A COMPARISON OF INDIAN AND CAUCASIAN STUDENTS' ACHIEVEMENT AS MEASURED BY THE IOWA TESTS OF EDUCATIONAL DEVELOPMENT AT AN ARIZONA HIGH SCHOOL

BY

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CHAPTER I

INTRODUCTION

When 65 per cent of the students in a particular high school class fail a course, there are several major reasons that might be considered. Possibly the teacher was not doing the job properly, or the material may not have been suited to the course, or perhaps the students were not able to cope with the material.

This situation occurred in a second year General Mathematics class at Parker High School during the 1959-1960 school year, so an analysis of the above factors was made.

Three different experienced teachers in three successive years judged that over half the class failed. This pattern of failures would indicate that the teacher was not at fault.

The superintendent of schools, the librarian, and the mathematics staff worked as a committee in selecting one of the most elementary textbooks in the field, which was supplemented by fifth and sixth grade materials and a series of films on number concepts. It would appear that the material was not too difficult for a course at a basic level.

These facts pointed to a need for investigation of the student's ability. Over half the students in this class were Indians, of which 60 per cent failed, whereas

only 40 per cent of the Caucasians in the class failed. Curiosity as to whether this condition prevailed throughout the curriculum prompted further study.

Statement of the Problem

The apparent scholastic difficulty of the Indian student in mathematics classes with Caucasians led to the problem in this study: How well does the Indian student meet the Caucasian standards in the Parker High School?

Procedures

To determine how well the Indian student meets Caucasian standards in Parker High School, Indian student scores on the Iowa Tests of Educational Development (ITED) were compared with the scores of the remainder of the Parker High School students for the 1959-1960 school year, using percentiles based on national norms.

Limitations

This study was limited to Parker Arizona high school students at the end of the first semester of the 1959-1960 school year. Information concerning the ITED was obtained from the Montana State College Library.

Definitions

Indian students have been defined as those with one-fourth or more Indian blood, as ascertained by government aid standards.

All non-Indian students are referred to as Caucasians.

A discussion of the reasons for selecting the Iowa Tests of Educational Development for measuring achievement of the two groups follows in Chapter 2.

CHAPTER II

IOWA TESTS OF EDUCATIONAL DEVELOPMENT

The Iowa Tests of Educational Development (ITED) were selected as the measuring instrument to determine how well the Indian student meets the Caucasian standards in the Parker High School.

The ITED is a well-validated battery of tests designed to measure school and individual progress from year to year in grades 9 through 12. They were prepared in 1942 under the direction of Lindquist at the State University of Iowa. During the 19 years of their publication, the ITED have grown to the point where well over one million students in four thousand high schools were tested in 1961.

Buros[1] provided evidence that these tests should be a very substantial basis upon which to compare Indian and Caucasian abilities. For instance, Lee[2] commented that the ITED are excellent. They measure the achievement of some of the important objectives which high schools are attempting to attain. Criticism of the ITED came from Wiseman[3] who maintained that the difficulty level is too high, and that

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[1]Buros, O. K., The Fifth Mental Measurements Yearbook, p. 55.

[2]Lee, J. M., The Fifth Mental Measurements Yearbook, p. 55.

[3]Wiseman, Stephan, The Fifth Mental Measurements Yearbook, p. 56.

the time allowance is too long. Each test requires from 22 to 70 minutes to complete. Wiseman was also of the opinion that open-end questions are preferable to the multiple choice questions employed in the ITED.

At Parker High School, the ITED are administered annually to the entire student body at the same time. Results are sent to each parent with an explanation of the areas and scores obtained. In addition to measuring school and individual progress from year to year, the ITED are also used at Parker High School for ability grouping, curriculum revision, college field and success prediction, individual counseling, and determining the average educational level of each year group in school.

The ITED are a battery of nine tests that measure educational development in four major curricular areas: Social Sciences, Natural Sciences, Mathematics, and English. Tests permit evaluation of knowledge and skills acquired by the student both in and out of school.

Two alternate forms of the battery are available: X-3S and Y-3S. Student norms are provided in the form of standard scores and percentiles for comparison within the particular school, and also on a national basis. Norms were standardized on a 1957 nation-wide stratified sample of 148,950 students in 366 high schools.

The nine tests measure the following:

Understanding of Basic Social Concepts (Test 1): the student's general knowledge and understanding of contemporary social institutions and practices.

General Background in the Natural Sciences (Test 2): knowledge and understanding of scientific terms and principles, of common natural phenomena and their industrial applications, and of the contributions of science to contemporary civilization.

Correctness and Appropriateness of Expression (Test 3): mastery of punctuation, usage, capitalization, spelling, diction, phraseology, and organization.

Ability to do Quantitative Thinking (Test 4): ability to apply mathematical concepts and principles to the solution of practical problems.

Ability to Interpret Reading Materials in Social Studies (Test 5): ability to interpret selections from textbooks, magazines, and newspaper articles.

Ability to Interpret Reading Materials in Natural Sciences (Test 6): interpretation and evaluation of selections from textbooks, references, scientific articles, and from relatively nontechnical literature.

Ability to Interpret Literary Materials (Test 7); understanding of general literature. Selections include both prose and poetry.

General Vocabulary (Test 8); ability to understand meaning of words commonly found in reading materials.

Use of Sources of Information (Test 9): ability to locate and utilize reference sources--textbooks, dictionaries, encyclopedias, maps, globes, and atlases.[4]

Test 1, Social Studies Background, and Test 5, Reading Social Studies, were grouped for evaluating level of competency

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[4]Educational Catalog, 1961-1962. Science Research Associates, p. C6.

in curriculum areas of Geography, World History, American History, and Constitution.

Test 2, Natural Science Background, and Test 6, Reading Natural Science, were grouped for evaluating level of competency in curriculum areas of General Science, Biology, Physics, and Chemistry.

Test 3, Correctness in Expression, Test 7, Reading Literature, and Test 8, General Vocabulary, were grouped for evaluating level of competency in the curriculum area of English.

Test 4, Quantitative Thinking, was used in evaluating level of competency in the curriculum area of General Mathematics, Algebra, and Geometry.

An evaluation of the achievements of Indian and Caucasian students at Parker High School on the ITED results in 1960 is presented in Chapter 3.

CHAPTER III

COMPARISON OF INDIAN AND CAUCASIAN ACHIEVEMENT

The Iowa Tests of Educational Development were utilized to provide measures of educational development of Indian and Caucasian students in the major curricular areas at Parker High School.

