these students in smaller classes the findings indicate that they made significantly greater gains in reading in 28 comparisons to 6 for those in larger classes. Fourteen comparisons were not statistically significant. With respect to arithmetic, the students in the smaller classes made significantly greater gains in arithmetic in 27 comparisons to 5 for those in larger classes. Sixteen comparisons indicated that neither the students in smaller nor in larger classes made significantly greater gains in arithmetic than the other. Table 71 contains the various statistics for all students in regular curriculum classes whose I.Q. scores were between 95 and 104. For these students the results favoring smaller over larger classes are rather impressive. For example, with respect to reading, the students in the smaller classes made significantly greater gains over the 5-year period (1959-1964) in 27 comparisons to 3 for those students in the larger classes. Eighteen comparisons indicated neither the students in larger nor in smaller classes made significantly greater gains in reading than the other. Results for arithmetic are almost as good as those for reading. With respect to arithmetic, these students in the smaller classes made significantly greater gains in arithmetic achievement in 27 comparisons to 6 for those in larger classes. Fifteen comparisons were not statistically significant.

Table 72 represents the last of the ability groupings tables. Table 72 summarizes class size results for all students in regular curriculum classes whose I.Q. scores were 105 and above. With respect to reading, the students in the smaller classes made significantly greater gains over the 5-year period (1959-1964) in 20 comparisons to 7 for those students in the larger classes. Twenty-one comparisons indicated that neither the students in larger nor in smaller classes made significantly greater gains in reading than the other. With respect to arithmetic, the students in the smaller classes made significantly greater gains in 18 comparisons to 10 for those students in the larger classes. Twenty comparisons yielded results which indicated that neither the students in larger nor in smaller classes made significantly greater gains in arithmetic than the other.

In summary, regardless of the ability level of the pupils involved in the regular curriculum classes, those in the smaller classes invariably made significantly greater gains on the average than their counterparts in larger classes in both arithmetic and reading achievement. Moreover, these gains were achieved despite the fact that in most instances the students in larger classes benefited more than those in the smaller classes from a set of advantageous supporting characteristics such as parental education, faculty knowledge, and faculty teaching experience.

## Class Size Comparisons of All Students in Regular Curriculum Classes Without Regard to Ability or Occupational Groupings

Table 73 represents a recapitulation of the results of the 16 tables which provided the basic data for the class size comparisons of white students in regular curriculum classes. Table 74 summarizes the results of the 16 tables that provided the basic data for the class size comparisons of nonwhite students in regular curriculum classes. Finally, Table 75 recapitulates from these 32 basic tables the class size comparisons of all students (both white and nonwhite) in regular curriculum classes.

## TABLE 71

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for All Children in Regular Curriculum Classes and Whose I.Q. Scores Were Between 95 and 104**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 0 | 0 | 8 | 0 | 1 | 7 | 0 | 1 | 7 | 1 | 2 | 5 | 0 | 1 | 6 | 0 | 2 | 6 | 2 | 3 | 3 |
| 1-25 | 32-37 | 1 | 1 | 6 | 0 | 1 | 7 | 8 | 0 | 0 | 7 | 0 | 1 | 1 | 1 | 5 | 2 | 3 | 3 | 0 | 2 | 6 |
| 1-25 | 38 & over | 2 | 0 | 6 | 0 | 3 | 5 | 7 | 0 | 1 | 7 | 0 | 1 | 2 | 1 | 4 | 2 | 2 | 4 | 2 | 4 | 2 |
| Sub-Total | | 3 | 1 | 20 | 0 | 5 | 19 | 15 | 1 | 8 | 15 | 2 | 7 | 3 | 3 | 15 | 4 | 7 | 13 | 4 | 9 | 11 |
| 26-31 | 32-37 | 5 | 0 | 3 | 2 | 3 | 3 | 6 | 0 | 2 | 7 | 0 | 1 | 4 | 3 | 1 | 4 | 0 | 4 | 0 | 4 | 4 |
| 26-31 | 38 & over | 6 | 0 | 2 | 1 | 4 | 3 | 5 | 0 | 3 | 3 | 0 | 5 | 4 | 3 | 1 | 1 | 6 | 1 | 3 | 2 | 3 |
| 32-37 | 38 & over | 4 | 1 | 3 | 2 | 4 | 2 | 1 | 2 | 5 | 2 | 4 | 2 | 2 | 1 | 5 | 1 | 7 | 0 | 4 | 1 | 3 |
| Total | | 18 | 2 | 28 | 5 | 16 | 27 | 27 | 3 | 18 | 27 | 6 | 15 | 13 | 10 | 22 | 10 | 20 | 18 | 11 | 16 | 21 |

S - Small Classes
L - Larger Classes
N - Neither

## TABLE 72

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for All Children in Regular Curriculum Classes and Whose I.Q. Scores Were 105 and Above**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Number of Pupil Mobility Comparisons Favoring | | | HOME FACTORS: Number of Parental Education Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Reading Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Arithmetic Comparisons Favoring | | | FACULTY FACTORS: Number of % Nonwhite Faculty Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Knowledge Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Teaching Experience Comparisons Favoring | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 1 | 1 | 6 | 0 | 1 | 7 | 0 | 1 | 7 | 1 | 3 | 4 | 1 | 0 | 6 | 0 | 2 | 6 | 0 | 3 | 5 |
| 1-25 | 32-37 | 0 | 1 | 7 | 0 | 3 | 5 | 4 | 0 | 4 | 5 | 1 | 2 | 1 | 0 | 6 | 1 | 3 | 4 | 1 | 4 | 3 |
| 1-25 | 38 & over | 0 | 0 | 7 | 0 | 2 | 5 | 8 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 7 | 2 | 3 | 3 | 0 | 5 | 3 |
| Sub-Total | | 1 | 2 | 20 | 0 | 6 | 17 | 12 | 1 | 11 | 14 | 4 | 6 | 2 | 0 | 19 | 3 | 8 | 13 | 1 | 12 | 11 |
| 26-31 | 32-37 | 3 | 3 | 2 | 2 | 1 | 5 | 3 | 1 | 4 | 2 | 1 | 5 | 4 | 1 | 3 | 3 | 2 | 3 | 0 | 4 | 4 |
| 26-31 | 38 & over | 3 | 0 | 5 | 0 | 3 | 5 | 3 | 1 | 4 | 1 | 2 | 5 | 2 | 1 | 5 | 2 | 2 | 4 | 3 | 1 | 4 |
| 32-37 | 38 & over | 3 | 3 | 2 | 2 | 2 | 4 | 2 | 4 | 2 | 1 | 3 | 4 | 4 | 1 | 3 | 2 | 2 | 4 | 3 | 0 | 5 |
| Total | | 10 | 8 | 29 | 4 | 12 | 31 | 20 | 7 | 21 | 18 | 10 | 20 | 12 | 3 | 30 | 10 | 14 | 24 | 7 | 17 | 24 |

S - Small Classes
L - Larger Classes
N - Neither

## TABLE 73

### Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Regular Curriculum Classes

### Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964

| CLASS SIZE | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pupil Groupings | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 1 | 4 | 11 | 2 | 4 | 10 | 4 | 4 | 8 | 6 | 4 | 6 | 4 | 1 | 9 | 3 | 3 | 10 | 3 | 4 | 9 |
| 1-25 | 32-37 | 2 | 4 | 10 | 2 | 5 | 9 | 9 | 2 | 5 | 10 | 1 | 5 | 4 | 1 | 8 | 3 | 6 | 7 | 3 | 7 | 6 |
| 1-25 | 38 & over | 2 | 0 | 12 | 0 | 6 | 6 | 12 | 1 | 3 | 12 | 1 | 3 | 4 | 2 | 7 | 2 | 7 | 7 | 1 | 8 | 7 |
| Sub-Total | | 5 | 8 | 33 | 4 | 15 | 25 | 25 | 7 | 16 | 28 | 6 | 14 | 12 | 4 | 24 | 8 | 16 | 24 | 7 | 19 | 22 |
| 26-31 | 32-37 | 7 | 2 | 7 | 3 | 5 | 8 | 7 | 2 | 7 | 10 | 3 | 3 | 8 | 4 | 4 | 4 | 4 | 8 | 1 | 8 | 7 |
| 26-31 | 38 & over | 10 | 0 | 6 | 1 | 5 | 8 | 8 | 3 | 5 | 5 | 4 | 7 | 8 | 3 | 5 | 2 | 10 | 4 | 3 | 7 | 6 |
| 32-37 | 38 & over | 7 | 4 | 4 | 6 | 5 | 3 | 6 | 4 | 6 | 4 | 5 | 7 | 6 | 3 | 7 | 4 | 10 | 2 | 5 | 5 | 6 |
| Total | | 29 | 14 | 50 | 14 | 30 | 44 | 46 | 16 | 34 | 47 | 18 | 31 | 34 | 14 | 40 | 18 | 40 | 38 | 16 | 39 | 41 |

