DOCUMENT RESUME

ED 077 935 TM 002 730

TITLE	Educational Needs Assessment Program for Arizona.
INSTITUTION	Arizona State Dept. of Education, Phoenix.
PUB DATE	72
NOTE	160p.
EDRS PRICE	MF-$0.65 HC-$6.58
DESCRIPTORS	*Achievement Tests; *Basic Skills; Educational Needs; Elementary School Mathematics; Grade 8; Norm Referenced Tests; Reading Tests; Standardized Tests; *State Programs; Statistical Data; *Student Evaluation; Technical Reports; *Test Results; Writing Skills
IDENTIFIERS	Cognitive Abilities Test; Iowa Tests of Basic Skills

ABSTRACT

This report represents one step in Arizona's statewide student assessment program. The data presented here identify student achievement in grade 8, the end of the elementary school experience, in the basic skills of reading, writing, and arithmetic. The needs assessment program (ENAPA) is described in section one. The design for this evaluation is described in section two in terms of what is being assessed, the tools used, the reporting of scores, the representativeness of the sample, the accuracy of the sample, characteristics of the sample, data collection, and data processing. The Iowa Tests of Basic Skills and the Cognitive Abilities Test were the instruments used. In section three, test results are presented according to Arizona Predicted and Obtained Mean Grade Equivalents, along with national norms. A breakdown of Arizona Obtained scores by ethnic and sex subgroupings is given, as is a comparison between predicted and obtained scores for each ethnic subgroup. Median data for the Arizona sample is compared with national, Far West, and Southwest norms. Results are given for vocabulary, reading comprehension, spelling, capitalization, punctuation, usage, mathematics concepts, and mathematics problem solving. (KM)

EDUCATIONAL NEEDS ASSESSMENT PROGRAM FOR ARIZONA

ARIZONA DEPARTMENT OF EDUCATION • W.P. SHOFSTALL, PH.D., SUPERINTENDENT

FOREWORD

This document represents the completion of another step of the Arizona State Department of Education's statewide student assessment program. The first step of this program involved collecting the opinions of students, educators, lay citizens, businessmen and others as to what they thought the priorities are which public schools should be striving to achieve. The area identified by most persons participating in the first phase of the program was that we should be assisting each student to acquire skills in speaking, listening, reading, writing, and arithmetic. The data provided by this report identifies student achievement at the end of their elementary school experience in the basic subject areas of reading, writing, and arithmetic.

The Arizona Department of Education has been developing a statewide system for assessing student achievement in the public schools of our state. The Department's first real efforts in this field was the administration of a standardized reading achievement test to all third grade students as required by state law (ARS 15-1131). The test utilized to accomplish the objectives of that state law was a norm-referenced test. As the reader will note, the test employed to generate data for this document is also a norm-referenced test. Currently, the Arizona Department of Education is in the process of developing plans to enable the Department to work with all school districts in identification of specific measurable performance objectives in basic subjects. Upon completion of this task, criterion-referenced instruments will be used to measure student attainment of the specified objectives. Until this endeavor is accomplished the Arizona Department of Education will continue to use standardized norm-referenced tests or in some cases criterion-referenced instruments developed for use in other states. Through the use of a combination of both of the abovementioned the Department will be able to provide those persons responsible for improving instructional opportunities with information upon which beneficial decisions can be based.

The Arizona Department of Education will continue to examine student achievement in our schools, making recommendations for improvement where appropriate, and fulfilling its obligation to the general public to the maximum degree possible. Hopefully, this document will contribute to the goal of improved educational opportunities.

W. P. Shofstall
Superintendent of Public Instruction

The information reported in this document was collected during the 1971-72 school year.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF FIGURES

LIST OF FIGURES (continued)

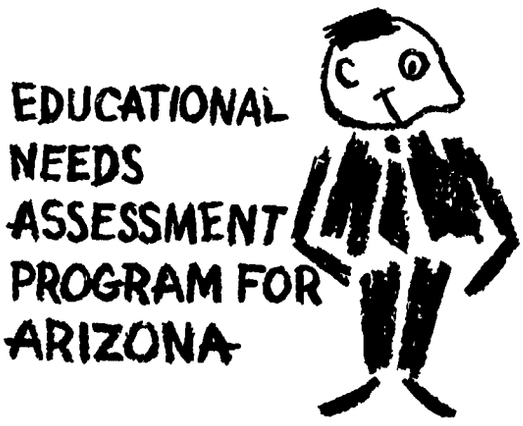
LIST OF FIGURES (Continued)

LIST OF FIGURES (Continued)

LIST OF APPENDIXES

LIST OF APPENDIXES (Continued)

SECTION ONE

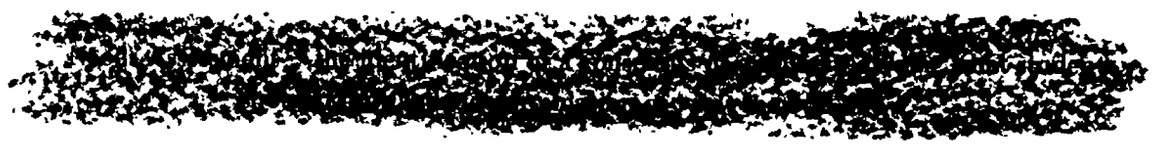


WHAT'S IT ALL ABOUT?

Relevancy, accountability, cost effectiveness, and other terminology are all current concepts and jargon which, to a large degree, dominate today's educational scene. While an educational needs assessment program cannot address itself to all aspects of each of these concepts, it can provide meaningful data which, if properly utilized by decision makers, could point the way to identification of problem areas, thus assisting the assurance that available funds and talent can be focused on a central point to affect a solution. With this thought in mind, the reader is invited to explore the current status of needs assessment in Arizona, to ponder its potential future, and to consider its contribution to the improvement of education in the state.

WHAT DOES NEEDS ASSESSMENT MEAN?

The Arizona Needs Assessment model involves students, their parents and teachers, as well as other educators, business leaders, governmental leaders, and other citizens of the community. Their opinions regarding the priorities of curriculum areas are gathered in order to determine what should be the focal points in the school setting. Finally, student attainment is assessed in each of the identified priority areas, thus allowing specific problem areas to be identified. A more succinct definition might be:



THE PAST...

The concept of "needs assessment" has long excited the imagination of educators. Until recently no formal investigation by the State Department of Education in this area had been attempted. In 1969, Dr. Fred Bedford, who at that time was a program officer in the ESEA Title III office, initiated what is generally recognized as Arizona's first needs assessment program. This study surveyed the opinions of various educators regarding the programs, services, and activities which were currently in existence in the elementary and secondary schools in Arizona.

Then in 1970, Arizona State University issued a report which was the culmination of a consulting contract with the Department of Education to ascertain student's needs in the state. This report, while more comprehensive than Dr. Bedford's initial work, still did not contain data pertaining to an analysis of actual student achievement.

In the summer of 1971, the Office of Planning and Evaluation was selected by Dr. Shofstall, Superintendent of Public Instruction, to provide the necessary leadership to coordinate and conduct the start of a comprehensive statewide needs assessment program. Several of the major divisions and/or offices of the department provided personnel to serve on an advisory committee for the project. A listing of these persons is provided in Appendix A. In addition, most of these offices provided funds to support the endeavor. A list of each office's contribution is presented in Appendix B.

In the early stages of the program, meetings were held with personnel from EPIC Diversified Systems Corporation. As a result of these meetings, a proposed plan for action was developed. A copy of the model for this plan is included as Appendix C. The initial work of determining the priority ranking of a pre-selected set of goals was also contracted through this consulting firm.

The study collected data from 501 students, 500 parents/lay citizens, 300 educators, and 200 business leaders, which related to the establishment of priorities with respect to the goals that were currently being emphasized in the schools of Arizona. This group was asked to prioritize goals as to their importance and/or appropriateness to the school curriculum. The combined ranked responses of this total group was as follows:

1. Education should assist every individual to acquire skills in speaking, listening, reading, writing, and arithmetic.
2. Education should assist every individual to acquire attitudes of responsible citizenship in his social, economic, and physical environment.
3. Education should assist every individual to acquire skills of creative and critical thinking.
4. Education should assist every individual to acquire and/or maintain sound health habits.
5. Education should assist every individual to acquire a positive attitude toward learning.
6. Education should assist every individual to acquire an understanding of himself.
7. Education should assist every individual to acquire an awareness of career opportunities and prepare him to take full advantage of these opportunities.
8. Education should assist every individual to acquire an understanding of art, music, literature, and drama in order to enjoy life and meet his leisure and vocational needs.

9. Education should assist every individual to acquire an awareness of persons belonging to social, cultural, economic, and racial groups different from his own and an appreciation of the worthiness of all persons.

10. Education should assist every individual to acquire an understanding of family life and responsible home membership.

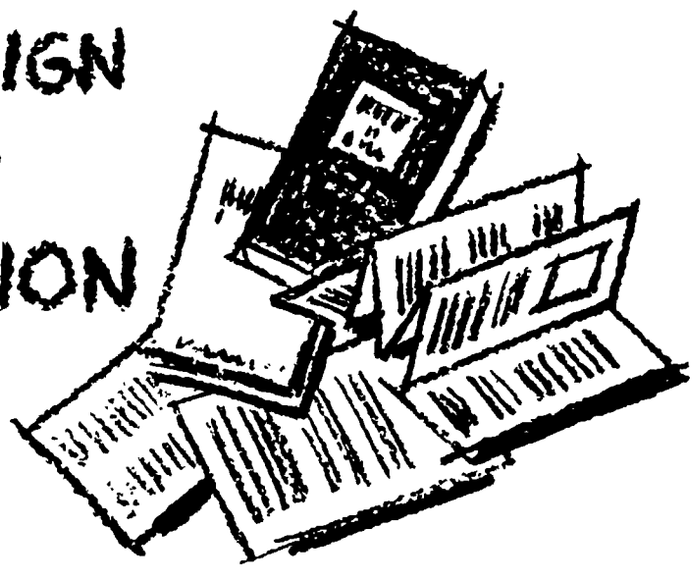
The data obtained in this study was taken into consideration when the activities for the current phase of the program was planned.

THE PRESENT

Activities included in the present phase of the program were to identify the specific areas for student assessment, determine the grade level or levels to be assessed, select appropriate assessment instruments, coordinate the assessment activities, analyze the data, prepare a final report, and make recommendations for future activities.

SECTION TWO

DESIGN FOR ACTION



WHAT SHALL WE LOOK AT AND HOW?