The Indian group was composed of students with one-fourth or more Indian blood, and the Caucasian group consisted of students with less than one-fourth Indian blood, together with the whites and Mexicans. Of the 83 students in the Indian group, 33 were in grade 9, 21 were in grade 10, 16 were in grade 11, and 13 were in grade 12. The Caucasian group of 143 students was made up of 47 in grade 9, 37 in grade 10, 32 in grade 11, and 27 in grade 12. More than one-third of the 226 students tested at Parker High School were of Indian ancestry.

Standard scores of students in the two groups were averaged and compared at grade levels for each test area. These standard score averages were converted to percentiles and are presented in graph form. Percentiles were used to compare achievement of the groups, as they adequately indicate rank in a group, and their meanings are generally understood. This method also affords a comparison of the students of a particular high school with students of other high schools. The results of the groups in each of the four general curricular areas are presented separately in the following sections.

Social Studies

The results of averaging the scores of the two groups on Test 1, Social Studies Background, indicated that the Caucasian group did considerably better than the Indian group at the 9th, 10th, and 11th grade levels. The bar graph illustrating these differences appears in Figure 1. The lowest mean percentiles attained by Indian groups in grades 9 and 12 came on this test. The difference in achievement between the two groups at the 12th grade level was not as pronounced as at the other grade levels. The Indian group grade level mean percentiles ranged from 24 to 45, while the Caucasian group grade level mean percentiles ranged from 43 to 62. The mid-point of the Indian group percentile range was approximately 29, while the Caucasian group percentile range mid-point was approximately 52.

The results of averaging the scores of the two groups on Test 5, Social Studies Reading, followed the same pattern as Test 1, except that the grade 12 Indians did somewhat better than the grade 12 Caucasians. The bar graph illustrating these differences appears in Figure 2. The Caucasian grade 11 group registered their lowest score in the battery on this test, with a mean percentile of 53. As can be seen in Figure 2, the mean percentiles for the Indian groups by grade level varied from 33 to 47, while the Caucasian group grade level mean percentiles varied from 46 to 54. The

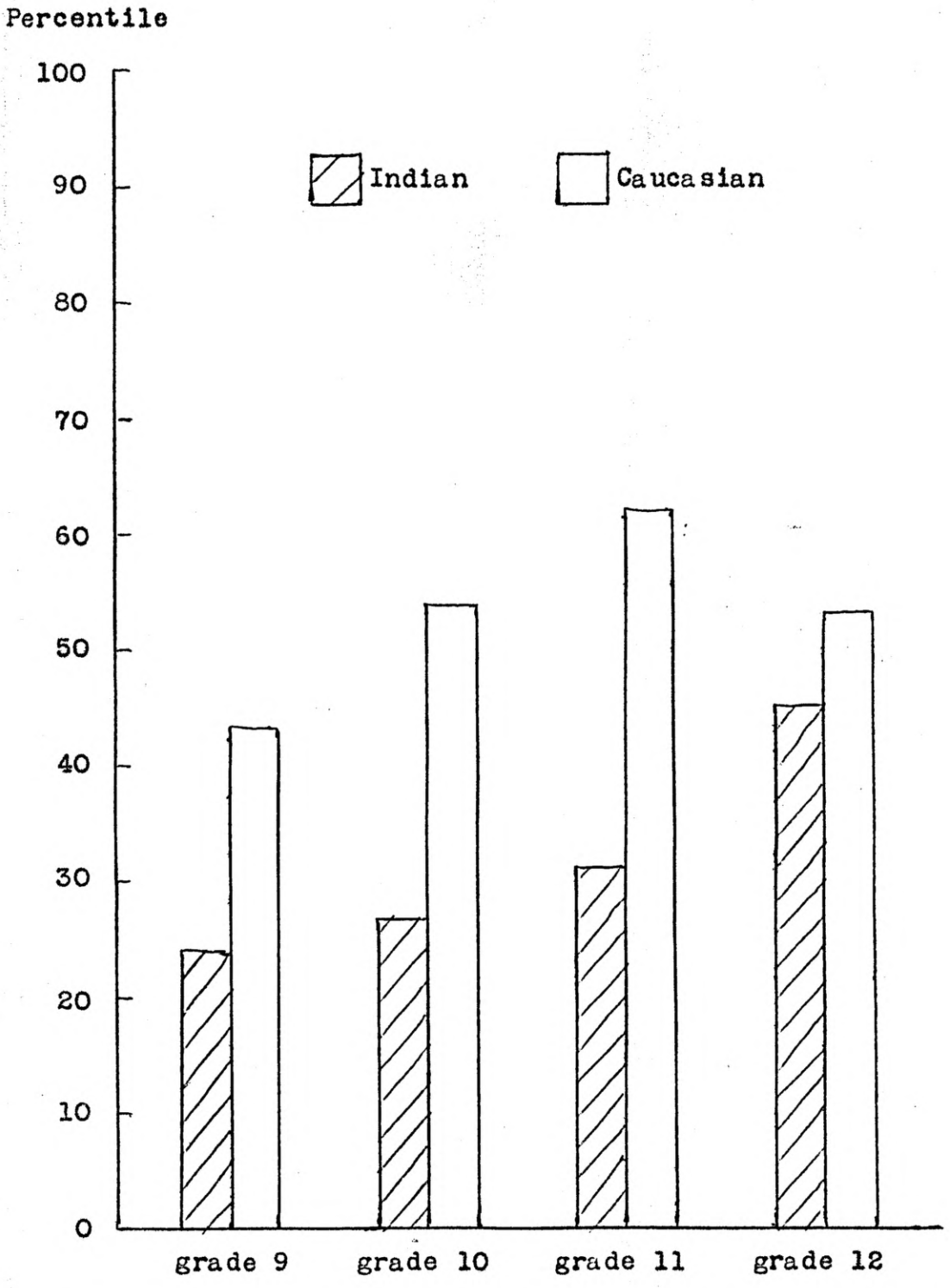

Figure 1. Mean Percentiles of Indian and Caucasian Students for Social Studies Background, Test 1 of ITED, at Parker High School, January, 1960