S - Small Classes
L - Larger Classes
N - Neither

## TABLE 74

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Regular Curriculum Classes**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Number of Pupil Mobility Comparisons Favoring | | | HOME FACTORS: Number of Parental Education Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Reading Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Arithmetic Comparisons Favoring | | | FACULTY FACTORS: Number of % Nonwhite Faculty Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Knowledge Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Teaching Experience Comparisons Favoring | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 2 | 1 | 13 | 2 | 1 | 13 | 3 | 0 | 13 | 6 | 2 | 8 | 2 | 4 | 10 | 4 | 4 | 8 | 3 | 5 | 8 |
| 1-25 | 32-37 | 3 | 0 | 13 | 2 | 5 | 9 | 15 | 0 | 1 | 13 | 1 | 2 | 2 | 4 | 10 | 5 | 6 | 5 | 2 | 5 | 9 |
| 1-25 | 38 & over | 4 | 0 | 12 | 1 | 4 | 9 | 13 | 0 | 3 | 14 | 0 | 2 | 3 | 4 | 9 | 3 | 8 | 5 | 5 | 8 | 3 |
| Sub-Total | | 9 | 1 | 38 | 5 | 10 | 31 | 31 | 0 | 17 | 33 | 3 | 12 | 7 | 12 | 29 | 12 | 18 | 18 | 10 | 18 | 20 |
| 26-31 | 32-37 | 7 | 2 | 7 | 2 | 5 | 9 | 8 | 2 | 6 | 7 | 0 | 9 | 5 | 7 | 4 | 5 | 5 | 6 | 0 | 7 | 9 |
| 26-31 | 38 & over | 10 | 1 | 5 | 2 | 5 | 8 | 6 | 2 | 8 | 6 | 1 | 9 | 3 | 5 | 8 | 1 | 10 | 5 | 8 | 1 | 7 |
| 32-37 | 38 & over | 7 | 3 | 6 | 1 | 5 | 9 | 1 | 6 | 9 | 3 | 7 | 6 | 7 | 2 | 7 | 1 | 10 | 4 | 8 | 0 | 8 |
| Total | | 33 | 7 | 56 | 10 | 25 | 57 | 46 | 10 | 40 | 49 | 11 | 36 | 22 | 26 | 48 | 19 | 43 | 33 | 26 | 26 | 44 |

S - Small Classes
L - Larger Classes
N - Neither

## TABLE 75

### Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for All Children in Regular Curriculum Classes

### Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Number of Pupil Mobility Comparisons Favoring | | | HOME FACTORS: Number of Parental Education Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Reading Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Arithmetic Comparisons Favoring | | | FACULTY FACTORS: Number of % Nonwhite Faculty Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Knowledge Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Teaching Experience Comparisons Favoring | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-25 | 26-31 | 3 | 5 | 24 | 4 | 5 | 23 | 7 | 4 | 21 | 12 | 6 | 14 | 6 | 5 | 19 | 7 | 7 | 18 | 6 | 9 | 17 |
| 1-25 | 32-37 | 5 | 4 | 23 | 4 | 10 | 18 | 24 | 2 | 6 | 23 | 2 | 7 | 6 | 5 | 18 | 8 | 12 | 12 | 5 | 12 | 15 |
| 1-25 | 38 & over | 6 | 0 | 24 | 1 | 10 | 15 | 25 | 1 | 6 | 26 | 1 | 5 | 7 | 6 | 16 | 5 | 15 | 12 | 6 | 16 | 10 |
| Sub-Total | | 14 | 9 | 71 | 9 | 25 | 56 | 56 | 7 | 33 | 61 | 9 | 26 | 19 | 16 | 53 | 20 | 34 | 42 | 17 | 37 | 42 |
| 26-31 | 32-37 | 14 | 4 | 14 | 5 | 10 | 17 | 15 | 4 | 13 | 17 | 3 | 12 | 13 | 11 | 8 | 9 | 9 | 14 | 1 | 15 | 16 |
| 26-31 | 38 & over | 20 | 1 | 11 | 3 | 10 | 16 | 14 | 5 | 13 | 11 | 5 | 16 | 11 | 8 | 13 | 3 | 20 | 9 | 11 | 3 | 13 |
| 32-37 | 38 & over | 14 | 7 | 10 | 7 | 10 | 12 | 7 | 10 | 15 | 7 | 12 | 13 | 13 | 5 | 14 | 5 | 20 | 6 | 13 | 5 | 14 |
| Total | | 62 | 21 | 106 | 24 | 55 | 101 | 92 | 26 | 74 | 96 | 29 | 67 | 56 | 40 | 88 | 37 | 83 | 71 | 42 | 65 | 85 |

S - Small Classes
L - Larger Classes
N - Neither

Table 75 indicates that the students in smaller classes made significantly greater gains in both reading and in arithmetic over the 5-year period (1959-1964) than those students in the larger classes. With respect to reading, the students in the smaller classes made significantly greater gains in reading in 92 comparisons to 26 for those in the larger classes — a 3.5 to 1 ratio favoring the students in the smaller classes. With respect to arithmetic, the students in the smaller classes made significantly greater gains in arithmetic in 96 comparisons to 29 for those in larger classes — a 3.3 to 1 ratio favoring smaller classes. These ratios were achieved despite the fact that students in the smaller classes had on the average greater home mobility, whereas the students in the larger classes had on the average parents with more formal education and were taught by a faculty who scored higher on academic knowledge tests and a faculty which had greater teaching experience.

When the statistics involving only those students in the smallest class size grouping (1-25 pupils) are analyzed, the results are even more impressive in favor of the smallest class size grouping. For example, with respect to reading the students in the smallest class size grouping made significantly greater gains in 56 comparisons to 7 comparisons for the students in the larger classes — a ratio of 8 to 1 favoring the students in the smallest class size grouping. The results are just as impressive with respect to arithmetic achievement. For example, the students in the smallest class size grouping made significantly greater gains in arithmetic in 61 comparisons to 9 for those in the larger classes, a ratio of 6.8 to 1 favoring the students in the smallest class size grouping.

Another way of summarizing the results could be to use a 100 percent base for all class size comparisons. In this instance, about 50 percent of the students in the smaller made significant gains in reading and arithmetic achievement over the 5-year period (1959-1964); about 35 percent did not; and about 15 percent of the students in larger classes achieved greater gains in reading and arithmetic. Within the scope of this study, larger classes had a decided advantage with respect to benefiting more from favorable supporting characteristics (about 35 percent); smaller classes about 17 percent; and about 46 percent did not favor either smaller or larger classes.

These findings indicate, then, that regardless of whether a student is white or nonwhite, regardless of whether a student comes from a high or a low socioeconomic level, and regardless of whether or not a student has a high or a low I.Q., the chances are decidedly greater that he will learn more if he is in a small rather than in a large class.

## ANALYSIS OF CLASS SIZE COMPARISONS FOR STUDENTS ENROLLED IN SPECIAL EDUCATION CLASSES

The cell parameters utilized to study the effects of class size upon pupil learning were detailed previously for students enrolled in regular curriculum classes. The cell parameters utilized to study the effects of class size upon pupil learning for students enrolled in special education are identical to those used for students enrolled in regular curriculum classes. Whereas the occupational groupings were identical, those for ability and class size were not.

For example, the class size parameter for regular curriculum students was subdivided into four divisions; for special education students, into three divisions. The four class size divisions for regular curriculum students were as follows: (1) 1-25 pupils; (2) 26-31 pupils; (3) 32-37 pupils; and (4) 38 pupils or more. For special education students, the class size divisions are as follows: (1) 1-19 pupils; (2) 20-25 pupils; and (3) 26 pupils or more.