Since each of the four groups (students, parents/lay citizens, educators, business leaders) identified in the EPIC report selected the goal pertaining to student achievement in the basic skill areas as being their first priority, the advisory committee determined that this area would be the most appropriate one to receive immediate attention.

The group also recognized the need to assess other areas, however, the financial constraints under which they were operating dictated that the number of students which could be included would be limited. This factor would not allow for further areas of investigation because multi-matrix sampling could not be employed. Not only did the financial constraints restrict the number of areas to be assessed, but also influenced the decision as to the assessment approach.

Another factor which weighed heavily upon the decision-making process was the general feeling that activity should be initiated as rapidly as possible in order to collect data to satisfy the federal guidelines of one of the offices participating in the program. When all factors were considered, the majority feeling of the advisory committee was that the current phase of the program would utilize a norm-referenced assessment instrument and that future activities of the program should be accomplished with criterion-referenced assessment instruments. This latter approach will necessitate an extensive process for developing instructional objectives, establishing performance standards, and writing or selecting appropriate items for the assessment instrument.

The basic skill areas selected to be included in the initial efforts of the program were reading, writing, and arithmetic.

WHAT TOOLS SHALL WE USE?

The Office of Planning and Evaluation reviewed several assessment instruments and discussed the program with several recognized authorities outside the department. After all the factors had been carefully considered, it was decided to use some of the tests of the Iowa Tests of Basic Skills to determine student achievement and to also employ the Cognitive Abilities Test to assist in the interpretation of the data.* Using these two tests in tandem, provides the possibility of not only examining the achievement level of the students, but also provides the opportunity to compare the student's actual achievement to their predicted achievement based upon their ability.

The Iowa Tests of Basic Skills is a battery of eleven separate tests which cover a wide range of skill development. Those tests selected for use in the Educational Needs Assessment Program for Arizona (ENAPA) were vocabulary, reading comprehension, spelling, capitalization, punctuation, usage, mathematics concepts, and mathematics problem solving. A description of each selected test is provided in Appendix D.

The Cognitive Abilities Test (CAT) was designed to measure the student's ability to use and manipulate abstract and symbolic relationships. In this instance, symbols are divided into three main types: symbols representing words, symbols representing quantities, and symbols representing spatial, geometric, or figural patterns. The CAT provides scores for three subtests based upon these three identified areas. The three subtests are: (1) Verbal Battery, which includes vocabulary, sentence completion, verbal classification, and verbal analogies, (2) Quantitative Battery, which includes quantitative relations, number series, and equation building, and (3) Nonverbal Battery, which includes figure analogies, figure classification, and figure synthesis.

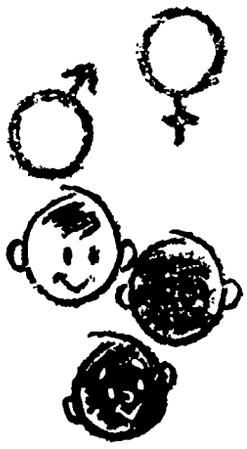
*The Iowa Tests of Basic Skills (ITBS) and the Cognitive Abilities Test (CAT) are both published by Houghton Mifflin Company, Boston.

The CAT was normed jointly with the Iowa Tests of Basic Skills (ITBS). This feature makes it possible to predict ITBS scores based upon a student's CAT score. Representatives of the test publisher indicated that in the interest of economizing time and money, ITBS scores could also be predicted utilizing only the verbal section of the CAT. For this reason, only the verbal battery was administered.

HOW WE WILL REPORT THE SCORES

In order to make the data collected by the program meaningful and easily understood by as wide an audience as possible, the scores are reported in "mean grade equivalents" or "median grade equivalents." Grade equivalent scores convey the meaning of test performance in terms of what is typical of an average student at a given grade level.

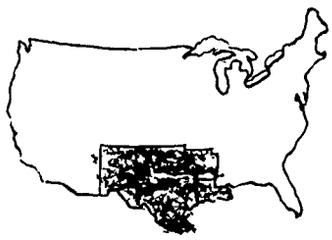
The **mean grade** equivalent is the arithmetic average grade level for the particular group in question. The **median grade** equivalent is somewhat similar to the above term except instead of being the arithmetic average (mean) of a group of scores, it is the point at which 50 percent of the students scored higher and 50 percent of the students scored lower.



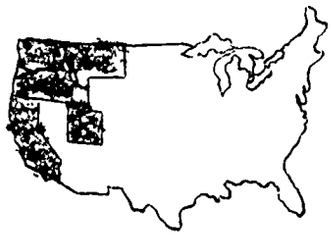
An expression used quite frequently in reporting the data collected during this assessment survey is the term **Arizona Obtained** and/or the similar term **Obtained Score**. These terms mean the actual scores the students received on any particular test. Since this report does not deal with individual student scores, these terms apply to the combined scores for the various groups (i.e., male, female, Indian, Black, Title I, etc.) or for the total eighth grade sample.

The term Arizona Predicted and/or the similar term Predicted Score refers to the derived score as a result of combining the student's Standard Age Score (score received on the Cognitive Abilities Test and somewhat similar to an intelligence score), with the variables of sex and age. This information is used to predict the grade equivalent score the student should make, based upon comparisons of other students with the same ability, sex, and age. Since this report does not deal with individual student scores, these terms apply to the combined scores for the various groups under study.

Comparisons of the obtained student scores of the eighth grade Arizona sample will be compared, not only to the student's predicted scores, but also to national and regional norms. The National norm is derived by the test publisher at the time of the standardization of the test and is a composite score of the students in their sample.



Comparisons with two regional norms will be made--Southwest and Far West. The Southwest norms were obtained by the test publishers from scores made by students who resided in the States of Arkansas, Louisiana, New Mexico, Oklahoma, and Texas. Southwest norms, when compared to National norms at the eighth grade level in the main curriculum areas, typically are about the same or slightly higher.



Far West norms were obtained from students residing in the States of California, Idaho, Montana, Oregon, Utah, and Washington. These norms are usually substantially higher than National norms in the main curriculum areas.

Unfortunately, Arizona was not included in any region during the norming process of the tests.

WHO SHALL THE SAMPLE REPRESENT?

5TH

6TH

7TH

9TH

10TH

11TH

Early in the planning stages, while attempting to determine the student population to be assessed, the decision was made to confine assessment activities to a representative sample of students at one grade level. This decision was reached after considering the basic project constraints of time and available funds.

Ideally, a statewide needs assessment program would attempt to assess a representative student sample for at least three age levels of those students attending the public elementary and secondary schools in the state. The previously mentioned time constraint, which resulted in the selection of a standardized achievement test and the subsequent need for employing proctors (which increased the financial requirements of the project), played a significant role in determining the sample size. Costs associated with employing personnel and providing them with travel allowances increases in direct proportion to the size of the student sample.

Therefore, rather than a diluted multi-grade approach, it was decided that resources would be concentrated at one grade level in order to obtain a higher degree of precision.

The next major decision was to determine which grade level would be assessed. Since some data was being made available statewide at the third grade level in the area of reading, this grade level was eliminated from consideration. After discussing the problem with local school personnel, various staff members of the State Department of Education, and consultants from a research firm involved in student assessment in other states, it was determined that the eighth grade level would be assessed. It was felt that this level would represent a culmination of student learnings at the completion of the elementary levels.

The major goal in designing a student sample is to select a representative group that accurately reflects the total group in those characteristics under study. If this endeavor is successful, valid generalizations can be made about the total group concerning achievement in the selected basic skill areas from data obtained through testing the sample group.

ACCURACY OF THE SAMPLE

If the reader wishes to examine the accuracy with which the ENAPA sample mean test scores estimate the means of the total population, he is referred to Appendix E. The standard error of the mean and the 95 percent confidence interval are presented in tabular form. The accuracy of the sample can be estimated from the standard error of the mean. There is a 95 percent chance that an obtained sample mean does not deviate more than ± 2 standard errors of the mean from the mean of all the students that the particular sample represents.

In order for the reader to be able to more easily comprehend the following material, he should have a basic understanding of the term "average daily membership" (ADM). This term means the number of students actually enrolled, whether in attendance or not, divided by the possible number of days that they could have been in attendance. This term (ADM) should not be confused with "average daily attendance" (ADA), which, in addition to enrollment, also considers the number of days students are present or absent.

SELECTING THE SAMPLE

All public elementary school districts were listed by average daily membership (ADM) in descending order with the district having the highest ADM listed first. All ADM figures were based upon the immediate past fiscal year.

In order to guarantee that a representative sample of students in the largest school districts was present, it was decided to include some students from each school district with more than 6,000 elementary students in ADM. This action would include 12 school districts with a total of 165,692 elementary students, representing 52.6 percent of the state's total elementary ADM of 315,113 for the immediate past fiscal year.

The remaining school districts on the list, arranged in descending order according to ADM, were divided into groups of ten, with the exception of the last group which contained thirteen school districts. This procedure provided a fair amount of stratification based upon ADM. While not entirely accurate, it can be said that in relationship to student population the groups were relatively homogeneous.

In Appendix F, a listing of school districts arranged in descending order according to 1970-71 school year ADM figures is given. This Appendix also shows the strata groups used in the stratified random selection process.

One school district was drawn from each stratum to represent that stratum. In those cases where the school district drawn did not have any eighth grade students enrolled, another district was randomly drawn from the same stratum. This process was repeated until each stratum was represented by a school district which had eighth grade students enrolled. By doing this, any sampling errors would be limited to a specific stratum and not to the total group. This process is referred to as the stratified random selection process.

In Appendix G, an alphabetical listing of the school districts actually included in the sample as a result of the stratified random selection process is given.

In Stratum #19 (identified in Appendix E), difficulties presented themselves in selecting a school district that actually had eighth grade students enrolled. Appendix H explains the difficulties encountered and the solutions used to resolve them.

Some educators and laymen hold the belief that increased expenditure of funds to support "better" educational programs is closely associated with student achievement.

In an attempt to start to examine the effect of dollar expenditures on student achievement, it was decided to determine if a correlation existed between student achievement and total dollars expended per ADA. It is generally agreed that this comparison does not have any real meaning. Total expenditures per ADA includes capital outlay and other items, such as transportation costs, which may vary widely from district to district. In order to make valid comparisons, only direct educational program costs should be considered, and even this procedure would be full of pitfalls. Consider the case of a school district with ten students. That school district would reflect high educational program costs, but in fact the educational program might be inferior to a district that spends half the amount per ADA but had an enrollment of 3,000 students. Another factor that seriously limits the credibility of this comparison is that the sampling procedures employed selected too few students from districts with high expenditures per ADA to be really representative of that group. However, a start has been made. In future years the threats to the validity of this type of comparison might be controlled and useful information obtained.