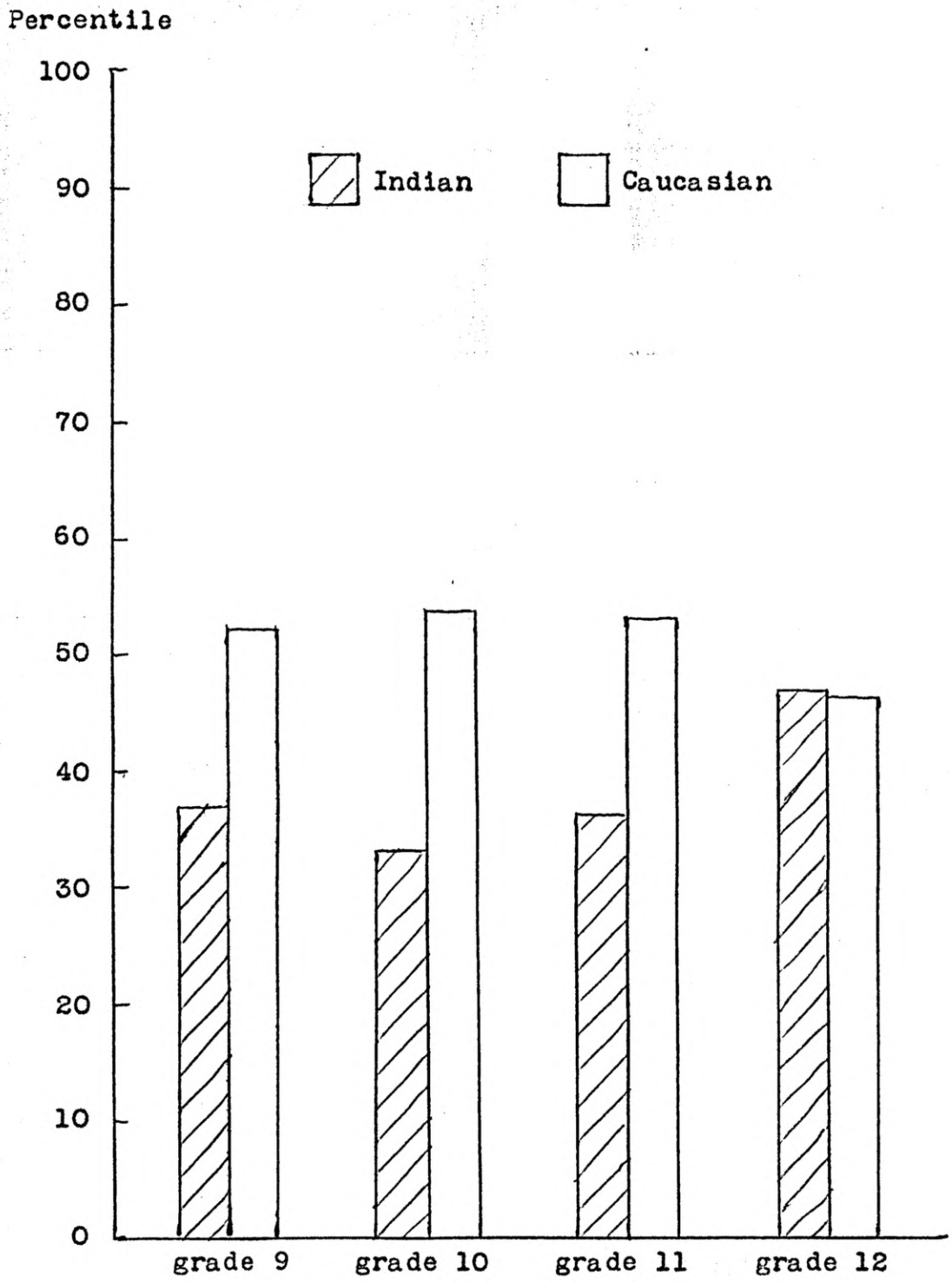

Figure 2. Mean Percentiles of Indian and Caucasian Students for Social Studies Reading, Test 5 of ITED, at Parker High School, January, 1960

mid-point of the Indian group percentile range was approximately 37, while the Caucasian group percentile range mid-point was approximately 52.

With the exception of grade 12, it appeared that the Indian students did not compare favorably with Caucasian students in curriculum areas involving Geograph, World History, American History, and Constitution. The exception found in grade 12 may be due partly to the small number of Indian students that had survived three previous years of schooling.

Natural Science

The results of averaging the scores of the two groups on Test 2, Natural Science Background, indicated that the Caucasian group did considerably better than the Indian group at the 9th, 10th, and 11th grade levels. The bar graph illustrating these differences appears in Figure 3. Of the four Indian grade level groups, the grade 12 group compiled the highest mean percentile on this test, whereas of the four Caucasian grade level groups, the grade 12 group had the lowest mean percentile on this test, with the result that little difference is reflected between these two grade level groups. As can be seen in Figure 3, the mean percentiles for the Indian groups by grade level ranged from 30 to 46, while the Caucasian group grade level mean percentiles ranged