## TABLE 76

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Special Education Classes Whose I.Q. Scores Were 79 and Below and Whose Parents Were Employed in Sales, Clerical, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS Pupil Mobility | | HOME FACTORS Parental Education | | PUPIL ACHIEVEMENT FACTORS Reading | | PUPIL ACHIEVEMENT FACTORS Arithmetic | | % Nonwhite Faculty | | FACULTY FACTORS Faculty Knowledge | | FACULTY FACTORS Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-19 | 20-25 | — | .01 | .01 | — | .02 | — | .01 | — | — | — | — | .01 | — | .01 |
| 1-19 | 26 & over | .02 | — | — | .02 | .01 | — | .05 | — | — | — | — | .01 | — | .02 |
| 20-25 | 26 & over | .01 | — | — | .05 | .01 | — | — | .02 | — | — | .05 | — | .05 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.
Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 77

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Special Education Classes Whose I.Q. Scores Were 79 and Below and Whose Parents Were Employed in Private Households and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS Pupil Mobility | | HOME FACTORS Parental Education | | PUPIL ACHIEVEMENT FACTORS Reading | | PUPIL ACHIEVEMENT FACTORS Arithmetic | | % Nonwhite Faculty | | FACULTY FACTORS Faculty Knowledge | | FACULTY FACTORS Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-19 | 20-25 | — | .01 | — | .02 | .02 | — | .01 | — | .05 | — | .01 | — | — | .01 |
| 1-19 | 26 & over | — | .01 | — | .01 | .01 | — | .01 | — | — | — | .05 | — | — | .01 |
| 20-25 | 26 & over | .05 | — | — | .01 | | .05 | .02 | — | — | — | .02 | — | .01 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.
Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

Moreover, for special education students only one ability grouping was used, whereas for regular curriculum students, four ability groupings were utilized. The reason that only one ability grouping was used for special education students was that for a student to be enrolled in special education classes he must have an intelligence quotient from 79 to 56. Since the number of students at the lower end of this I.Q. range were extremely limited in number, to increase the number of ability groupings for special education students would only have had the result of not having an acceptable number of cases in each cell. Thus, tests of statistical significance of the differences between means would probably have had little practical significance even though in some instances the results might have had statistical significance.

## Class Size Comparisons of White Students in Special Education Classes by Occupational Groupings

Data on white pupils enrolled in special curriculum classes are reported in 4 tables by 4 occupational and 1 intelligence quotient groupings. Although mean differences and critical ratios were computed for each cell matrix, those cells without an acceptable minimum level of cases were not statistically utilized nor reported in the various tables. Any cell which did not have at least 30 cases was considered as not having an acceptable minimum level and, therefore, the results of the tests of statistical significance between mean values were not reported, regardless of whether or not mean differences were statistically significant.

Tables 76, 77, 78, and 79 contain data on tests of statistical significance of the differences between means for selected class size groupings for white students in special education classes by four occupational groupings. Since only one intelligence quotient grouping was utilized, results are not discussed by ability groupings. In the paragraphs which follow, student gains in reading and arithmetic achievement are reported without regard for ability but with regard to the number of favorable supporting characteristics such as parental education, teachers' academic knowledge, and teachers' years of teaching experience.

*Reading Achievement.* White students whose parents were employed in sales, clerical, and kindred occupations and who were in the smaller special education classes made significantly higher gains in reading achievement over the 5-year period (1959-1964) in 3 comparisons to 0 for students in larger classes. As Table 76 indicates, the special education students in smaller classes achieved these gains in spite of the fact that the students in the smaller classes generally had more home addresses and the students in the larger classes had teachers with greater academic knowledge and more years of teaching experience.

Table 77 contains the data on white students in special education classes and whose parents were employed in private households and kindred occupations. Students in smaller classes made significantly higher reading gains in 2 comparisons to 1 for those in the larger classes. With respect to favorable and unfavorable supporting characteristics, the results appear confusing and contradictory. For example, the students in the larger classes had significantly greater home mobility in 2 comparisons to 1 for students in smaller classes. On the other hand, the students in the smaller classes had teachers with significantly greater academic knowledge than the teachers of those students in larger classes. But the parents of the students in larger classes had significantly more formal years of education than the parents of the pupils in smaller classes. Finally, with respect to faculty teaching experience, the students in the larger classes had teachers who had significantly greater years of teaching experience in 2 comparisons to 1 for the students in smaller classes.

Table 78 contains data on white children in special curriculum classes whose parents were employed in service, labor, operative, and kindred occupations. The white students in smaller special education classes made significantly greater gains over the 5-year period (1959-1964) in 3 comparisons to 0 for those students in the larger classes.

## TABLE 78

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Special Education Classes Whose IQ.Scores Were 79 and Below and Whose Parents Were Employed in Service, Labor, Operative, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS Pupil Mobility | | HOME FACTORS Parental Education | | PUPIL ACHIEVEMENT FACTORS Reading | | PUPIL ACHIEVEMENT FACTORS Arithmetic | | FACULTY FACTORS % Nonwhite Faculty | | FACULTY FACTORS Faculty Knowledge | | FACULTY FACTORS Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-19 | 20-25 | — | .05 | — | .01 | .01 | — | .01 | — | — | .01 | .02 | — | — | .01 |
| 1-19 | 26 & over | — | .05 | — | .01 | .02 | — | .05 | — | .02 | — | .05 | — | — | .01 |
| 20-25 | 26 & over | — | — | — | — | .01 | — | .02 | — | — | .02 | — | .05 | — | .05 |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 79

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Special Education Classes Whose IQ.Scores Were 79 and Below and Whose Parents Were Employed in Professional, Technical, Skilled, Supervisory, and Kindred Occupations Class Size and Pupil Learning Project, Baltimore Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS Pupil Mobility | | HOME FACTORS Parental Education | | PUPIL ACHIEVEMENT FACTORS Reading | | PUPIL ACHIEVEMENT FACTORS Arithmetic | | FACULTY FACTORS % Nonwhite Faculty | | FACULTY FACTORS Faculty Knowledge | | FACULTY FACTORS Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-19 | 20-25 | — | .05 | — | .01 | .01 | — | .02 | — | — | .05 | — | .02 | — | .02 |
| 1-19 | 26 & over | — | .01 | .01 | — | .01 | — | .01 | — | — | .02 | — | .05 | .05 | — |
| 20-25 | 26 & over | — | .02 | — | .02 | — | — | — | — | .01 | — | — | .01 | — | .01 |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.

Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

Interestingly, these reading gains were made in spite of the fact that the students in the larger classes had teachers who had significantly more years of teaching experience than the teachers of the students in smaller classes. However, the pupils in the larger classes had significantly more home addresses in 2 instances to 0 for those students in smaller classes. One comparison indicated that neither the students in larger nor in smaller classes had significantly more home moves than the other. With respect to faculty knowledge, the students in the smaller classes had teachers with more academic knowledge in 2 comparisons to 1 for those students in larger classes.

The last occupational grouping deals with professional and kindred occupations. Table 79 has the statistical results on class size comparisons for white students in special education classes whose parents were employed in professional, technical, skilled, supervisory, and kindred occupations. Students in the smaller classes made significantly greater gains in reading in 2 comparisons to 0 for those students in larger classes. One comparison yielded results which indicated that neither the students in larger nor in smaller classes made significantly greater gains in reading than the other. These results were achieved despite the fact that the students in larger classes had teachers with significantly greater academic knowledge in 3 comparisons to 0 for those students in smaller classes. Moreover, the students in larger classes had teachers who had significantly more years of teaching experience in 2 comparisons to 1 for those students in smaller classes. However, the students in the larger classes had significantly more changes in home addresses in 3 comparisons to 0 for the students in smaller classes.

*Arithmetic Achievement.* With respect to arithmetic achievement, the white students in special education classes whose I.Q. scores were between 79 and 56 and whose parents were employed in clerical, sales, and kindred occupations, and who were in the smaller classes made significantly greater gains in arithmetic achievement over the 5-year period (1959-1964) in 2 comparisons to 1 for the students in larger classes. With respect to pupil home mobility, the students in the smaller classes had significantly more changes in home addresses in 2 comparisons to 1 for the students in larger classes. However, with respect to faculty knowledge, the students in the larger classes had teachers with significantly greater academic knowledge in 2 comparisons to 1 for those students in smaller classes. The students in larger classes also had teachers with significantly more years of teaching experience in 2 comparisons to 1 for those students in smaller classes.