The total expenditures per ADA for all elementary school districts in the state was examined. The districts with the highest dollar expenditure per ADA and the districts with the lowest dollar expenditure per ADA were identified. These districts were included in the needs assessment sample.

Appendix I lists those districts which were added to the sample as a result of their high dollar expenditures per pupil. The procedures used in selecting the districts is also given.

Appendix J lists those districts which were added to the sample as a result of their low dollar expenditures per pupil.

After all the school districts to be included in the sample had been identified, a grand total for eighth grade membership of all selected districts was determined. The next calculation obtained the percent each district's eighth grade membership was in relationship to the total eighth grade membership for the entire sample. This percentage was used to determine how many eighth grade students from each school district would be included in the total sample of 2,500 students.

In some cases, the percentage of a school district's eighth grade membership in relationship to the total sample was so small that they would not be represented by any students. In order to assure that all the selected districts were represented, each district was "guaranteed" at least one student to be included in the sample. All calculations were carried to the third decimal place, and when used to determine the number of students to be selected from a particular district, were "rounded off."

In the actual testing situation, an attempt was made to include more students in the first testing session than the sample actually called for. This was done in an attempt to compensate for students who might be absent on the second and third days that the tests were administered. No set percentage was

established to obtain this "over test" situation. However, the students included in the "over test" were selected in the same manner as all others.

Appendix K lists all the school districts included in the sample, their eighth grade membership at the close of the 1970-71 school year, their percentage of the total eighth grade membership for the entire sample, the number of students to be tested in each district, and the number of students actually tested.

The superintendent of each district selected to be included in the sample was contacted by the Superintendent of Public Instruction and requested to furnish the Office of Planning and Evaluation the following information:

1. The name of each teacher in the school district who taught eighth grade students. If the district had a departmental program or a modification of that type of program, then the superintendent was requested to furnish the names of the "homeroom" teachers.
2. The approximate number of students in each of the above classes.
3. The number of minutes the teacher has the class each day.
4. The name of the school in which the teacher is employed.
5. The name of the principal.

Specific students to be included from each of the participating districts were selected in the following manner:

1. The name of each eighth grade teacher in the district was placed in a box.
2. The names of teachers were drawn until the total number of students in their classes equalled the number of students to be included for that particular district.
3. If only part of a class was needed to meet the desired number for a particular district, then the names of all the students in that class were placed in a box and enough names drawn until the desired number was reached.

LOOKING AT SPECIFIC CHARACTERISTICS OF THE SAMPLE

The ENAPA sample included 2,609 students at the eighth grade level from forty-one school districts and eleven counties. A total of 98 individual schools were included in the sample. Of this total, approximately 50.1 percent of the students were male and 49.9 percent were female.

Information pertaining to the student's ethnic origin was not available for all the students in the sample. However, this number was small and relatively insignificant. Available data indicates that the sample included approximately 75.7 percent Anglo-White, 14.9 percent Spanish surname, 5.7 percent

Black, 2.6 percent Indian, .6 percent Oriental, and .5 percent Other non-white. This information is graphically illustrated in Figure 1.

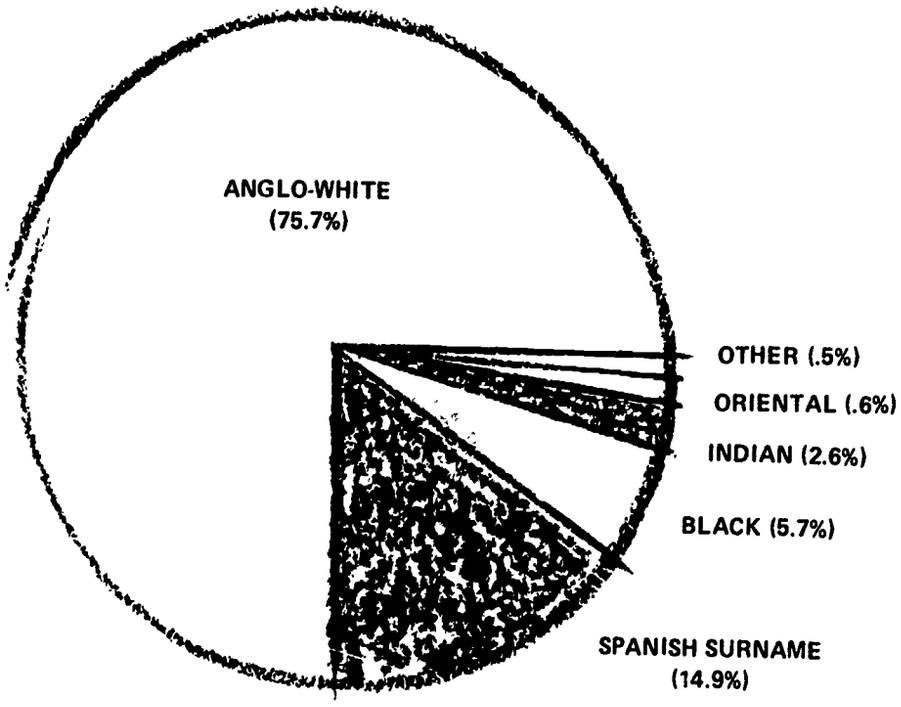


Figure 1

Ethnic Origin Comparison of the ENAPA Sample

♂=96.7

♀=100.3

The average standard age score for the sample determined by the Verbal Battery of the Cognitive Abilities Test was 98.7. This score is similar to the frequently used concept of intelligence quotient. A further breakdown of the sample's scores reveals that the average standard age score for male students was 96.7, while the female students scored an average of 100.3.

In order for a sample to accurately reflect the total population, it must represent but need not have the same characteristics, of the total population. An example of this would be in the area of ethnic origin. It is not necessary to have the same percent of Spanish surname, Other nonwhite, Black, Indian, Oriental, etc. in the sample as there are in the total population. However, it is necessary to have enough students of each ethnic origin category to insure that they can truly represent their particular group. For those readers who are interested in the ethnic origin distribution of the sample and how it compares with the total population, they may find this information in Appendix L.

DATA COLLECTION

The State Department of Education employed nineteen substitute and/or unemployed certified teachers to serve as test administrators. These teachers were enrolled in a two-day workshop relating to the specific administrative procedures of the Cognitive Abilities Test and the Iowa Tests of Basic Skills.

A schedule was devised to send one teacher to each of the selected school districts. Before arriving at the school district, each teacher knew the specific school, classroom teacher, and in some cases, the actual names of the students to be involved in the testing program.

Prior arrangements with each school district had been made to insure that the proper amount of time had been set aside for the testing sessions and that the physical facilities were adequate.

In most cases, the following schedule was utilized in administering the Tests. On the first morning the testing session consisted of the Vocabulary and Reading Comprehension tests. An appropriate recess was observed between the two tests. Total testing time for the morning session was 72 minutes.

During the first afternoon, the testing session consisted of the Verbal Battery of the Cognitive Abilities Test. The time requirement for this test was 60 minutes.

On the second morning, the testing session included the Spelling, Capitalization, Punctuation, and Usage Tests. Between each of these tests an appropriate amount of time was allowed for a recess. Total testing time for this session was 67 minutes.

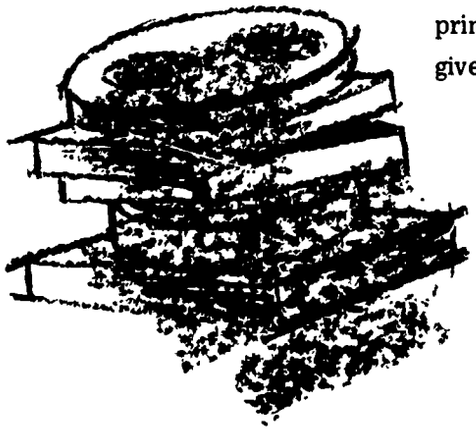
The second afternoon testing session consisted of the Mathematics Concepts and Mathematics Problem Solving Tests. As with other testing sessions, appropriate recess periods were allowed. Total testing time amounted to 60 minutes.

The first tests were administered on March 15, 1972, and the last tests were given on April 28, 1972. This period of time represents 33 school days, however, the major portion of the tests were given during the first 20 days of the project. Difficulties were encountered with scheduling in one school district, which accounted for the rather lengthy testing calendar. This school district represented 124 students in the sample, which was approximately 4.8 percent of the total sample.

In addition to the test data collected, the teachers were requested to obtain certain types of demographic data pertaining to each of the students included in the sample. A listing of the information requested, as well as other aspects of this area, is included in Appendix M.

DATA PROCESSING

Upon completion of the testing sessions, the tests and the demographic data were shipped to the test publishers for scoring and processing. The test publishers scored the tests, converted them into either grade equivalents or standard age scores, prepared some predicted mean grade equivalents, and prepared a computer tape with those data plus the demographic data relating to each student. The Office of Planning and Evaluation prepared some basic data tables which indicated the types of computer printouts they desired. These tables, plus the computer tape received from the test publisher, were given to a private data processing firm for final processing.



SECTION THREE

RESULTS

Obviously, much data was obtained and there are many ways in which the data could be presented. As mentioned in Section Two, a decision was made to report the scores obtained by the students using mean grade equivalents, and on occasion, median scores, as these type of reporting measures are universally used and easily interpreted. Also, a decision was made to focus attention on the following areas:

LOOKING AT THE DATA FOR THE TOTAL SAMPLE

- comparing obtained achievement scores to predicted achievement scores and to the National norm.
- comparing obtained achievement scores by ethnic and sex subgroups.
- comparing obtained achievement scores to predicted achievement by ethnic subgroups.
- comparing obtained Arizona scores to the National, Far West, and Southwest norms.

LOOKING AT THE DATA OBTAINED FOR STUDENTS IN THE SAMPLE WHO ALSO WERE PARTICIPANTS IN A TITLE I PROGRAM

- comparing obtained achievement scores of Title I participants to their predicted scores and to the predicted and obtained achievement scores of the total ENAPA sample.
- comparing Title I obtained achievement scores to predicted achievement by sex subgroups.
- comparing Title I obtained achievement scores by ethnic subgroups.