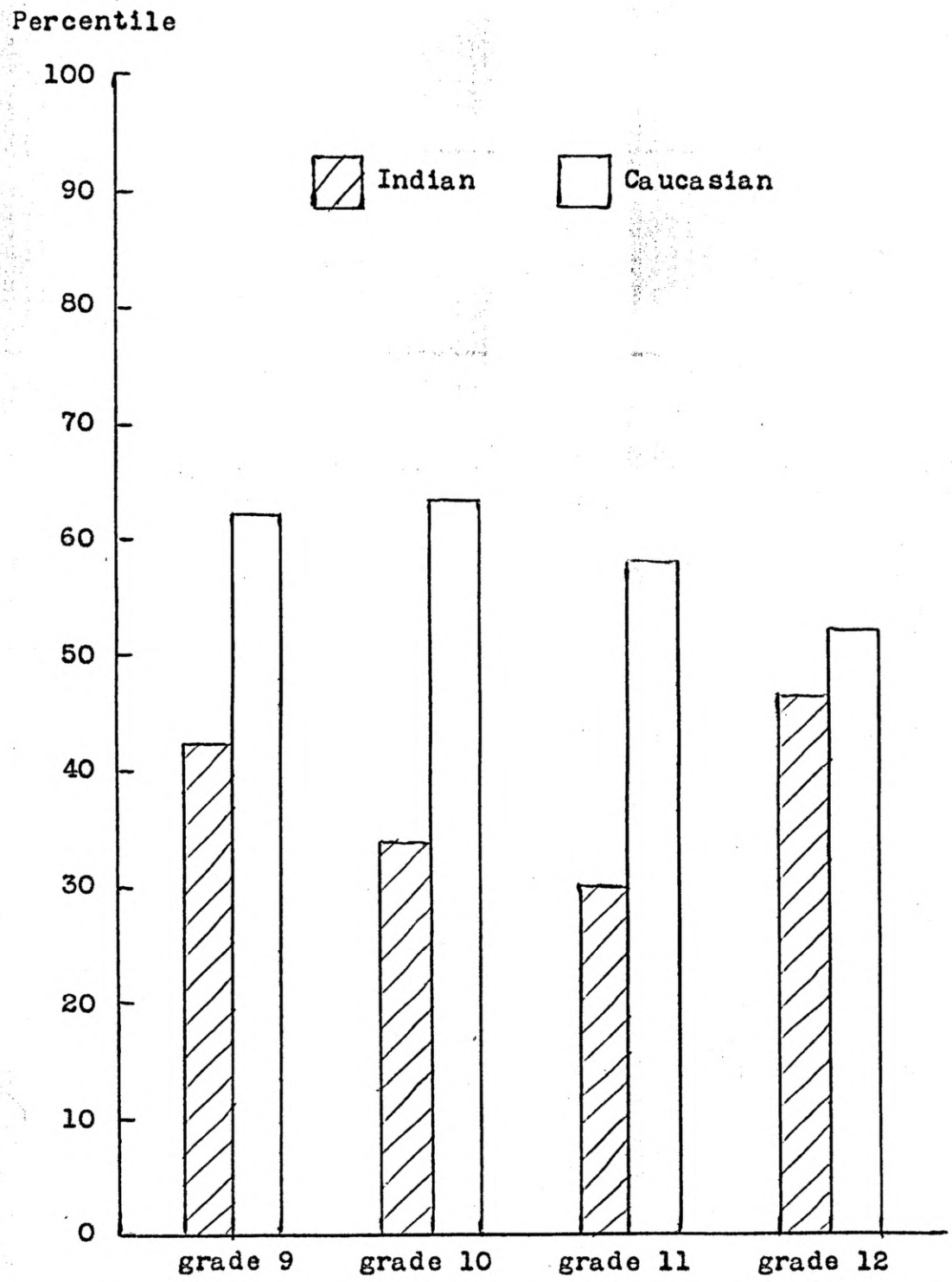

Figure 3. Mean Percentiles of Indian and Caucasian Students for Natural Science Background, Test 2 of ITED, at Parker High School, January, 1960

from 52 to 63. The mid-point of the Indian group percentile range was approximately 38, while the Caucasian group percentile range mid-point was approximately 61.

The results of averaging the scores of the two groups on Test 6, Natural Science Reading, indicated that the Caucasian group did much better than the Indian group at the 10th and 11th grade levels. There was little difference between Indian and Caucasian achievement at grades 9 and 12. The bar graph depicting these differences appears in Figure 4. This test supplied the highest scores over the entire battery in this study for Indian grades 9, 10, and 11, and also for Caucasian grades 10 and 12. As can be seen in Figure 4, Indian group grade level mean percentiles varied from 43 to 55, while the Caucasian group grade level mean percentiles varied from 55 to 70. The mid-point of the Indian group percentile range was approximately 50, while the Caucasian group percentile range mid-point was approximately 62.

The Natural Science area was one in which two of the four Indian grade level groups compared quite favorably with the Caucasian groups. This area also supplied the best overall scores for both Indians and Caucasians. This would indicate that the Indian group compares more favorably with the Caucasian group in curriculum areas involving General Science, Biology, Physics, and Chemistry than in other areas.

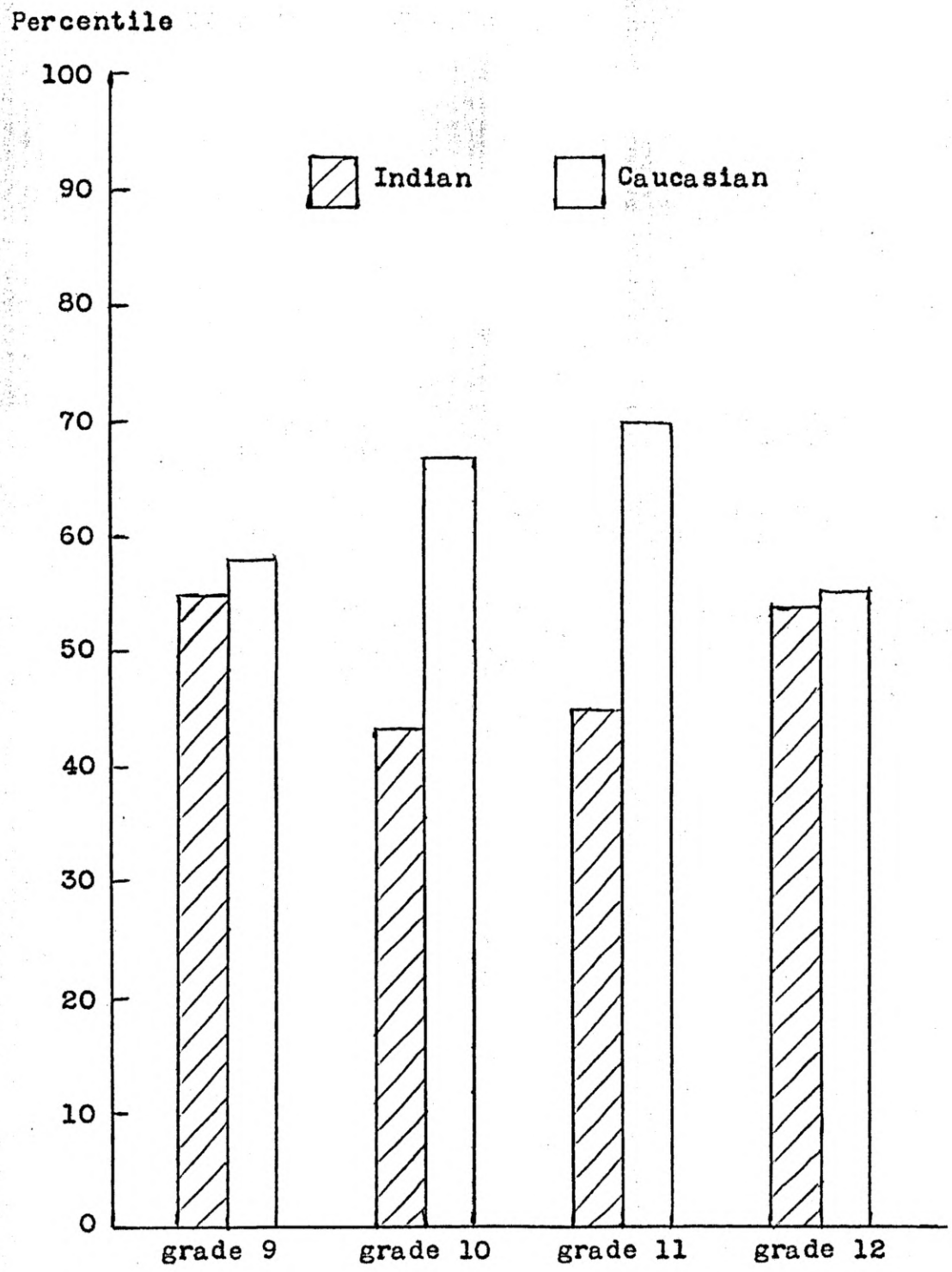

Figure 4. Mean Percentiles of Indian and Caucasian Students for Natural Science Reading, Test 6 of ITED, at Parker High School, January, 1960

English

The results of averaging the scores of the two groups on Test 3, Correctness in Expression, indicated that the Indian and Caucasian groups achieved at about the same level in grades 9, 10, and 12. The bar graph illustrating these facts appears in Figure 5. This was one of the three tests in which the grade 12 Indians surpassed the grade 12 Caucasians. This test provided the grade 12 Caucasians with the lowest mean percentile (42) scored by Caucasians on any of the areas in the battery. This test also produced the lowest score on the battery obtained by the grade 10 Caucasians. The Indian group grade level mean percentiles varied from 35 to 50, and the Caucasian group grade level mean percentiles varied from 42 to 63. The mid-point of the Indian group percentile range was approximately 45, while the Caucasian group percentile range mid-point was approximately 53.