With respect to white students whose parents were employed in private households and kindred occupations and who were enrolled in special curriculum classes, the students in smaller classes made significantly greater gains in arithmetic achievement over the 5-year period (1959-1964) in 3 comparisons to 0 for those students in larger classes. However, it must be noted that such a gain was made because of the fact that the students in the smaller classes had teachers with significantly greater academic knowledge in 3 comparisons to 0 for those students in the larger classes. Yet the results were also achieved despite the fact that the students in the larger classes had parents who had significantly more years of formal education in 3 comparisons to 0 for the students in smaller classes. With respect to pupil home mobility the students in the larger classes had more home moves in 2 comparisons to 1 for the students in smaller classes. A similar ratio holds for faculty teaching experience. For example, the students in larger classes had teachers with significantly more years of teaching experience in 2 comparisons to 1 for those students in smaller classes.

With respect to white students enrolled in special curriculum classes and whose parents were employed in service, labor, operative, and kindred occupations, the ratio favoring smaller over larger classes is 3 to 0. This is evidenced in Table 78 since the white students in the smaller classes and whose parents were employed in service, labor, operative, and kindred occupations made significantly greater gains in arithmetic

## TABLE 80

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for White Children in Special Education Classes and Whose IQ.Scores Were Between 79 and 56**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS: Number of Pupil Mobility Comparisons Favoring | | | HOME FACTORS: Number of Parental Education Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Reading Comparisons Favoring | | | PUPIL ACHIEVEMENT FACTORS: Number of Arithmetic Comparisons Favoring | | | FACULTY FACTORS: Number of % Nonwhite Faculty Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Knowledge Comparisons Favoring | | | FACULTY FACTORS: Number of Faculty Teaching Experience Comparisons Favoring | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-19 | 20-25 | 0 | 4 | 0 | 1 | 3 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 1 | 2 | 1 | 2 | 2 | 0 | 0 | 4 | 0 |
| 1-19 | 26 & over | 1 | 3 | 0 | 1 | 3 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 1 | 1 | 2 | 2 | 2 | 0 | 1 | 3 | 0 |
| 20-25 | 26 & over | 2 | 1 | 1 | 0 | 3 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 0 | 2 | 2 | 0 |
| Total | | 3 | 8 | 1 | 2 | 9 | 1 | 10 | 1 | 1 | 10 | 1 | 1 | 3 | 4 | 5 | 6 | 6 | 0 | 3 | 9 | 0 |

S - Small Classes
L - Larger Classes
N - Neither

achievement over the 5-year period (1959-1964) in 3 comparisons to 0 for those students in the larger classes. Such a ratio favoring the smaller over the larger classes was obtained despite the fact that the students in the larger classes had teachers with significantly more years of teaching experience in 3 comparisons to 0 for those students in the smaller classes. However, the students in the smaller classes had teachers with significantly greater academic knowledge in 2 comparisons to 1 for those students in larger classes. With respect to pupil home mobility, the students in the larger classes had significantly more changes in home addresses in 2 comparisons to 0 for those students in the smaller classes. One comparison was not statistically significant indicating that neither the students in larger nor in smaller classes had significantly more home moves than the other.

Statistical data on white students in special education classes whose parents were employed in professional, technical, skilled, supervisory, and kindred occupations are reported in Table 79. White students in smaller classes over the 5-year period (1959-1964) made significantly greater gains in arithmetic achievement in 2 comparisons to 0 for those students in larger classes. One comparison was not statistically significant indicating that neither the students in smaller nor in larger classes made significantly greater gains in arithmetic achievement than the other. These results were achieved by the students in the smaller classes despite the fact that the teachers of the students in the larger classes had significantly greater academic knowledge in 3 comparisons to 0 for those teachers of students in smaller classes. However, the pupils in the larger classes had significantly more home changes in 3 comparisons to 0 for the students in smaller classes. With respect to parental education, the students in the larger classes had parents with significantly more years of formal education in 2 comparisons to 1 for those students in the smaller classes. Also, the students in larger classes had in 2 comparisons teachers who had significantly more years of teaching experience to 1 comparison for those students in smaller classes.

*Summary of Pupil Achievement in Special Education Classes.* Table 80 summarizes pupil achievement gains in arithmetic and reading for white students in selected class size groupings and in special education classes. Also summarized in Table 80 are the class comparisons with respect to pupil home mobility, parental education, faculty knowledge, and faculty teaching experience.

White special education students in smaller classes made significantly higher gains in reading and arithmetic achievement over the 5-year period (1959-1964) in 20 comparisons to 2 for students in larger classes. These statistics indicate a 10 to 1 ratio favoring smaller over larger classes. Let us examine both favorable and unfavorable characteristics to see whether or not such a ratio favoring the smaller over larger classes was achieved because favorable supporting characteristics benefited students in larger more than in smaller classes.

Out of a total of 11 comparisons, the white students in larger classes had significantly greater home mobility in 8 comparisons to 3 for those students in smaller classes. However, with respect to parental education, the white special education students in larger classes had parents who had significantly more years of formal education in 9 comparisons to 2 for those in smaller classes. With respect to faculty knowledge, neither students in larger nor in smaller classes benefited more, since out of 12 comparisons each had 6 comparisons in their favor. This wasn't the case, however, with respect to faculty teaching experience. Out of 12 comparisons, the teachers of the students in larger classes had significantly more years of teaching experience in 9 comparisons to 3 for those in smaller classes.

In light of the statistics just discussed, it is difficult not to conclude that class size represents an important factor to be taken into consideration if students with relatively limited mental ability are to learn more arithmetic and read better. The chances appear to be 10 to 1 that white students in the smaller special education classes will learn significantly more arithmetic and read better than the white students in larger special

## TABLE 81

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Special Education Classes Whose I.Q. Scores Were 79 and Below and Whose Parents Were Employed in Sales, Clerical, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS Pupil Mobility | | HOME FACTORS Parental Education | | PUPIL ACHIEVEMENT FACTORS Reading | | PUPIL ACHIEVEMENT FACTORS Arithmetic | | FACULTY FACTORS % Nonwhite Faculty | | FACULTY FACTORS Faculty Knowledge | | FACULTY FACTORS Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-19 | 20-25 | .01 | — | — | .02 | .01 | — | .05 | — | — | — | — | .02 | — | .01 |
| 1-19 | 26 & over | — | .02 | — | .01 | .01 | — | .05 | — | — | .05 | — | .01 | — | .01 |
| 20-25 | 26 & over | — | — | .05 | | — | .05 | — | — | — | — | .01 | — | .05 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.
Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 82

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Special Education Classes Whose I.Q. Scores Were 79 and Below and Whose Parents Were Employed in Private Households and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS Pupil Mobility | | HOME FACTORS Parental Education | | PUPIL ACHIEVEMENT FACTORS Reading | | PUPIL ACHIEVEMENT FACTORS Arithmetic | | FACULTY FACTORS % Nonwhite Faculty | | FACULTY FACTORS Faculty Knowledge | | FACULTY FACTORS Faculty Teaching Experience | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-19 | 20-25 | — | — | — | .01 | .02 | — | .01 | — | — | .02 | — | .01 | — | .01 |
| 1-19 | 26 & over | — | .01 | .02 | — | .01 | — | .05 | — | — | — | .02 | — | — | — |
| 20-25 | 26 & over | .05 | — | — | — | — | — | .01 | — | — | .05 | — | — | .05 | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.
Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

education classes, even when these classes differ by as little as six pupils.

### Class Size Comparisons of Nonwhite Students in Special Education Classes by Occupational Groupings

Data on nonwhite students enrolled in special education classes are reported in 4 tables by 4 occupational and 1 intelligence quotient groupings. As was the situation with respect to the white students enrolled in special education, mean differences and critical ratios were computed for each cell matrix. However, those cells without an acceptable minimum level of cases were not statistically utilized nor reported in the four basic tables. Any cell which did not have at least 30 cases was considered as not having an acceptable minimum level and, therefore, the results of tests of statistical significance between mean values were not reported, regardless of whether or not mean differences were statistically significant.

Tables 81, 82, 83, and 84 contain the data on tests of statistical significance of the differences between means for selected class size groupings for nonwhite students in special education classes by four occupational groupings. As was the situation with respect to white students in special education classes, the nonwhite students in special education classes were subsumed under one ability grouping, that is, all students having I.Q.'s of from 79 to 56. In the paragraphs which follow, the student gains in reading and arithmetic achievement are reported with regard to an analysis of favorable or unfavorable supporting characteristics such as pupil home mobility, faculty knowledge, parental education, and faculty teaching experience.