TOTAL ENGLISH SCORES

In the follcwing material, data will be presented for each test according to Arizona Predicted and Obtained Mean Grade Equivalents, along with National norms. A breakdown of Arizona Obtained scores by ethnic and sex subgroupings will be described. In addition, a comparison between predicted scores and obtained scores will be given for each ethnic subgroup. Median data for the Arizona sample will also be compared with National, Far West, and Southwest norms.

VOCABULARY

Figure 2 graphically illustrates the Mean Grade Equivalent differences between the predicted score (8.1) of the Arizona eighth grade students included in the sample, and their obtained score (8.2), as well as the norm for eighth grade students nationally (8.7) at the time the test was administered.

The reader can observe that the students scored .1 higher than their predicted score, based upon the standard age scores for the total group, and .5 below the National norm.

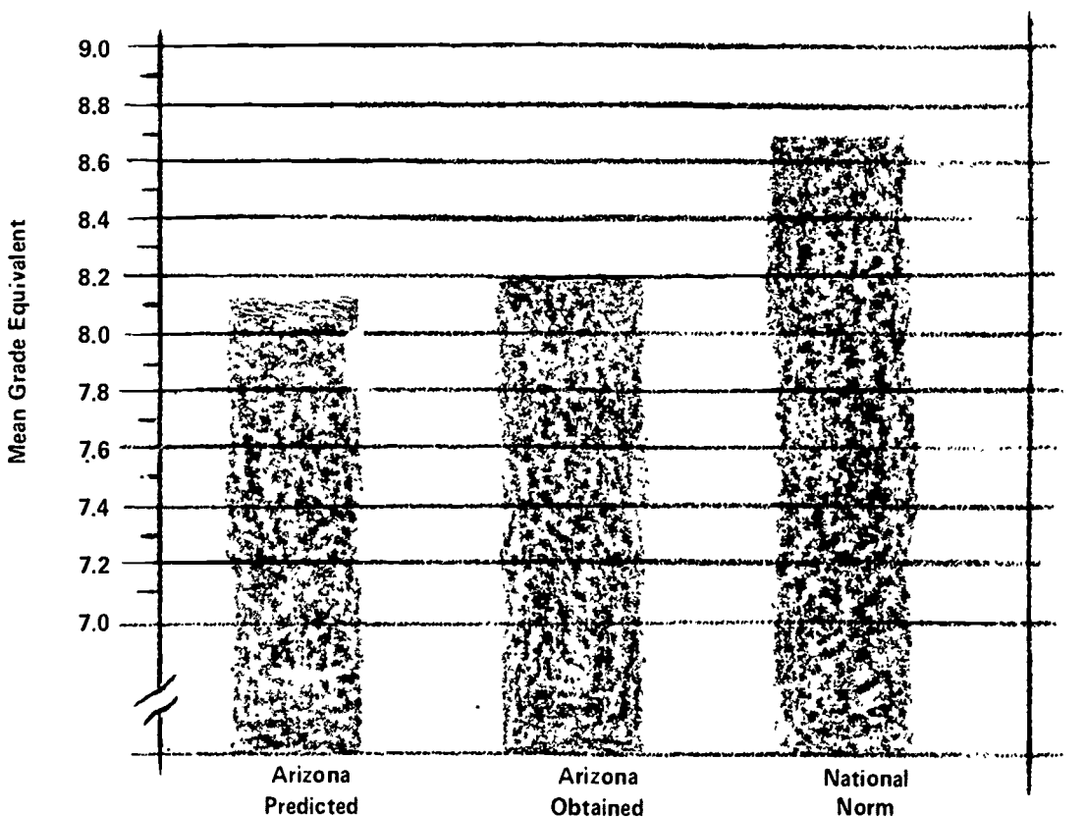


Figure 2

Comparison of Vocabulary Predicted and Obtained Arizona Mean Grade Equivalents and National Norm

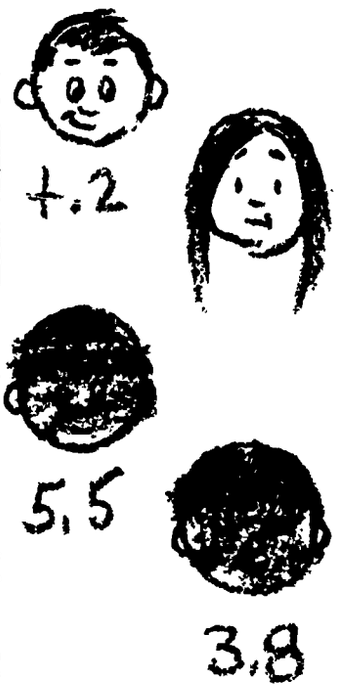
The Mean Grade Equivalents, both predicted and obtained, for the Arizona eighth grade student sample on the vocabulary test are depicted in Table 1 by ethnic subgroupings, and by group totals. Also, obtained scores for sex subgroupings are presented.

Table 1

Vocabulary Mean Grade Equivalents For Total Arizona Sample By Ethnic and Sex Subgroups

Ethnic Origin	Predicted	Obtained		
	Total Group	Total Group	Male	Female
Anglo-White	8.4	8.7	8.7	8.7
Black	6.9	6.6	6.5	6.6
Indian	6.2	5.7	5.5	5.9
Oriental	9.2	9.2	9.0	9.3
Other nonwhite	7.8	7.9	7.8	8.6
Spanish surname	7.0	6.7	6.8	6.6
Total Group	8.1	8.2	8.2	8.2

5.7 - 9.2



As the reader may note, the average obtained Mean Grade Equivalents for the various total ethnic subgroups ranged from a low of 5.7 to a high of 9.2.

With the exception of Anglo-White and Spanish surname, the total obtained score within a given ethnic category was lower for male students than for female students. The total obtained score for male Anglo-White was the same as the total obtained score for female Anglo-White, while the total obtained score for male Spanish surname students was .2 higher than the total obtained score for female Spanish surname students. The range for the differences in obtained scores for the remaining ethnic groups was a maximum fluctuation of .8 for Other nonwhite to a minimum fluctuation of .1 for Black.

The lowest total obtained Mean Grade Equivalent for a sex subgroup within an ethnic category was 5.5 for male Indians, while the highest total obtained Mean Grade Equivalent was 9.3 for female Orientals, representing a difference of 3.8.

In Appendix N, Table 24 presents the total number of students included in each of the various categories listed in Table 1.

In Figure 3, the reader will observe that the predicted and obtained Mean Grade Equivalents for each of the ethnic subgroups has been taken from Table 1 and graphically illustrated.

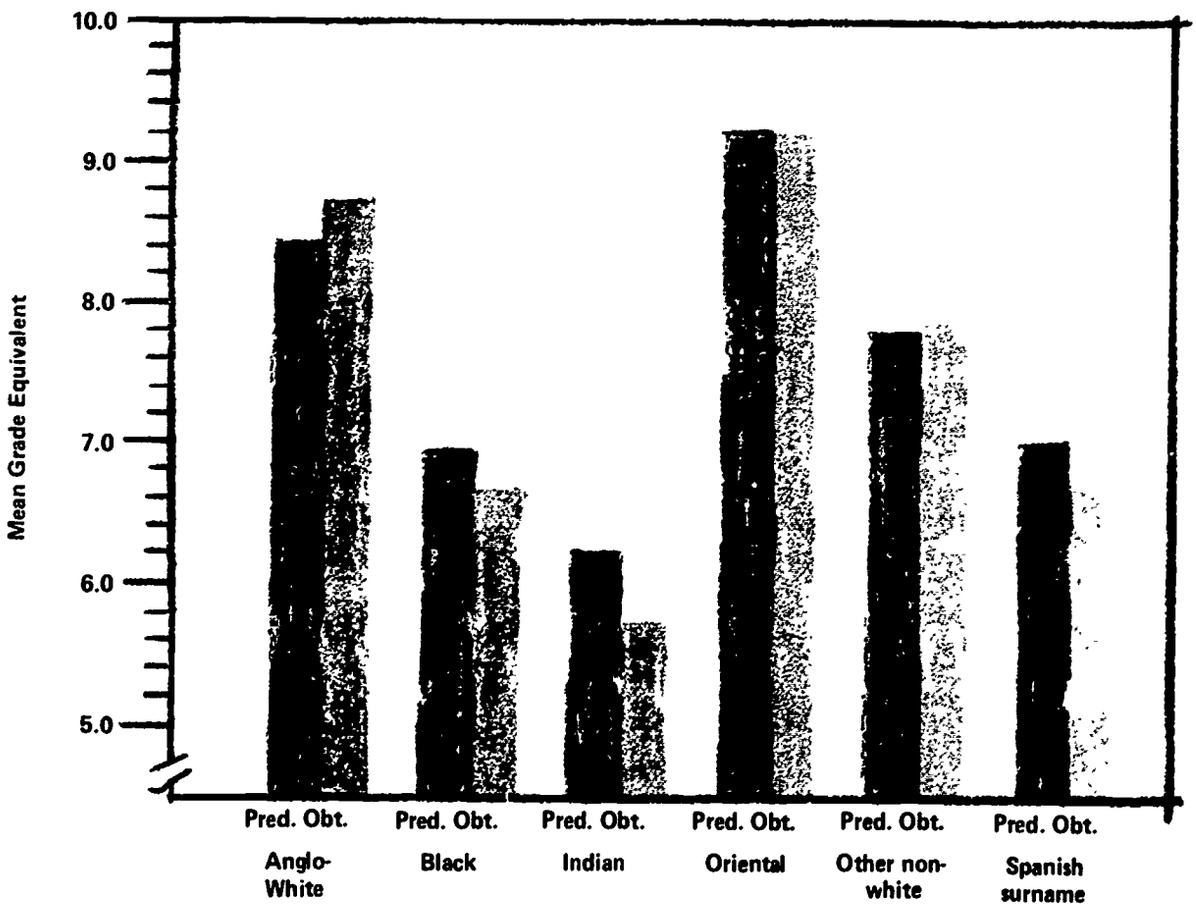


Figure 3

Comparison of Vocabulary Predicted And Obtained Mean Grade Equivalents by Ethnic Origin

It can be observed that three of the subgroups equalled or excelled their predicted Mean Grade Equivalent--those subgroups being Anglo-White (+.3), Other nonwhite (+.1), and Orientals (equal). The remaining groups failed to achieve their predicted scores. Black and Spanish surname subgroups scored .3 below their predicted score, while the Indian subgroup obtained score was .5 below their predicted score.

The following figure compares the Median Grade Equivalent score obtained by the ENAPA sample with the National norm, as well as the Far West and Southwest regional norms.