The results of averaging the scores of the two groups on Test 7, Reading Literature, indicated that the Caucasian group did much better than the Indian group at grade levels 9, 10, and 11. The bar graph illustrating these differences appears in Figure 6. This was another of the three tests in which the grade 12 Indian group achieved a higher score than the Caucasian grade 12 group. A mean percentile of 74 gave the Caucasian grade 11 group the highest achievement of any

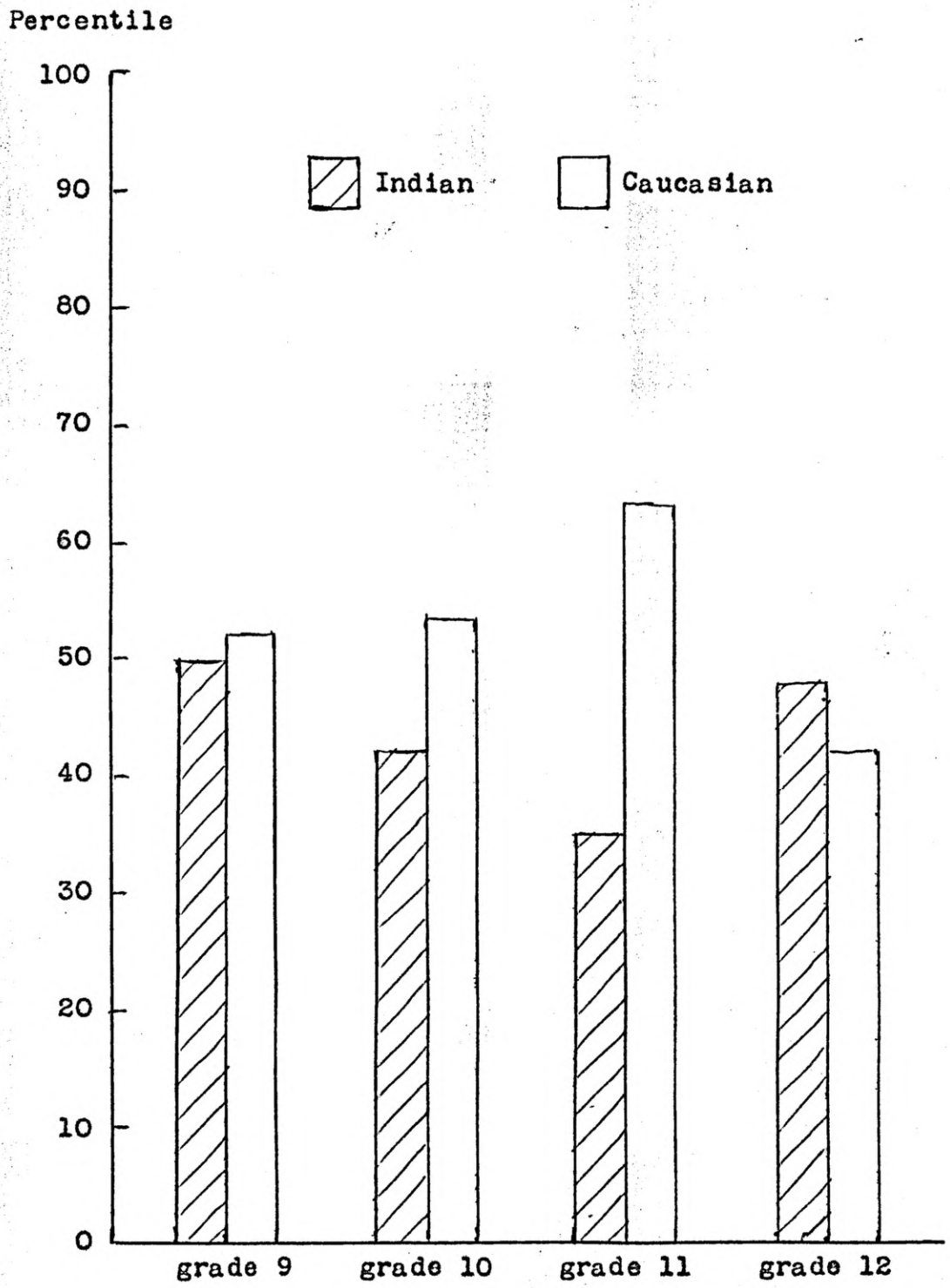

Figure 5. Mean Percentiles of Indian and Caucasian Students for Correctness in Expression, Test 3 of ITED, at Parker High School, January, 1960