*Reading Achievement.* Table 81 contains the statistical data for nonwhite children in special education classes whose parents were employed in clerical, sales, and kindred occupations. With respect to reading achievement, the nonwhite students in smaller classes made significantly greater gains in reading achievement over the 5-year period (1959-1964) in 2 comparisons to 1 for the nonwhite students in larger classes. This indicates a ratio of 2 to 1 in favor of smaller over larger classes. This ratio was obtained in spite of the fact that the students in larger classes had parents who had significantly more formal education in 2 comparisons to 1 for those in smaller classes, and that the students in larger classes had teachers with significantly more academic knowledge in 2 comparisons to 1 for those in smaller classes, as well as teachers who had significantly more years of teaching experience in 2 comparisons to 1 for those in smaller classes. Only with respect to pupil mobility, the comparisons in the main neither favored those in smaller nor in larger classes.

Statistical data on nonwhite children in special education classes and whose parents were employed in private households and kindred occupations are contained in Table 82. The students in smaller classes made significantly greater reading gains over the 5-year period (1959-1964) in 2 comparisons to 0 for those in larger classes. One comparison was not statistically significant, indicating that neither the students in larger nor in smaller classes made significantly greater gains in reading than the other. With respect to favorable and unfavorable supporting characteristics, the data indicates that neither the students in larger nor in smaller classes benefited significantly more than the other.

Table 83 contains the statistical tests on nonwhite students in special education classes whose parents were employed in service, labor, operative, and kindred occupations. The ratio favoring smaller over larger classes is 3 to 0. Thus, the nonwhite students in the smaller special education classes made significantly greater gains in reading achievement over the 5-year period (1959-1964) in 3 comparisons to 0 for those in larger classes. This was accomplished despite the fact that the students in larger classes had teachers with significantly greater academic knowledge in 2 comparisons to 1 for those in smaller classes, and the students also had teachers who had significantly greater years of teaching experience in 2 comparisons to 0 for those in smaller classes.

## TABLE 83

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Special Education Classes Whose I.Q. Scores Were 79 and Below and Whose Parents Were Employed in Service, Labor, Operative, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-19 | 20-25 | — | .01 | — | .05 | .01 | — | .05 | — | — | .05 | — | .01 | — | .01 |
| 1-19 | 26 & over | — | — | — | — | .02 | — | .05 | — | — | .02 | — | .02 | — | .01 |
| 20-25 | 26 & over | — | — | — | — | .05 | — | .01 | — | — | — | .05 | — | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05, at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.
Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

## TABLE 84

**Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Special Education Classes Whose I.Q. Scores Were 79 and Below and Whose Parents Were Employed in Professional, Technical, Skilled, Supervisory, and Kindred Occupations**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE Pupil Groupings | | HOME FACTORS | | | | PUPIL ACHIEVEMENT FACTORS | | | | FACULTY FACTORS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pupil Mobility | | Parental Education | | Reading | | Arithmetic | | % Nonwhite Faculty | | Faculty Knowledge | | Faculty Teaching Experience | |
| Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 | Grp 1 | Grp 2 |
| 1-19 | 20-25 | — | — | — | — | — | — | .01 | — | — | .01 | — | — | — | .02 |
| 1-19 | 26 & over | — | — | — | — | — | — | .02 | — | — | .02 | — | — | — | — |
| 20-25 | 26 & over | — | — | — | — | .05 | — | — | — | — | — | — | .05 | — | — |

Note 1: The value .01 means the difference between means for Group 1 and Group 2 children is statistically significant at the .01 level of confidence; .02, at the .02 level; and .05 at the .05 level. If the value .01, .02, or .05 appears under Group 1 columnar heading it means that the test of the statistical difference between means was in favor of Group 1. If the value .01, .02, or .05 appears under Group 2 columnar heading the difference was statistically significant in favor of Group 2. If dashes appear under both Group 1 and Group 2 for a given comparison, the difference between means was not statistically significant.
Note 2: If no value appears under either Group 1 or Group 2 and if the spaces are blank, this means that the computed results were NOT INCLUDED due to an insufficient number of cases in the cell groupings compared. Such computed results would not have had practical significance though they might have had statistical significance.

The last occupational grouping deals with parents who were employed in professional and kindred occupations. Table 84 contains the data for nonwhite students in special education classes whose parents were employed in professional, technical, skilled, and kindred occupations. Interestingly, the results with respect to reading are certainly not conclusive, although the students in smaller classes made significantly greater gains in reading achievement in 1 comparison to 0 for those in larger classes. However, the two comparisons yielded results which indicated that neither the students in larger nor in smaller classes made significantly greater gains in reading achievement than the other.

In summary, then, the nonwhite students in the four occupational groupings in smaller classes made significantly greater gains in reading achievement over the 5-year period (1959-1964) in 8 comparisons to 1 for those students in larger classes. This indicates an 8 to 1 ratio in favor of smaller over larger classes with respect to gains in reading achievement for nonwhite students in special education classes.

*Arithmetic Achievement*. Table 81 indicates that the nonwhite students in the smaller special education classes and whose parents were employed in clerical, sales, and kindred occupations made significantly greater gains in arithmetic over the 5-year period (1959-1964) in 2 comparisons to 0 for those nonwhite students in larger classes. One comparison indicated that neither the students in larger nor in smaller classes made significantly greater gains in arithmetic achievement than the other. With respect to favorable supporting characteristics, the students in larger classes had parents who had significantly more years of formal education in 2 comparisons to 1 for those in smaller classes. This same ratio held for the students in larger classes over those in smaller classes with respect to faculty knowledge and faculty teaching experience. Yet, the students in the smaller classes made significantly greater gains in arithmetic achievement than those in the larger classes.

Table 82 indicates that the nonwhite students in the smaller special education classes whose parents were employed in private households and kindred occupations made significantly greater gains in arithmetic achievement over the 5-year period (1959-1964) in 3 comparisons to 0 for those nonwhite students in larger classes. This is a slightly higher ratio than that found for the nonwhite students in the smaller special education classes but whose parents were employed in sales, clerical, and kindred occupations. This ratio of 3 to 0 was obtained despite the fact that neither the students in smaller nor in larger classes benefited significantly more from a set of favorable characteristics than the other.

The nonwhite students in the smaller special education classes and whose parents were employed in service, labor, operative, and kindred occupations made significantly greater gains in arithmetic achievement over the 5-year period (1959-1964) in 3 comparisons to 0 for those students in the larger classes. This was the same ratio as that found for the nonwhite students in the smaller special education classes whose parents were employed in private households and kindred occupations. Moreover, this ratio was obtained as indicated in Table 83, in spite of the fact that the students in the larger classes tended to have teachers with significantly greater academic knowledge and years of teaching experience.

Table 84 shows that the nonwhite students in the smaller special education classes and whose parents were employed in professional, technical, skilled, supervisory, and kindred occupations made significantly greater gains in arithmetic achievement over the 5-year period (1959-1964) in 2 comparisons to 0 for those nonwhite students in larger classes. One comparison indicated that neither the students in larger nor in smaller classes made significantly greater gains in arithmetic achievement than the other.

In summary, nonwhite students in the smaller special education classes made significantly greater gains in arithmetic achievement over the 5-year period (1959-1964) in 10 comparisons to 0 for the nonwhite students in larger classes. Surely, the chances are decidedly greater that the

## TABLE 85

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for Nonwhite Children in Special Education Classes and Whose I.Q. Scores Were Between 79 and 56**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Pupil Groupings | | | | | | | | | | | | | | | | | | | | | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-19 | 20-25 | 1 | 1 | 2 | 0 | 3 | 1 | 3 | 0 | 1 | 4 | 0 | 0 | 0 | 3 | 1 | 0 | 3 | 1 | 0 | 4 | 0 |
| 1-19 | 26 & over | 0 | 2 | 2 | 1 | 1 | 2 | 3 | 0 | 1 | 4 | 0 | 0 | 0 | 3 | 1 | 1 | 2 | 1 | 0 | 2 | 2 |
| 20-25 | 26 & over | 1 | 0 | 3 | 1 | 0 | 3 | 2 | 1 | 1 | 2 | 0 | 2 | 0 | 1 | 3 | 2 | 1 | 1 | 2 | 0 | 2 |
| Total | | 2 | 3 | 7 | 2 | 4 | 6 | 8 | 1 | 3 | 10 | 0 | 2 | 0 | 7 | 5 | 3 | 6 | 3 | 2 | 6 | 4 |

S - Small Classes
L - Larger Classes
N - Neither

nonwhite students in special education classes will learn significantly more arithmetic if they are in smaller rather than in larger classes.