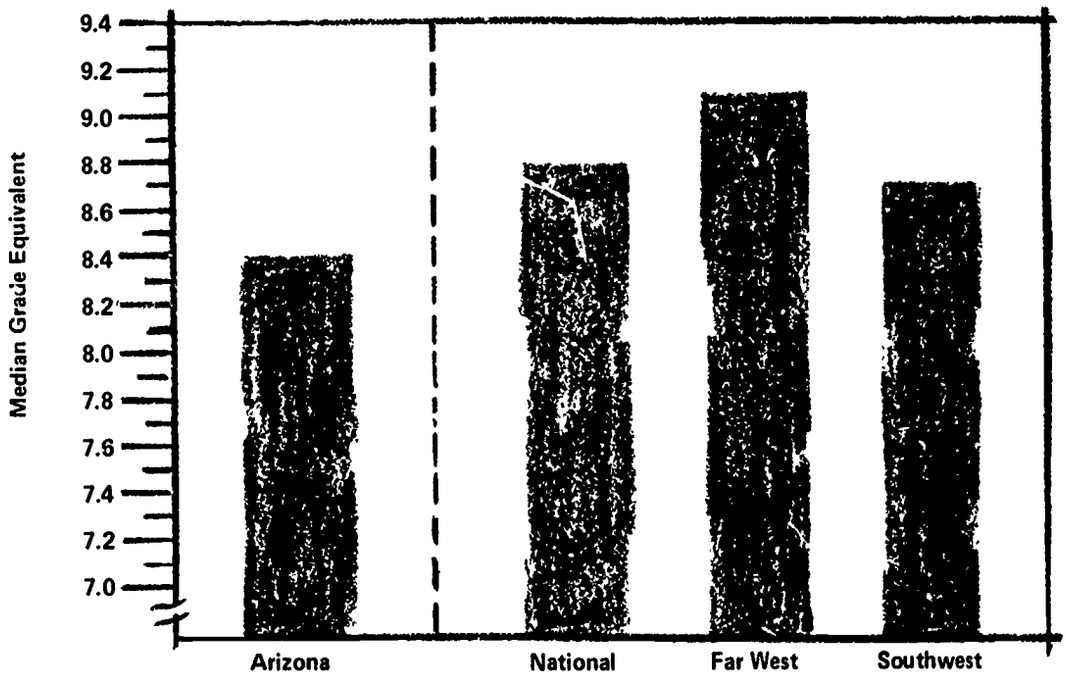


Figure 4

Vocabulary Obtained Median Grade Equivalent Comparisons Between the Arizona Sample, National, Far West and Southwest Norms

The obtained Median Grade Equivalent in vocabulary for the total eighth grade sample in Arizona was 8.4. According to the test publishers, the Median Grade Equivalent for the national level was 8.8 at the time of testing.

The corresponding Median Grade Equivalents for the Far West and Southwest regions were 9.1 and 8.7, respectively.

The data in Figure 4 reveals that the Arizona sample was .4 below the National norm, .7 below the Far West norm, and .3 below the Southwest norm.

READING COMPREHENSION

Figure 5 shows the Mean Grade Equivalent for the predicted score (8.2) of the students in the sample, and the obtained score of 8.2. The figure also depicts the norm for eighth grade students nationally (8.7) at the time the test was administered.

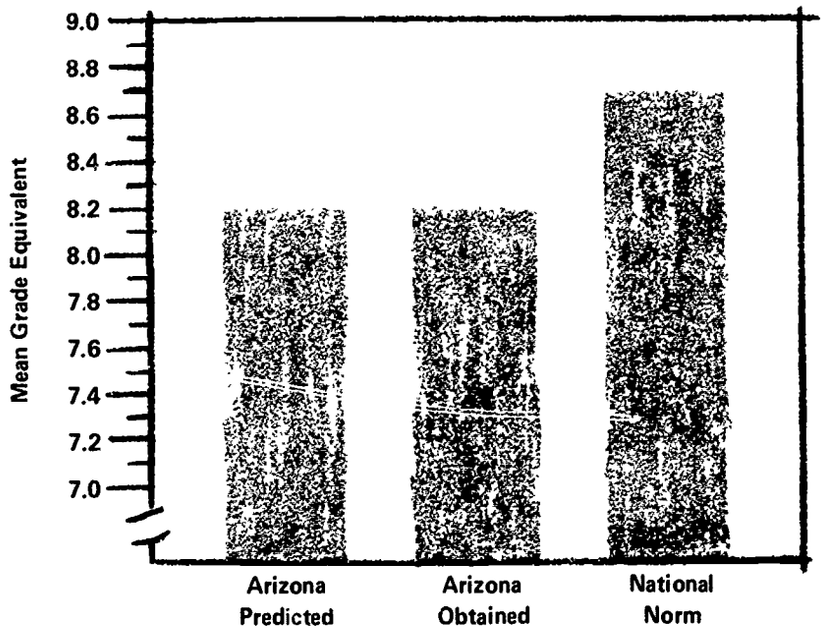


Figure 5

Comparison of Reading Comprehension Predicted and Obtained Arizona Mean Grade Equivalents and National Norm

It can be observed that the total student sample obtained the exact score that was predicted for them. However, their obtained score was .5 below the National norm.

The Mean Grade Equivalents, both predicted and obtained, for the student sample on the reading comprehension test are presented in Table 2 by ethnic subgroupings, as well as by group totals. Also presented are the obtained scores for sex subgroups.

Table 2

Reading Comprehension Mean Grade Equivalents For Total Arizona Sample By Ethnic and Sex Subgroups

Ethnic Origin	Predicted	Obtained		
	Total Group	Total Group	Male	Female
Anglo-White	8.5	8.6	8.4	8.7
Black	7.0	6.6	6.5	6.8
Indian	6.3	6.2	6.1	6.2
Oriental	9.2	9.2	8.9	9.4
Other nonwhite	7.9	7.4	7.4	7.8
Spanish surname	7.1	7.1	7.0	7.2
Total Group	8.2	8.2	8.0	8.3

The range of obtained Mean Grade Equivalents for the various total ethnic subgroup totals was 6.2 to 9.2.

In all cases, the total obtained scores for the male students of any given ethnic category was lower than the female students of the same ethnic origin.

The lowest total obtained Mean Grade Equivalent for a sex subgroup within an ethnic category was 6.1 for male Indians, while the highest total obtained Mean Grade Equivalent was 9.4 for female Orientals, representing a difference of 3.3.

In Appendix N, Table 25 shows the total number of students included in each of the categories listed in Table 2.

In Figure 6, data is presented to illustrate the differences between the predicted and obtained Mean Grade Equivalents of the ethnic subgroups. Data for the figure was taken from Table 2.

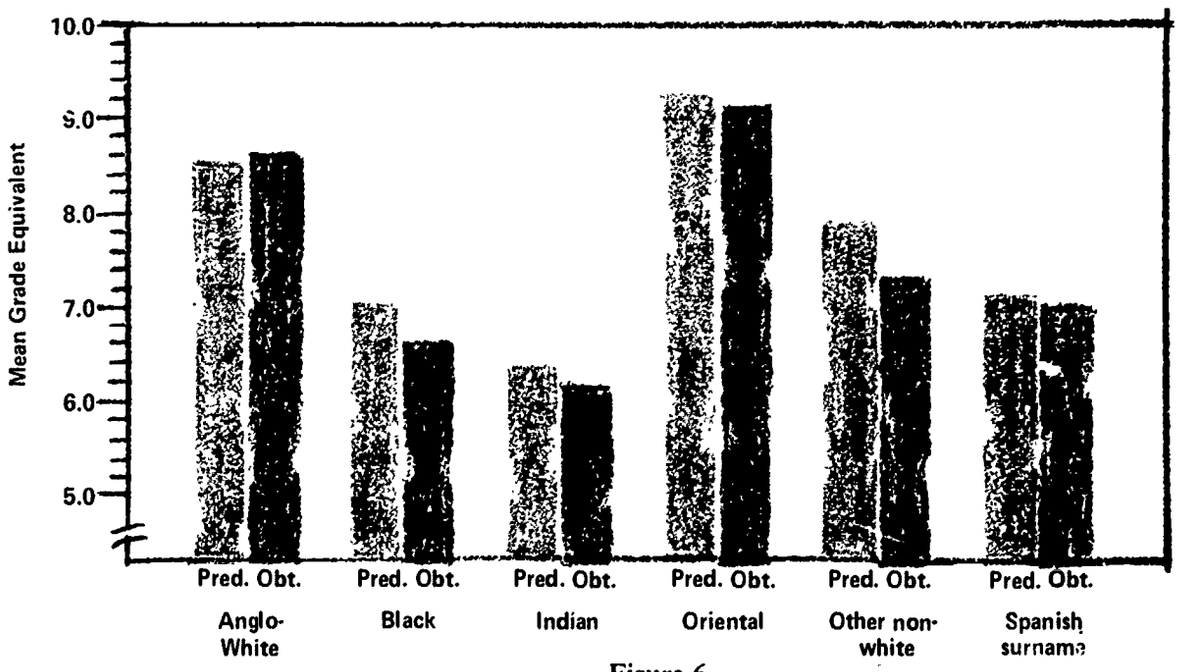


Figure 6

Comparison of Reading Comprehension Predicted And Obtained Mean Grade Equivalents by Ethnic Origin

The reader can readily observe that three of the subgroups equalled or exceeded their predicted Mean Grade Equivalents. Those subgroups being: Anglo-White (+.1), Oriental (equal), and Spanish surname (equal). The remaining groups failed to obtain their predicted scores. Other nonwhite scored .5 below their predicted scores, while Blacks and Indians scored .4 and .1, respectively, below their predicted scores.

The following figure compares the Median Grade Equivalent score obtained by the ENAPA sample with the National norm, as well as the Far West and Southwest regional norms.