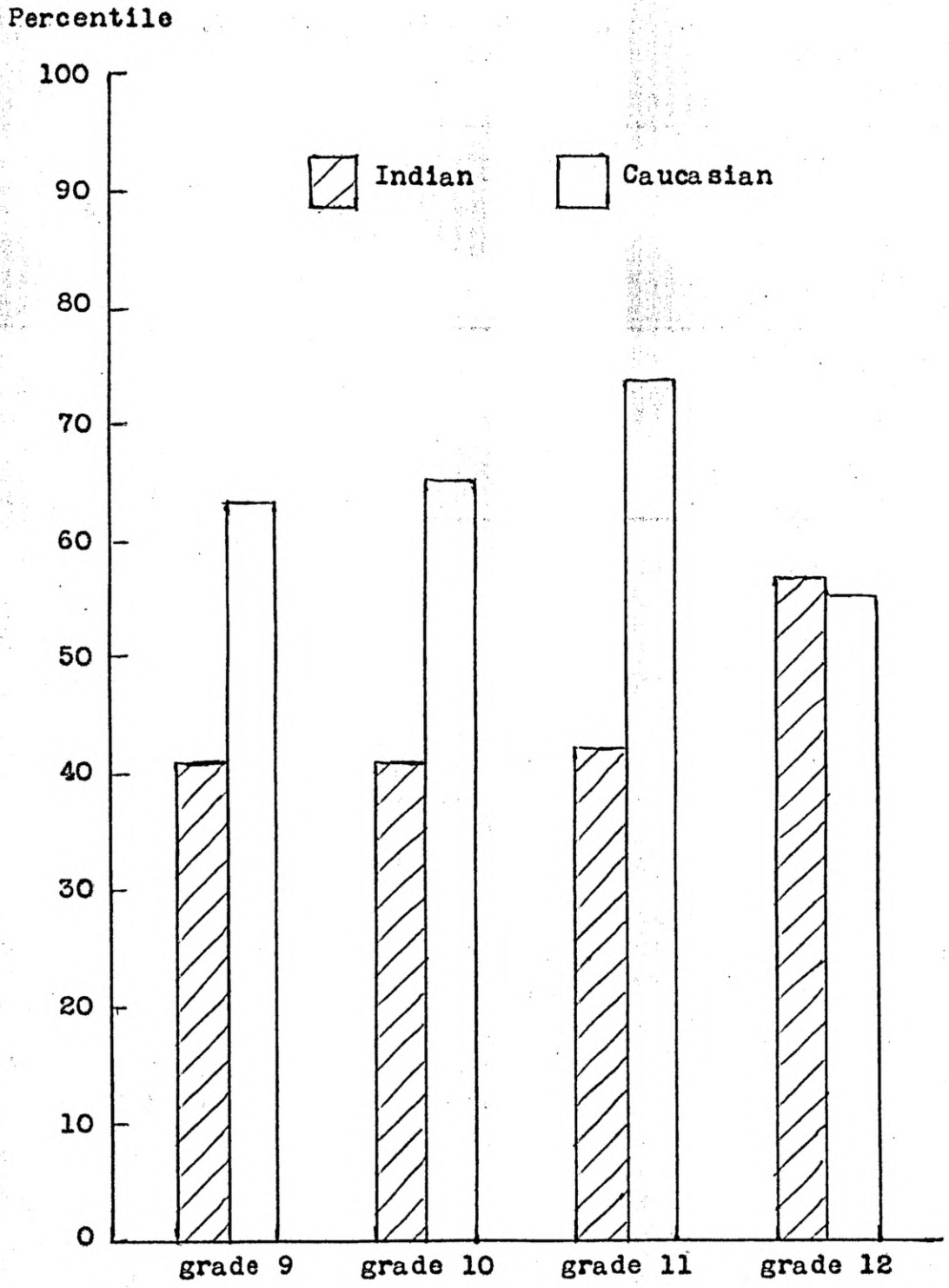

Figure 6. Mean Percentiles of Indian and Caucasian Students for Reading Literature, Test 7 of ITED, at Parker High School, January, 1960

of the two groups on any of the areas. The mean percentile of 57 scored by the Indian grade 12 group on this test was the highest achievement of any of the Indian groups in any of the areas. Grade 9 Caucasians attained their highest battery score on this test. As can be seen in Figure 6, the mean percentiles for the Indian groups by grade level ranged from 41 to 57, while Caucasian group grade level mean percentiles ranged from 55 to 74. The mid-point of the Indian group percentile range was approximately 44, while the Caucasian group percentile range mid-point was approximately 64.

The results of averaging the scores of the two groups on Test 8, General Vocabulary, provided evidence that Indian group grade levels 9, 10, and 11 did not achieve as highly as Caucasian group grade levels 9, 10, and 11. The bar graph illustrating these differences appears in Figure 7. Both the Indian and Caucasian grades 12 were below the national median for this test, with identical mean scores of 45, which was the highest score attained on this test by the Indian grade level groups, and the lowest score achieved by Caucasian grade level groups on this test. From Figure 7, it can be seen that the Indian group grade level mean percentiles varied from 26 to 45, while the Caucasian group grade level mean percentiles varied from 45 to 58. The mid-point of the Indian group percentile range was approximately 31, while the Caucasian group percentile range mid-point was approximately 52.