*Summary of Pupil Achievement in Special Education Classes.* Table 85 summarizes pupil achievement gains in arithmetic and reading for nonwhite students in special education classes by selected class size groupings. Table 85 also enumerates the class size comparisons with respect to pupil home mobility, parental education, faculty knowledge, and faculty teaching experience.

The nonwhite students in the smaller special education classes made significantly higher gains in reading and arithmetic over the 5-year period (1959-1964) in 18 comparisons to 1 for those students in larger classes. As the evidence indicates in Table 85, these gains in reading and arithmetic by the students in the smaller special education classes were not achieved because they benefited significantly more from a set of favorable supporting characteristics such as parental education, faculty knowledge, and faculty teaching experience. All in all, the chances are decidedly greater that the nonwhite students in the smaller special education classes will learn more arithmetic and read better if they are in smaller rather than in larger classes.

## Summary of Class Size Comparisons of Both White and Nonwhite Students in Special Education Classes

This section does not report on direct ratio comparisons of class size and pupil performance. In no instance were white children compared with nonwhite students. Table 86 reports on the tests of statistical significance of the differences between means for selected class size groupings for both white students and nonwhite students in special education classes whose I.Q. scores were between 79 and 56.

With respect to reading achievement, the students in the smaller special education classes made significantly greater gains in reading over the 5-year period (1959-1964) in 18 comparisons to 2 for those students in larger classes. The ratio then favoring smaller over larger classes with respect to gains in reading achievement is 9 to 1. Interestingly, when only the class size statistics involving the students in the smallest class size grouping (1-19 pupils) are analyzed, the ratio favoring the smallest class size grouping over the larger classes is 14 to 0.

With respect to gains in arithmetic achievement, the students in the smaller special education classes made significantly greater gains in arithmetic achievement over the 5-year period (1959-1964) in 20 comparisons to 1 for those students in the larger special education classes. As was the situation with respect to reading, when only the statistics involving the students in the smallest class size grouping (1-19 pupils) are analyzed, the results indicate that the students in this smallest class size grouping made significantly greater gains in arithmetic achievement in 16 comparisons to 0 for the students who were in the two larger class size groupings.

In summary, the students in the smaller special education classes made significantly greater gains in reading and arithmetic over the 5-year period (1959-1964) in 38 comparisons to 3 for those students in the larger classes. This indicates a ratio of 12.7 to 1 favoring pupil performance in smaller over larger special education classes. Moreover, such results were not achieved because the students in the smaller classes benefited significantly more from favorable supporting characteristics.

As indicated in Table 86, the parents of the students in the larger special education classes had significantly more formal years of education in 13 comparisons to 4 for those in the smaller classes. In addition, the students in the larger special education classes had teachers with significantly greater academic knowledge in 12 comparisons to 9 for those in smaller classes, and the students in the larger special education classes had teachers with significantly more years of teaching experience in 15 comparisons to 5 for those in smaller classes. However, the students in the larger classes

## TABLE 86

**Summary of Tests of Statistical Significance of the Differences Between Means for Selected Class Size Groupings for All Children in Special Education Classes and Whose IQ Scores Were Between 79 and 56**
**Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| CLASS SIZE | | HOME FACTORS | | | | | | PUPIL ACHIEVEMENT FACTORS | | | | | | FACULTY FACTORS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number of Pupil Mobility Comparisons Favoring | | | Number of Parental Education Comparisons Favoring | | | Number of Reading Comparisons Favoring | | | Number of Arithmetic Comparisons Favoring | | | Number of % Nonwhite Faculty Comparisons Favoring | | | Number of Faculty Knowledge Comparisons Favoring | | | Number of Faculty Teaching Experience Comparisons Favoring | | |
| Pupil Groupings | | | | | | | | | | | | | | | | | | | | | | |
| Grp 1 | Grp 2 | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N | S | L | N |
| 1-19 | 20-25 | 1 | 5 | 2 | 1 | 6 | 1 | 7 | 0 | 1 | 8 | 0 | 0 | 1 | 5 | 2 | 2 | 5 | 1 | 0 | 8 | 0 |
| 1-19 | 26 & over | 1 | 5 | 2 | 2 | 4 | 2 | 7 | 0 | 1 | 8 | 0 | 0 | 1 | 4 | 3 | 3 | 4 | 1 | 1 | 5 | 2 |
| 20-25 | 26 & over | 3 | 1 | 4 | 1 | 3 | 4 | 4 | 2 | 2 | 4 | 1 | 3 | 1 | 2 | 5 | 4 | 3 | 1 | 4 | 2 | 2 |
| Total | | 5 | 11 | 8 | 4 | 13 | 7 | 18 | 2 | 4 | 20 | 1 | 3 | 3 | 11 | 10 | 9 | 12 | 3 | 5 | 15 | 4 |

S - Small Classes
L - Larger Classes
N - Neither

had significantly more home moves in 11 comparisons to 5 for those in the smaller special education classes.

Such statistics surely indicate, however, that the students in the smallest special education classes did not benefit significantly more from a favorable set of supporting class size characteristics. Thus, the chances are decidedly greater that if white and nonwhite students are placed in the smaller special education classes they will learn more arithmetic and more reading than if they are placed in larger special education classes. Moreover, the odds are even distinctiy greater if the class size is 19 pupils or less than if it is 20 pupils or more.

## COMPARISONS OF PUPIL PERFORMANCE IN SPECIAL EDUCATION CLASSES WITH THOSE IN REGULAR CURRICULUM CLASSES

Previously, we indicated that for a student to be eligible to be enrolled in special education classes he must have an intelligence quotient score between 79 and 56. Students having an intelligence quotient score of 55 and below are eligible to be enrolled in mentally deficient and trainable classes. In this study there were both nonwhite and white students in the intelligence quotient range of 79 and 56 who were enrolled in either special education or in regular curriculum classes. Thus, students who were eligible to be enrolled in special education classes were actually enrolled in regular curriculum classes. The reason for this development was at least two-fold: (1) there was a dire lack of necessary classroom facilities for special education classes; and (2) there was a grave shortage of qualified special education teachers.

This situation, however, made it possible to test the following important question: Is it wiser to put "slow learning students" into regular curriculum or into special education classes? Will children achieve greater learning gains in reading and arithmetic in regular curriculum or in special education classes? Table 87 sheds some light on these questions.

Table 87 contains the tests of statistical significance of the differences between means for pupils enrolled in special education classes in contrast to those enrolled in regular curriculum classes. Of course, regardless of whether the students were enrolled in special or in regular curriculum classes they still had I.Q. scores which ranged between 79 and 56.

*Reading Achievement.* With respect to class size comparisons involving only students in the smallest class size grouping (1-19 pupils), out of 12 comparisons the students in regular curriculum classes made significantly greater gains in reading achievement over the 5-year period (1959-1964) in 7 comparisons to 3 for those students in the same I.Q. range but in special education classes. Two comparisons were not statistically significant, indicating that neither the students in special education classes nor in regular curriculum classes made significantly greater gains in reading achievement than the other.

When only the class size comparisons involving students in the class size grouping (20-25 pupils) are analyzed, the results are as follows: out of 12 comparisons, the students in the regular curriculum classes made significantly greater gains in reading achievement over the 5-year period (1959-1964) in 6 comparisons to 3 for those students in the same I.Q. range but in special education classes. Three comparisons were not statistically significant, indicating that neither the students in special education nor in regular curriculum classes made significantly greater gains in reading achievement than the other. The final class size comparison concerned those students enrolled in classes having 26 pupils or more and whose I.Q. scores were between 79 and 56. Out of 12 comparisons the students in regular curriculum classes made significantly greater gains in reading achievement over the 5-year

## TABLE 87

**Tests of Statistical Significance of the Differences Between Means for Pupils Enrolled in Special Education Classes in Contrast to Those Enrolled in Regular Curriculum Classes Both Having IQ.Scores of 79 and Below, by Selected Class Size Groupings Class Size and Pupil Learning Project, Baltimore City Public Schools, 1959-1964**

| Class Size Groupings | Comparisons on Reading Achievement | | | Comparisons on Arithmetic Achievement | | |
|---|---|---|---|---|---|---|
| | Favoring Special Education Pupils | Favoring Regular Curriculum Pupils | Favoring Neither | Favoring Special Education Pupils | Favoring Regular Curriculum Pupils | Favoring Neither |
| 1-19 | 3 | 7 | 2 | 2 | 8 | 2 |
| 20-25 | 3 | 6 | 3 | 4 | 6 | 2 |
| 26 & Over | 3 | 3 | 6 | 4 | 4 | 4 |
| TOTAL | 9 | 16 | 11 | 10 | 18 | 8 |

period (1959-1964) in 3 comparisons to 3 for those students in special education classes. Six comparisons indicated that neither the students in regular curriculum classes nor in special education classes made significantly greater gains in reading achievement than the other. This perhaps indicates that for low ability students, regardless of whether they are in special education or in regular curriculum classes, class size is probably too large for them to make significant gains in reading achievement.