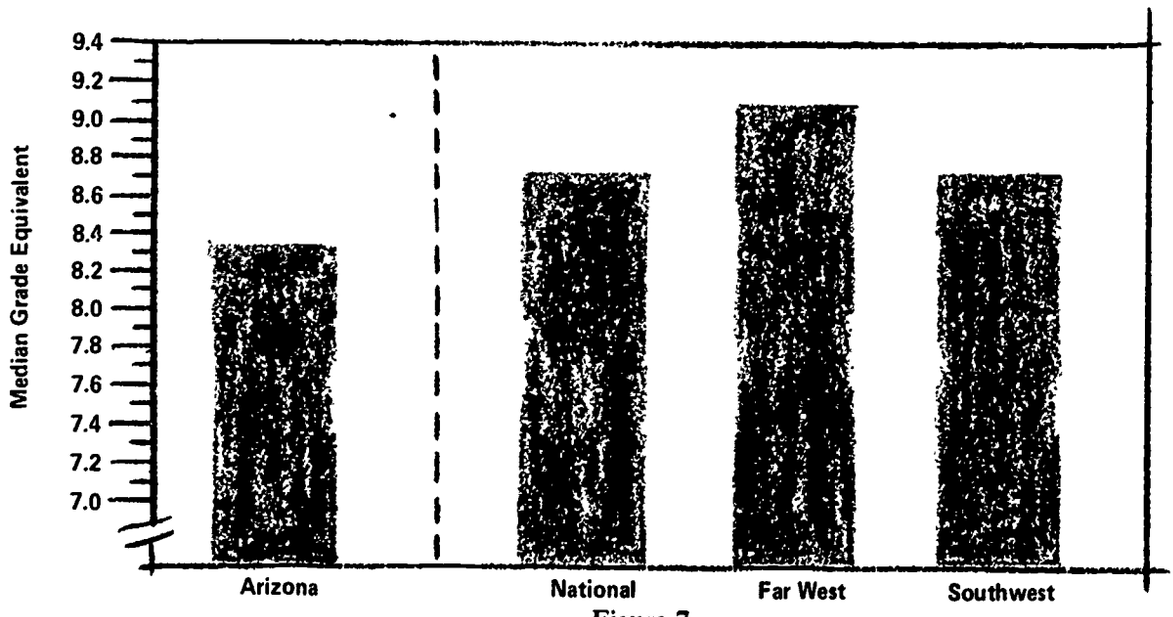


Figure 7

Reading Comprehension Obtained Median Grade Equivalent
Comparisons Between the Arizona Sample, National,
Far West and Southwest Norms

The obtained Median Grade Equivalent in reading comprehension for the total eighth grade sample in Arizona was 8.3. The Median Grade Equivalent for the national level at the time this test was administered equalled 8.7.

The corresponding Median Grade Equivalents for the Far West and Southwest regions were 9.1 and 8.7, respectively.

The data in Figure 7 reveals that the Arizona sample was .4 below the National norm, .8 below the Far West norm, and .4 below the Southwest norm.

SPELLING

Figure 8 depicts the Mean Grade Equivalent differences between the predicted score (8.2) of the student sample, and their obtained score of 8.3. Also illustrated is the norm for eighth grade students nationally (8.7).

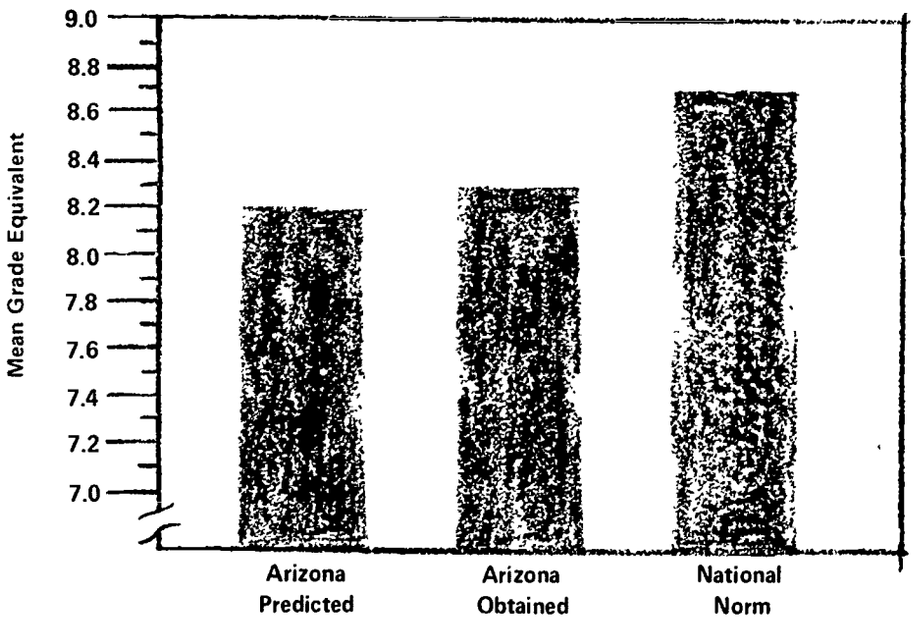


Figure 8

Comparison of Spelling Predicted and Obtained Arizona Mean Grade Equivalents and National Norm

It can be observed that the obtained score is .1 higher than the predicted score, and .4 below the National norm.

The Mean Grade Equivalents, both predicted and obtained, for the sample on the spelling test are depicted in Table 3 by ethnic subgroupings and by group totals. In addition, the obtained scores for sex subgroupings are presented.

Table 3

Spelling Mean Grade Equivalents For Total Arizona Sample by Ethnic and Sex Subgroups

Ethnic Origin	Predicted	Obtained		
	Total Group	Total Group	Male	Female
Anglo-White	8.5	8.5	8.0	9.0
Black	7.0	7.0	6.5	7.5
Indian	6.2	6.9	6.3	7.5
Oriental	9.3	10.3	9.5	10.8
Other nonwhite	7.9	7.4	7.2	8.3
Spanish surname	7.1	7.5	7.1	8.0
Total Group	8.2	8.3	7.8	8.7

The average obtained Mean Grade Equivalents for the various total ethnic subgroups ranged from a low of 6.9 to a high of 10.3.

In all cases except Spanish surname, male students of any given ethnic category scored one grade level (1.0) or more below the female students of the same ethnic origin.

In Appendix N, Table 26 presents the total number of students in each of the categories listed in Table 3.

In Figure 9, the reader will observe that the predicted and obtained Mean Grade Equivalents for each of the ethnic subgroups has been taken from Table 3 and graphically illustrated.

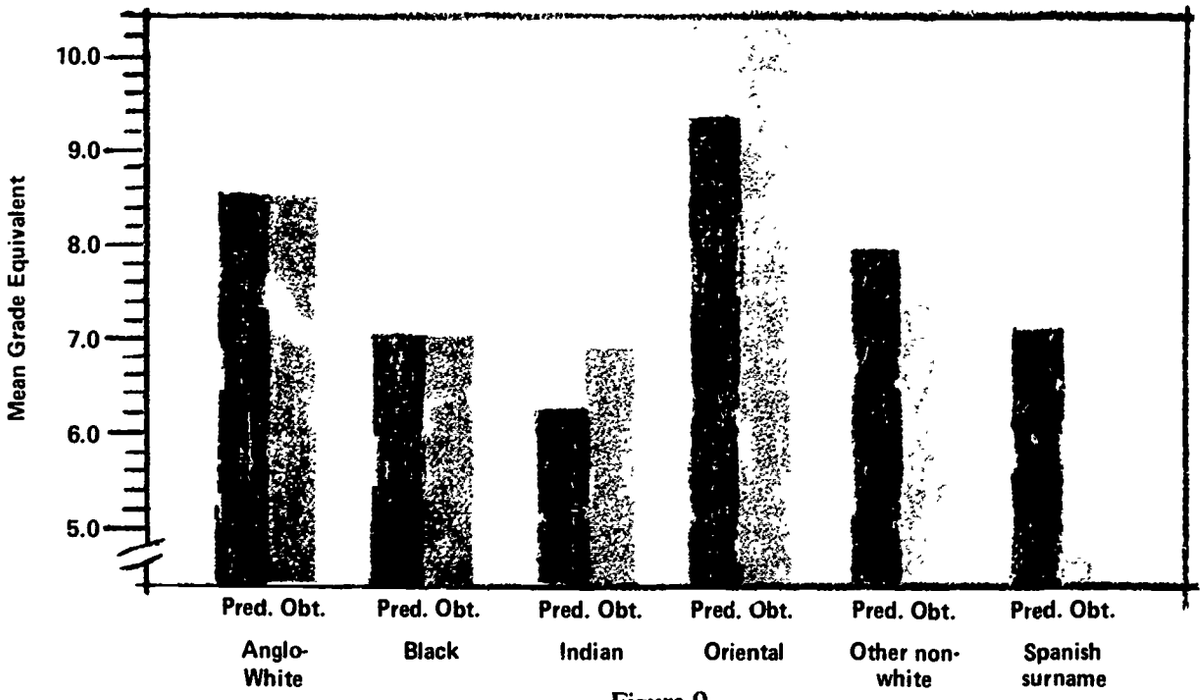


Figure 9

Comparison of Spelling Predicted And Obtained

Mean Grade Equivalents by Ethnic Origin

It can be observed that all but one of the subgroups equalled or excelled their predicted Mean Grade Equivalent. Those groups being: Orienta' (+1.0), Indian (+.7), Spanish surname (+.4), with Anglo-White and Black equalling their predicted scores. Only the Other nonwhite subgroup did not equal their predicted score and was below by .5.

The following figure compares the Median Grade Equivalent score obtained by the ENAPA sample with the National norm, as well as the Far West and Southwest regional norms.