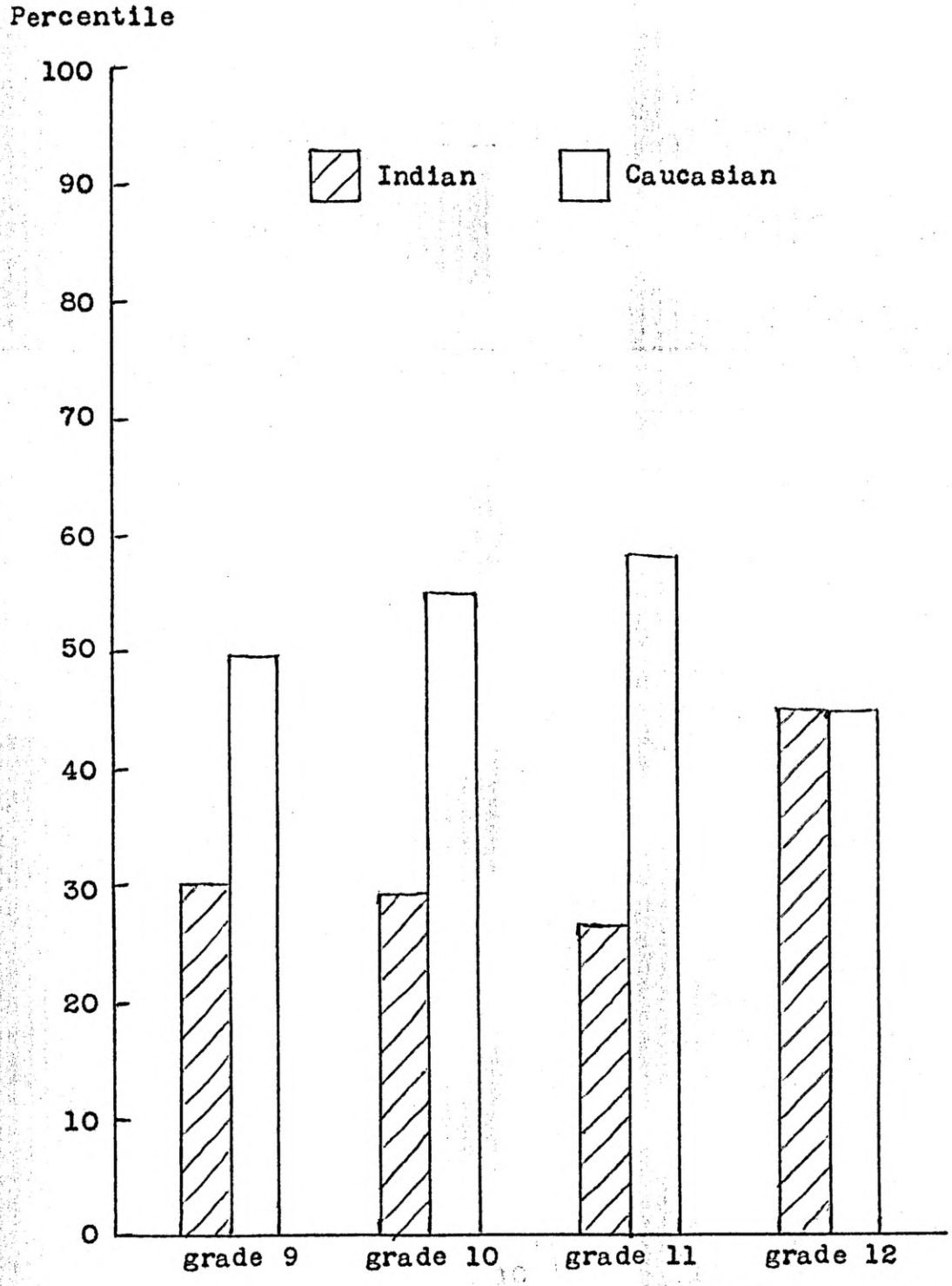

Figure 7. Mean Percentiles of Indian and Caucasian Students for General Vocabulary, Test 8 of ITED, at Parker High School, January, 1960

It is apparent from these three tests (Correctness in Expression, Reading Literature, and General Vocabulary) that the Indian group compared well with the Caucasian group in some areas of English, such as punctuation, capitalization, spelling, and usage, but not in poetry, literature, and vocabulary.

Mathematics

The results of averaging the scores of the two groups on Test 4, Quantitative Thinking, indicated that the Caucasian group achieved higher scores than the Indian group at grade levels 9, 10, and 11. The bar graph presenting these differences appears in Figure 8. This test was the area in which both Indian and Caucasian groups compiled the poorest overall scores. Indian group grades 10 and 11, and Caucasian group grade 10 experienced more difficulty on this test than on any other test in the battery. The grade 10 Indian group mean percentile of 22 was the lowest performance level of any of the Caucasian or Indian groups in the entire battery. Both the Caucasian and Indian grades 12 were again below the national median with identical mean percentile scores of 47. It can be seen in Figure 8 that the Indian group grade level mean percentiles ranged from 22 to 47, while the Caucasian group grade level mean percentiles ranged from 43 to 57. The mid-point of the Indian group percentile range was

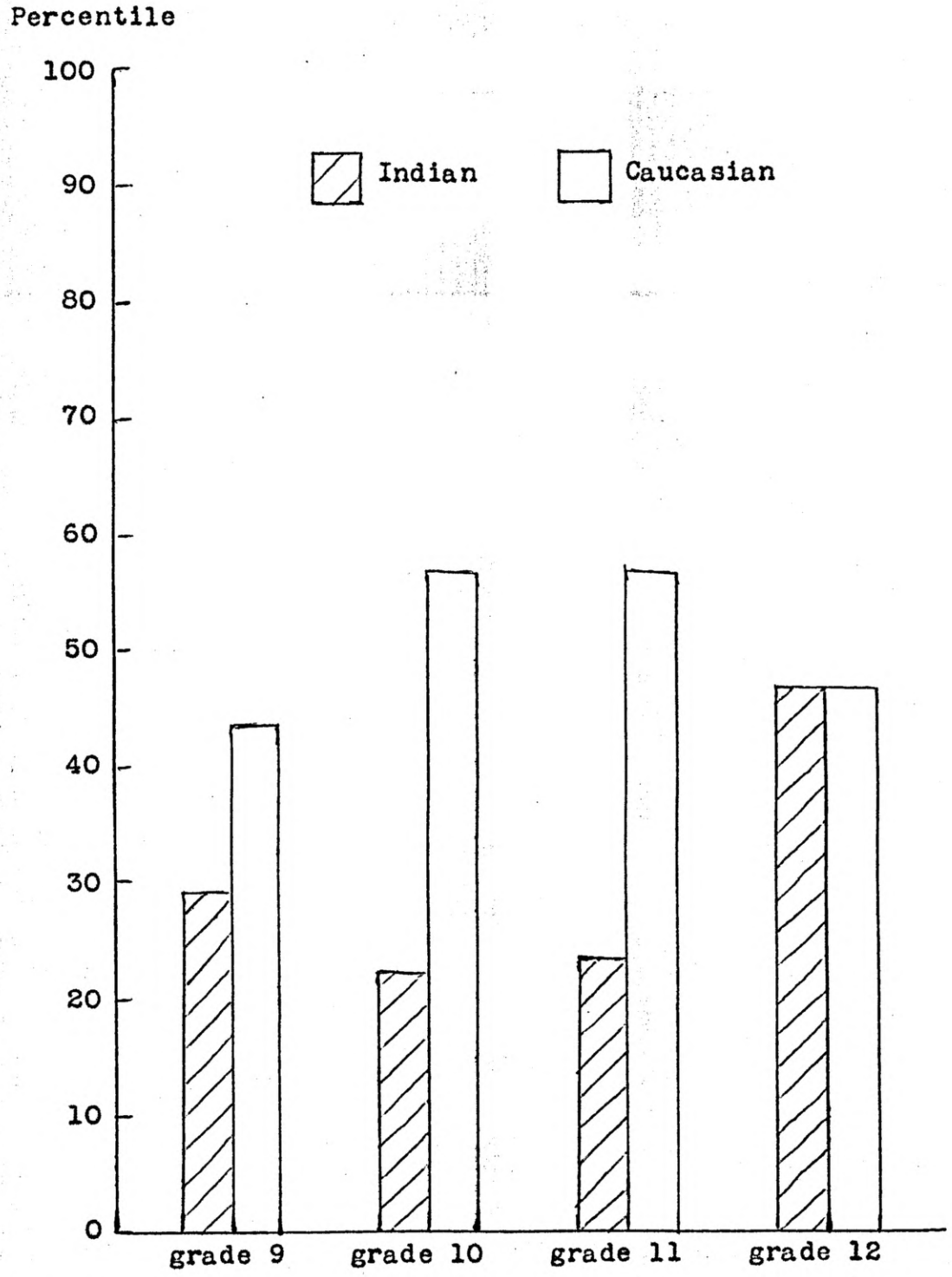

Figure 8. Mean Percentiles of Indian and Caucasian Students for Quantitative Thinking, Test 4 of ITED, at Parker High School, January, 1960

approximately 29, while the Caucasian group percentile range mid-point was approximately 51.

It was apparent that the Indian groups did not achieve well in curriculum areas embracing General Mathematics, Algebra, and Geometry. It also appeared that the Caucasian groups did not achieve very well in this area.