*Arithmetic Achievement.* Table 87 also contains class size comparisons with respect to special education and regular curriculum students insofar as arithmetic achievement is concerned. When the class size comparisons involving only those students in the smallest class size grouping (1-19 pupils) are analyzed, the results are as follows: out of 12 comparisons the students in the regular curriculum classes made significantly greater gains in arithmetic achievement in 8 comparisons to 2 for those students in special education classes. Two comparisons were not statistically significant, indicating that neither the students in special education nor in regular curriculum classes made significantly greater gains in arithmetic achievement than the other.

With respect to the class size comparisons involving only those students in class sizes of 20-25 pupils, the results are as follows: out of 12 comparisons the students in the regular curriculum classes made significantly greater gains in arithmetic achievement over the 5-year period (1959-1964) in 6 comparisons to 4 for those students in special education classes. Two comparisons were not statistically significant, indicating that neither the students in regular curriculum classes nor in special education classes made significantly greater gains in arithmetic achievement than the other.

The class size comparisons with respect to students enrolled in classes of 26 students or more are not particularly conclusive. For example, out of 12 comparisons the students in regular curriculum classes made significantly greater gains in reading achievement in 4 comparisons to 4 for those students in special education classes. Four comparisons yielded results which indicated that neither the students in special education nor in regular curriculum classes made significantly greater gains in arithmetic achievement than the other.

*Summary of Pupil Achievement.* With respect to pupil achievement, regardless of class size, the students in regular curriculum classes and with I.Q. scores between 79 and 56 made significantly greater gains in reading and arithmetic achievement over the 5-year period (1959-1964) in 34 comparisons to 19 for similar ability students who were enrolled in special education classes. Nineteen class size comparisons were not statistically significant, indicating that neither the students in special education nor those in regular curriculum classes made significantly greater gains in reading and arithmetic achievement than the other. Such results appear to favor placing the low ability pupil in regular curriculum classes rather than in special education classes. However, it must be noted that regardless of whether or not the students were in special or in regular curriculum classes, if the classes tended to have 26 or more students the results were more often than not confusing and contradictory. It would be most unwise for anyone to draw the conclusion that the low ability students are better off in regular curriculum classes than in special education classes. One reason for not drawing such a conclusion is that so many variables that could have affected these results more than class size in and of itself have not been measured. Also, it is important to note that skills other than reading and arithmetic achievement must be taught by teachers and learned by pupils.

Yet it is still important to ask: Does a teacher's expectations as to his pupils' performance affect that performance? According to Rosenthal and Jacobson writing in the November 1967 *Scientific American* the answer to this question is apparently *yes*. They randomly selected about 20 percent of the students in 18 classes (students who were enrolled in average, below average, and above average curricula). These students were reported to their teachers

as being likely to show unusual intellectual gains in the coming year. The children were retested eight months later. Each child's change in I.Q. was computed. Interestingly, the supposed "bloomers" showed a mean gain of 12.2 points compared to 8.4 for the control group. Children in the experimental group and in the early grades achieved greater gains in I.Q. scores than those in the upper grades. Curiously, those pupils in the control group who made significantly higher I.Q. gains were not rated favorably by their teachers. In fact, in many instances, their teachers rated them as less well adjusted, interesting, and affectionate than like experimental pupils. In a few instances, teachers actually resented children in the control group who actually "bloomed intellectually." Apparently, Rosenthal and Jacobson found out what we did: that pupils do less well on arithmetic, reading, and intelligence tests when less is expected of them than when their teachers have higher favorable expectations of their performance.

# CHAPTER VI

# SUMMARY OF FINDINGS AND SUGGESTIONS FOR FUTURE RESEARCH STUDIES

## CLASS SIZE STILL AN IMPORTANT POLICY CONSIDERATION

Class size policies have always represented an important ingredient in the achievement of educational excellence. Present day trends in collective bargaining for teachers make class size considerations even more important. An article in *The Wall Street Journal*[1] entitled "Labor Letter" stated that:

> SCHOOL STRIKES loom as nonpay demands complicate teacher bargaining . . . Money is still important, but negotiations grow tougher over other complex demands . . . Class size is an issue in many places; a Denver poll finds it the No. 1 concern of teachers . . . .

In a memo to the senior author of this study, Dr. M. Thomas Goedeke, Associate Superintendent-in-Charge of the Baltimore City Public Schools, remarked:

> As you know, the Baltimore Teachers Union is concerned about the size of our classes and this topic will receive additional attention in the future months . . . .

In a press release dated September 13, 1967 Dr. James Sensenbaugh, Maryland State Superintendent of Schools, said " . . . smaller classes are fundamental to improved instruction." Dr. Sensenbaugh went on to state that " . . . students should attend some classes in groups of only five or six to get maximum benefit from their educational experience." He added that "lecture type high school classes may number up to a hundred or more students without diluting the education program." Because statewide median class figures declined in the State of Maryland for the third straight year, Dr. Sensenbaugh described the trend as "particularly gratifying in light of the encouragement and financial inducement that the State offers local school systems to reduce class size." Commissioner Owen B. Kiernan of Massachusetts, President of the Council of Chief State School Officers, has expressed concern for more research on class size and agreed with his colleague from Maryland, Dr. Sensenbaugh, that smaller classes seem to provide better social environments.

New York City's More Effective Schools program spent $859 per pupil in 1964-65, about $425 more than for each pupil in a regular program. The higher per pupil expenditure was used to reduce class size in kindergarten classes to 15 and to a maximum of 22 in other classes. Moreover, with respect to the September 1967 teachers' strike against the New York Public Schools an important demand of the United Federation of Teachers was the reduction of class size. But to do what needs to be done in urban education probably requires something close to tripling the total staff of the schools, not just chipping away at class size. In commenting about New York City's More Effective Schools program, the President of the New York City Board of Education remarked that "the most important thing that MES did was to reduce class size . . . ."

After more than a half century of research on class size, school administrators, school officials, classroom teachers, exclusive bargaining representatives, professional educational organizations, and lay persons still attach great importance to class size. That this importance is probably justified with respect to pupil achievement in reading and arithmetic is borne out by the findings of this study.

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[1] "Labor Letter," *The Wall Street Journal*, August 22, 1967, p. 1.

## SUMMARY OF CLASS SIZE FINDINGS

Students in the regular curriculum and in smaller classes made significantly greater gains in pupil achievement (on both standardized reading and arithmetic tests) over the five-year period (1959-1964) in 188 comparisons to 55 for students in larger classes—a 3.4 to 1 ratio in favor of smaller over larger classes. These results were attained even though in most instances the pupils in larger classes benefited more significantly from such favorable supporting characteristics as parental education, faculty knowledge, and faculty teaching experience. When pupil achievement is analyzed separately for reading and arithmetic, the results were as follows: (1) with respect to reading, the students in the smaller classes made significantly greater gains in reading over the five-year period (1959-1964) in 92 comparisons to 26 for students in larger classes—a 3.5 to 1 ratio; and (2) with respect to arithmetic, the students in the smaller classes made significantly greater gains in arithmetic over the five-year period (1959-1964) in 96 comparisons to 29 for students in larger classes—a 3.3 to 1 ratio.

The most important finding of this study relates to the smallest class size grouping (1-25 students). Out of 192 comparisons, pupils in the smallest class size grouping made significantly greater gains in pupil achievement than those in larger classes in a ratio of 7.3 to 1. Stated differently, 117 comparisons (61 percent) favored pupils in the smallest class size grouping (1-25), 16 comparisons (8 percent) favored pupils in larger classes, and 59 comparisons (31 percent) showed no significant differences favoring either smaller or larger classes. Also, it should be noted that smaller classes made these significant gains in reading and arithmetic achievement despite the fact that the pupils in smaller classes benefited significantly more from such supporting characteristics as parental education, faculty knowledge, and faculty experience in only 32 percent of the comparisons.