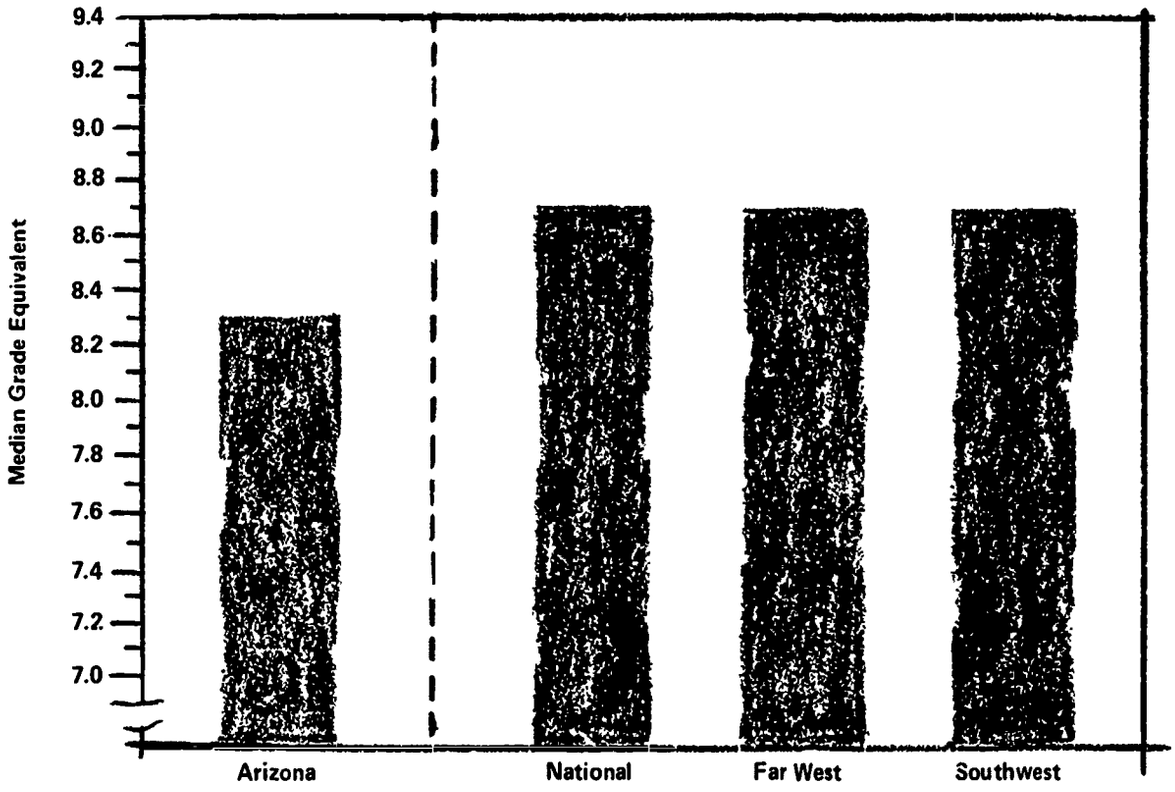


Figure 10

Spelling Obtained Median Grade Equivalent Comparisons Between the Arizona Sample, National, Far West and Southwest Norms

The obtained Median Grade Equivalent in spelling for the total eighth grade sample in Arizona was 8.3. The Median Grade Equivalent for the national level at the time this test was administered equalled 8.7. The Median Grade Equivalents for the Far West and Southwest regions were 8.7 and 8.7, respectively.

The data in Figure 10 shows that the Arizona sample was .4 below the National norm, .4 below the Far West norm, and .4 below the Southwest norm.

CAPITALIZATION

Figure 11 identifies the Mean Grade Equivalent differences between the predicted score of the sample (8.3) and their obtained score of 7.8. The figure also indicates the norm for eighth grade students nationally, which was 8.7 at the time the test was administered.

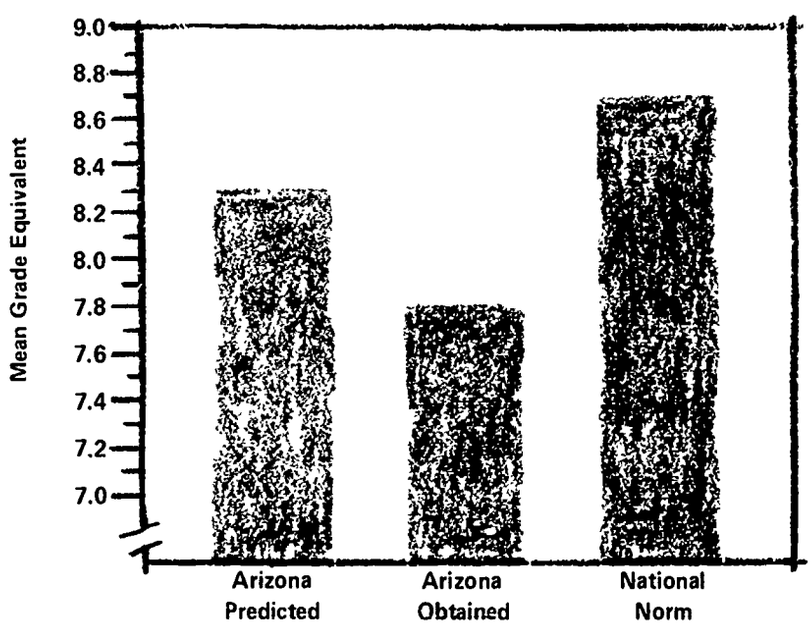


Figure 11

Comparison of Capitalization Predicted and Obtained Arizona Mean Grade Equivalents and National Norm

The reader can readily observe that the students scored .5 lower than their predicted score, and .9 below the National norm.

The Mean Grade Equivalents, both predicted and obtained, for the student sample on the capitalization test are illustrated in Table 4 by ethnic subgroupings and by group totals. Also, obtained scores for sex subgroupings are presented.

Table 4

Capitalization Mean Grade Equivalents For Total Arizona Sample By Ethnic and Sex Subgroups

Ethnic Origin	Predicted	Obtained		
	Total Group	Total Group	Male	Female
Anglo-White	8.6	8.1	7.7	8.5
Black	7.0	6.4	5.9	6.9
Indian	6.2	6.6	6.2	7.1
Oriental	9.4	9.4	8.4	10.9
Other nonwhite	8.0	7.2	7.0	8.4
Spanish surname	7.2	7.0	6.8	7.2
Total Group	8.3	7.8	7.4	8.2

The range of the average obtained Mean Grade Equivalents for the various total ethnic subgroups was 6.4 to 9.4.

Without exception, the total obtained score within a given ethnic category was lower for male students than for the females of the same ethnic origin. The greatest difference between obtained scores for male and female students of the same ethnic origin was for Oriental students where the male students were 1.6 below the female students.

In Appendix N, Table 27 gives the total number of students in each of the categories listed in Table 4.

In Figure 12, the reader will observe that the predicted and obtained Mean Grade Equivalents for each of the ethnic subgroups has been taken from Table 4 and graphically illustrated.

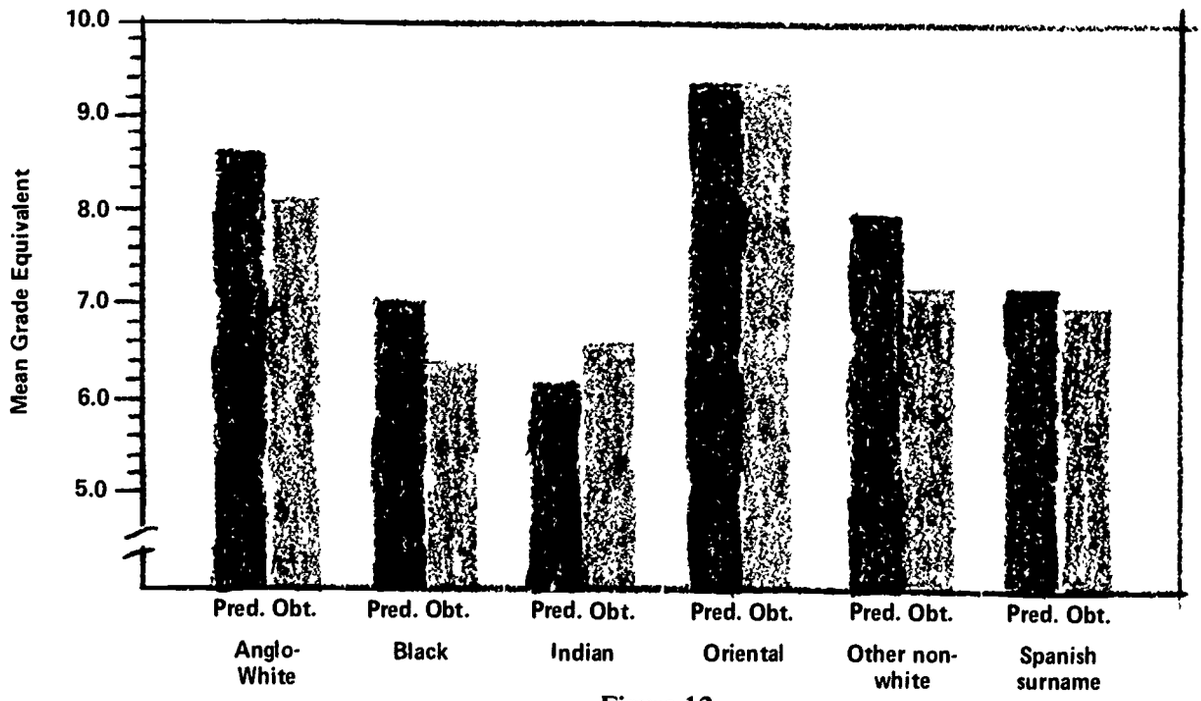


Figure 12
Comparison of Capitalization Predicted And Obtained
Mean Grade Equivalents by Ethnic Origin

It can be observed that only two of the subgroups equalled or excelled their predicted Mean Grade Equivalents. Those subgroups being: Indian (+.4) and Oriental, which equalled its predicted score.

Other nonwhite scored .8 below their predicted score, while Blacks, Anglo-White, and Spanish surname scored .6, .5, and .2 below their predicted scores respectively.

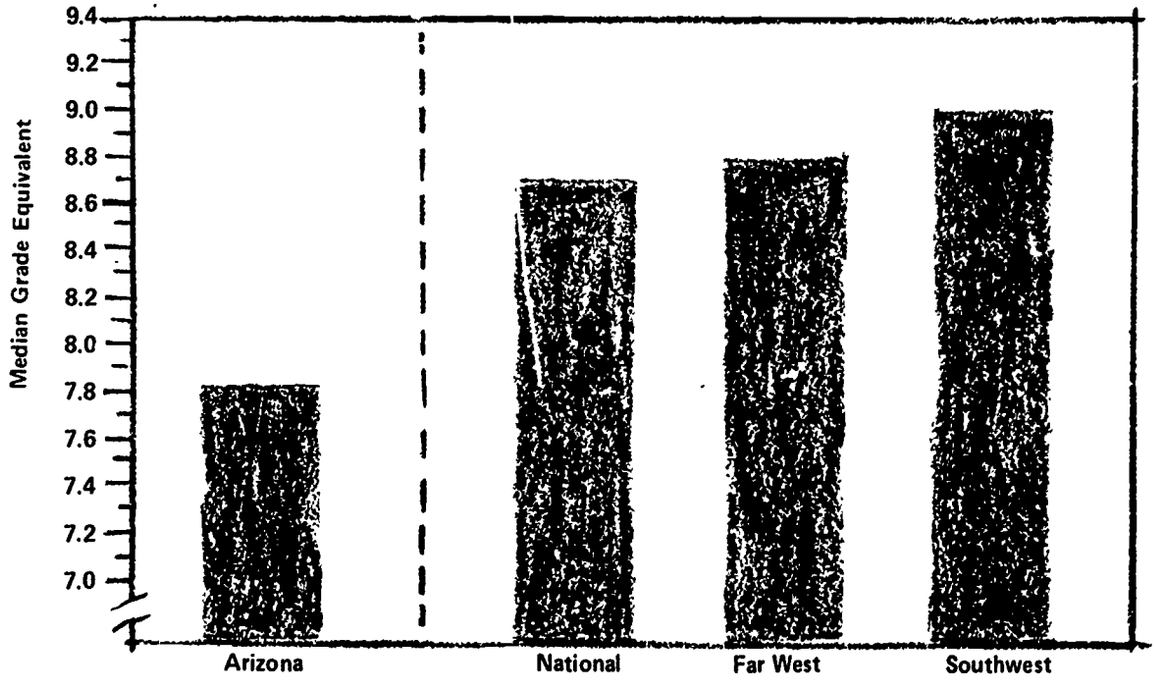


Figure 13

Capitalization Obtained Median Grade Equivalent Comparisons Between The Arizona Sample, National, Far West and Southwest Norms

The obtained Median Grade Equivalent in capitalization for the total eighth grade sample in Arizona was 7.8. The Median Grade Equivalent for the national level at the time this test was administered equalled 8.7.