Test Battery Composite

The results of averaging the scores of the two groups to obtain a composite of the battery substantiate the general pattern of Indian groups in grades 9, 10, and 11 not competing successfully with the Caucasian groups in grades 9, 10, and 11. The bar graph illustrating these differences appears in Figure 9. There appeared to be little difference in the Indian and Caucasian groups at the grade 12 level. As can be seen in Figure 9, the Indian group grade level mean percentiles varied from 30 to 47, and the Caucasian group grade level mean percentiles varied from 50 to 62. The mid-point of the Indian group percentile range was approximately 36, while the Caucasian group percentile range mid-point was approximately 56.

A summary and conclusions on the achievement of the two groups in this study are presented in Chapter 4.

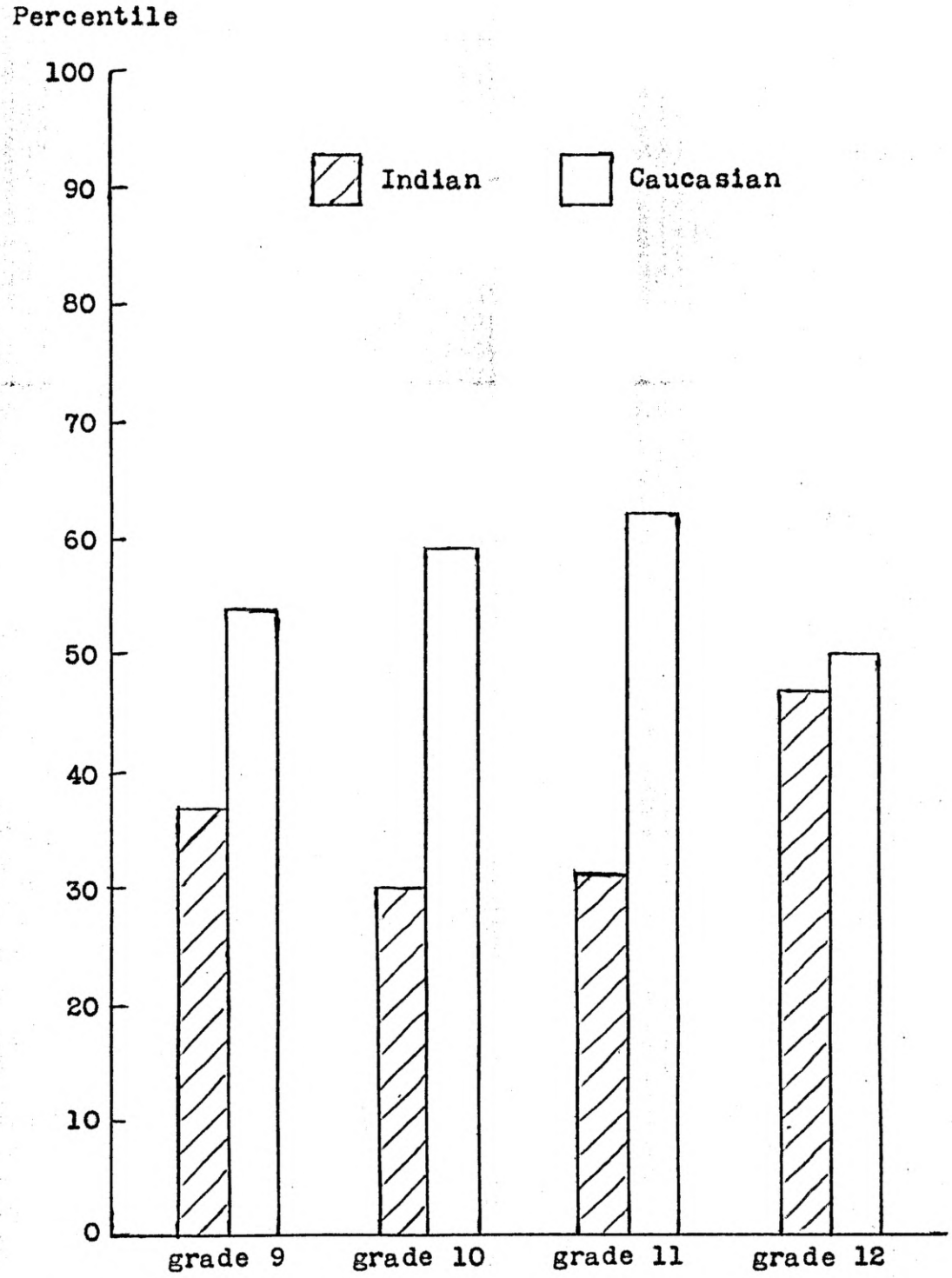

Figure 9. Mean Percentiles of Indian and Caucasian Students for Composite of ITED Tests 1 through 8 at Parker High School, January, 1960

CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This study was conducted to determine how well the Indian student meets the Caucasian standards at the Parker High School in 1960. The battery of Iowa Tests of Educational Development was employed as the measuring device, as it measures the achievement of some of the important objectives which high schools are striving to attain. This test has been in use at Parker High School for several years, and in 1961 well over one million students in four thousand high schools were tested by this instrument. The battery of nine tests measures educational achievement in four major curricular areas of Social Science, Natural Science, English, and Mathematics.

Summary

Standard scores attained on the ITED were averaged for the Indian and Caucasian groups and were converted to percentiles which compared the two groups at grade levels for each test area. The comparison of the two groups was pictured by bar graphs illustrating mean percentile achievements by grade level and curricular areas of the battery. Use of percentiles facilitated comparison of the groups with each other, and also with national norms.

There was a noticeable difference of approximately 20 points in the mean percentile ranks of the achievement of the two groups. Indian group grade levels 9, 10, and 11 did not achieve as highly as Caucasian group grade levels 9, 10, and 11. The Caucasian groups tended to score near the national median.

The Indian and Caucasian grade 12 groups achieved at about the same level. The explanation for this might be in the fact that the Caucasian grade 12 group achieved at a lower level than any other Caucasian grade groups, and at the same time, the Indian grade 12 group achieved at a higher level than any of the other Indian groups. The number of grade 12 Indians (13) might not be large enough to produce a true indication of Indian ability at this level. The higher drop-out rate of the Indian as evidenced by 40 per cent membership in grade 9 to 30 per cent membership in grade 12 may be a factor in the differences in achievement at the various grade levels.

Of the four major curricular areas measured, achievement of both groups was highest in Natural Science, and was lowest for both groups in Mathematics. Conclusions based on this study follow.

Conclusions

The results of this study indicated that in most cases,

Indian students, with the exception of grade 12, did not compete successfully with Caucasian students at Parker High School.

Recommendations

Further study should be conducted to determine the true ability and knowledge of the two groups. Priority should be given to culture-free tests.

The increasingly higher drop-out rate of the Indian at each successive grade level should be investigated.

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