The advantages of the smallest class size (1-25) were considerably more productive for nonwhite students than for white students. In 96 group comparisons, nonwhite pupils in the smallest classes made significantly greater gains in reading and arithmetic over these in larger classes by a ratio of 21.3 to 1. Stated differently, out of 96 comparisons, nonwhite students in smaller classes made significantly greater gains in achievement in 64 comparisons (66 percent), nonwhite students in larger classes made significantly greater gains in achievement in 3 comparisons (3 percent), and 29 comparisons (30 percent) favored neither nonwhite students in larger nor in smaller classes. Again it should be pointed out that the nonwhite students in smaller classes benefited significantly more from such favorable supporting characteristics as previously enumerated in only 20 percent of the comparisons.

In a society which is more aware that absolute answers to complex problems are figments of oversimplification, the probabilistic equation is becoming more and more respected. In 1958 even the composition of the atom whose particles were described with certainty in the late 1940's became dependent on the probability theories for more accurate description, mainly because measuring devices were acknowledged as limited in sensitivity and admittedly distorted the speed and life of the particles such instruments were intended to measure. Certainly, the human complexities of man are equally deserving of probabilistic descriptions.

Students in the special education curriculum and in smaller classes made significantly greater gains in pupil achievement (on both standardized reading and arithmetic tests) over the five-year period (1959-1964) in 38 comparisons to 3 for students in larger classes — a 12.7 to 1 ratio favoring smaller over larger classes. When pupil achievement is analyzed separately for reading and arithmetic, the results were as follows: (1) with respect to reading, the special education students in smaller classes made significantly greater gains in reading over the five-year period (1959-1964) in 18 comparisons to 2 for students in larger classes — a 9 to 1 ratio favoring smaller over larger classes;

and (2) with respect to arithmetic, the special education students in smaller classes made significantly greater gains in arithmetic achievement over the five-year period (1959-1964) in 20 comparisons to 1 for those special education students in larger classes — a 20 to 1 ratio favoring smaller over larger classes.

## SUGGESTIONS FOR FUTURE CLASS SIZE AND PUPIL LEARNING STUDIES

The primary objective of the Baltimore City Public School system's "Class Size and Pupil Learning Study" was to discover the relationship between class size and pupil achievement in two critical skill areas — reading and arithmetic. Moreover, the period of time covered (the time span involved 5 years) to measure gains or losses in reading and arithmetic and the fact that pupils were taken in whatever class size environment they were found (i.e., we did not contrive experimental and control class size groups), we think, did much to eliminate the phenomenon of the "Hawthorne effect." The study was also designed to test whether or not class size was a more critical factor with respect to the academic achievement of pupils from culturally deprived backgrounds in contrast to pupils from culturally advantaged environments.

There were a significant number of innovations and borrowings from earlier research studies. Notably this study provided: (1) longitudinal dimensions to class size research; it shows that to a degree (2) class size, (3) occupations of parents, (4) I.Q., (5) curriculum, and (6) race can be held constant in analysis while any number of variables may be tested for the statistical significance in an educational model. We tested over 300 items on students, home, school, and teachers by factor analysis before selecting the following variables: (1) pupil mobility, (2) parental level of education, (3) achievement in reading, (4) achievement in arithmetic, (5) percentage of nonwhite faculty, (6) faculty knowledge, and (7) faculty experience.

As in our national efforts in space, it is evident that we explored only a small number of the infinite number and interrelated variables that could affect the relationship between student learning and class size. Resources for more intensive and extensive research on the important objective of enhancing student learning are certainly worthy of a more concentrated national effort.

Clearly, the matrix of factors examined in this study did not represent by any means what we originally wanted to research; but it did go far enough into the matrix of factors which make up the "unknowns" or "residual factors" omitted by the limits of the researchers' knowledge or insensitive measuring instruments in the research of class size in the past. Yet were it not for Dr. Richard K. McKay, Director of Research and Development of the Maryland State Department of Education, even this limited study would not have been published nor would it be available for wide distribution. He encouraged the Maryland State Department of Education to finance the publication of this study to the extent of $7,500.00.

Had sufficient funds been available we would have devised a more extensive research design. We desired to explore the relationship between class size and academic performance in areas other than pupil achievement in reading and arithmetic. We also wanted to explore relationships between class size and other variables in the area of child development, such as "creativity," "deportment," "citizenship," "critical judgment," "critical reasoning," "attitudes toward learning," and "problem solving," particularly when it becomes difficult to define the problem. We would have been delighted to study other related social and economic variables. Moreover, our design would have included for study such complex variables as staff attitudes, teaching methods, and instructional materials, all of which should be added to the matrix studying class size and pupil learning.

In effect, we wanted to be overly ambitious since we wished to look at class size and pupil learning in terms of the following matrix of factors:

1. Individual students or disaggregate approaches.
2. Individual teachers.
3. The teaching process, particularly as it concerns methods, content, curriculum development, and evaluation.
4. Home environments, parental attitudes, and the effects of siblings.
5. The neighborhood.
6. White and nonwhite teachers and their effect on various social, economic, and racial mixes of students.
7. Classmates, particularly the influence and effect of white and nonwhite mixes of intelligence levels in varying proportions of heterogeneous groups.
8. Supporting staff, particularly varying specialists.
9. Large group lectures.
10. Variable or team teaching.
11. Longer periods of time.
12. Weighing of marginal influences.
13. Mobile and lagged variables.
14. Social and psychological influences.
15. Attitudes toward continuous learning.
16. A variety of reading techniques and achievement skills.
17. Objectives of education proposed by the Educational Policies Commission. (See Exhibit I.)
18. Appreciations, attitudes, values, and responsibilities.
19. Influence of "innovative" ideas.

With respect to smaller versus larger classes, or grouping children in one way rather than another, we need to know more than whether or not children learn to read better, write more proficiently, or spell more accurately. We need to know the metes and bounds with respect to class size and school and classroom organization in which children learn best to develop skills in critical thinking, develop respect for human dignity, respect the rights of others, learn healthy self-concepts, create wholesome civic attitudes, develop superior physical health and healthy mental and emotional outlooks.

Too often class size or research in grouping has looked only at pupil learning and the pupil, omitting the effects of class size and grouping practices on the teacher. Yet class size and pupil grouping practices affect the mental, emotional, and physical health of teachers and research as to how and in what ways should be useful. Teachers unions, presently, consider class size such an important matter that they are willing to strike in order to achieve limits on class size. And parents can see the logic in their concern and the benefit to their children. For example, in the fall of 1967, teachers in Detroit won a 30-pupil limit on class size in the first three grades in ghetto schools and a 39-student limit in all other classes.

Lastly, how class size and pupil grouping practices affect the teaching process should be studied. Are teaching methods different? Do teachers lecture more in large or in small classes? What types of tests do children in small classes get compared to those in large classes?

Such a multidimensional research paradigm could easily complement a number of those proposed in N.L. Gage's *Handbook of Research on Teaching*[2], or accelerate the achievement of more reliable measures of educational objectives and what factors contribute most to learning.

In any event, we hope that we have contributed to improved designs for studies of class size and numerous other factors related to student learning and the educational process. By this experience, future studies on class size and pupil learning should be better designed and executed.

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[2]N.L. Gage, *Handbook of Research on Teaching*, A Project of The American Educational Research Association. Chicago: Rand McNally & Company, 1963.

# EXHIBIT I

## OBJECTIVES OF EDUCATION FOR THE UNITED STATES

Objectives of Self Realization

1. The inquiring mind
2. Speech
3. Reading
4. Writing
5. Number
6. Sight and hearing
7. Health
8. Health habits
9. Public health
10. Recreation
11. Intellectual interests
12. Aesthetic interests
13. Character

Objectives of Human Relations

1. Respect for humanity
2. Friendship
3. Cooperation
4. Courtesy
5. Appreciation of the home
6. Conservation of the home
7. Homemaking
8. Democracy in the home

Objectives of Economic Efficiency

1. Work
2. Occupational information
3. Occupational choice
4. Occupational efficiency
5. Occupational adjustment
6. Occupational appreciation
7. Personal economics
8. Consumer judgment
9. Efficiency in buying
10. Consumer protection

Objectives of Civic Responsibility

1. Social justice
2. Social activity
3. Social understanding
4. Critical judgment
5. Tolerance
6. Conservation
7. Social application of science
8. World citizenship
9. Observance of law
10. Economic literature
11. Political citizenship
12. Devotion to Democracy

Source: Educational Policies Commission, *The Purposes of Education in an American Democracy*, Washington; National Education Association, 1938, pp. 50, 72, 90, 108.

# INDEX