The corresponding Median Grade Equivalents for the Far West and Southwest regions were 8.8 and 9.0, respectively.

The data in Figure 13 shows that the Arizona sample was .9 below the National norm, 1.0 below the Far West norm, and 1.2 below the Southwest norm.

PUNCTUATION

Figure 14 graphically illustrates the Mean Grade Equivalent differences between the predicted score (8.2) of the Arizona eighth grade students included in the sample, and their obtained score (7.7), as well as the norm for eighth grade students nationally (8.7) at the time the test was administered.

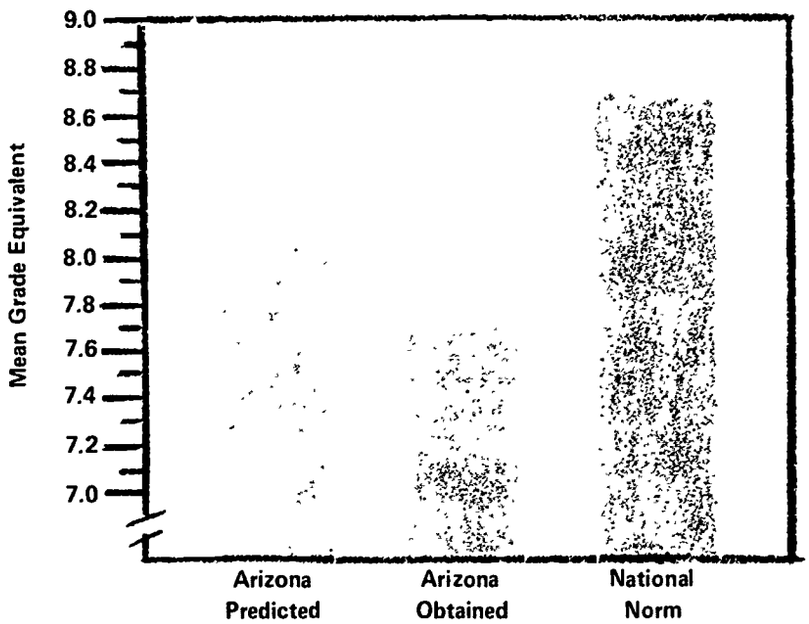


Figure 14

Comparison of Punctuation Predicted and Obtained Arizona Mean Grade Equivalents and National Norms

The reader can observe that the students scored .5 lower than their predicted score, based upon the standard age scores for the total group, and 1.0 below the National norm.

The Mean Grade Equivalents, both predicted and obtained, for the student sample on the punctuation test are depicted in Table 5 by ethnic subgroupings, and by group totals. Also, obtained scores for sex subgroupings are presented.

Table 5

Punctuation Mean Grade Equivalents For Total Arizona Sample By Ethnic and Sex Subgroups

Ethnic Origin	Predicted	Obtained		
	Total Group	Total Group	Male	Female
Anglo-White	8.4	8.0	7.6	8.5
Black	7.0	6.3	6.1	6.5
Indian	6.3	6.8	6.4	7.3
Oriental	9.2	9.9	9.2	10.4
Other nonwhite	7.8	7.7	7.5	8.8
Spanish surname	7.1	6.8	6.5	7.0
Total Group	8.2	7.7	7.3	8.1

As the reader may note, the average obtained Mean Grade Equivalents for the various total ethnic subgroups ranged from a low of 6.3 to a high of 9.9.

Without exception, the total obtained score within a given ethnic category was lower for male students than for female students.

The lowest total obtained Mean Grade Equivalent for a sex subgroup within an ethnic category was 6.1 for male Blacks, while the highest total obtained Mean Grade Equivalent was 10.4 for female Orientals, representing a difference of 4.3.

In Appendix N, Table 28 presents the total number of students included in each of the various categories listed in Table 5.

In Figure 15, the predicted and obtained Mean Grade Equivalents for each of the ethnic subgroups is presented. The data is taken from Table 5.

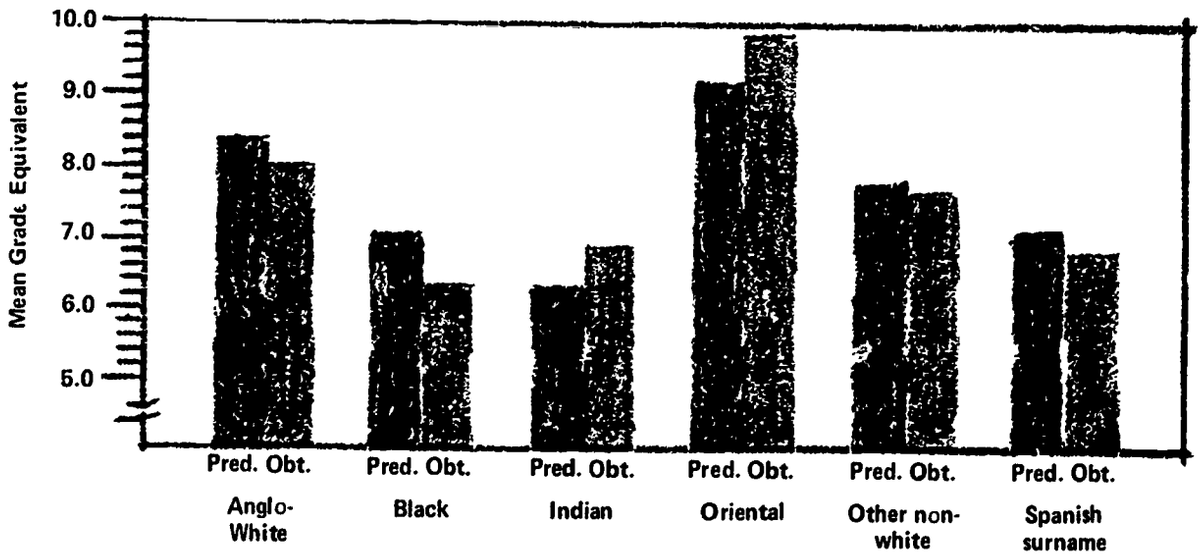


Figure 15
Comparison of Punctuation Predicted And Obtained
Mean Grade Equivalents by Ethnic Origin

It can be observed that only two of the subgroups equalled or excelled their predicted Mean Grade Equivalents. Those subgroups being: Oriental (+.7) and Indian (+.5). Blacks scored .7 below their predicted score, while Anglo-White, Spanish surname, and Other nonwhite scored .4, .3, and .1 below their predicted scores, respectively.

The following figure compares the Median Grade Equivalent score obtained by the ENAPA sample with the National norm, as well as the Far West and Southwest regional norms.

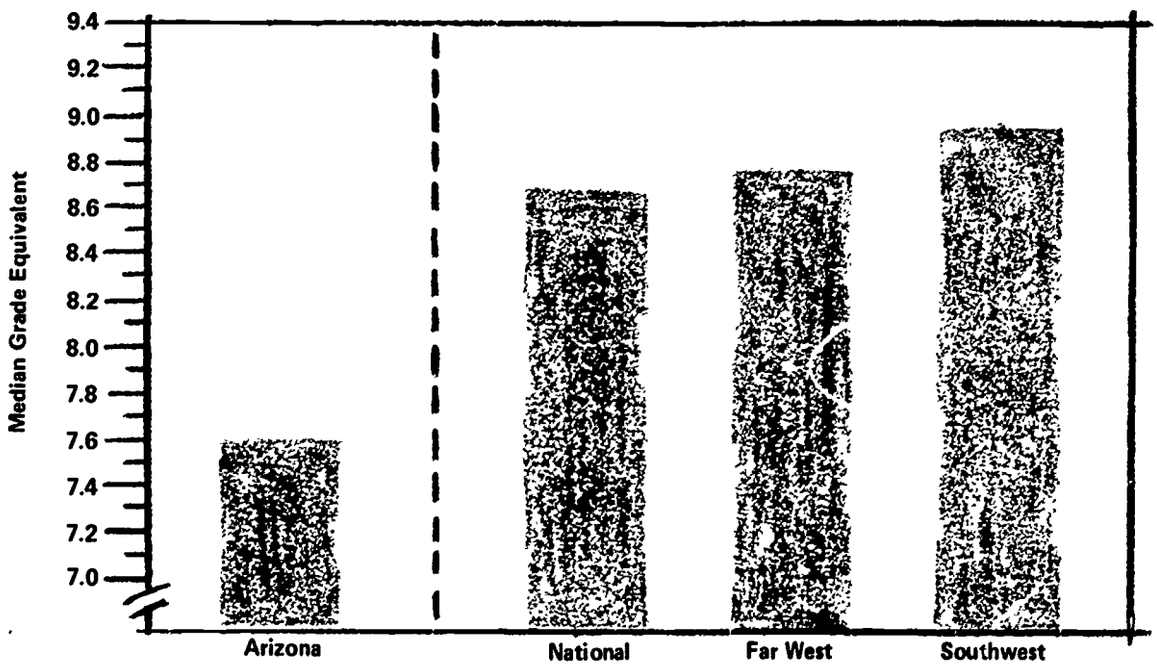


Figure 16

Punctuation Obtained Median Grade Equivalent Comparisons Between the Arizona Sample, National, Far West and Southwest Norms

In Appendix N, Table 28 presents the total number of students included in each of the various categories listed in Table 5.

In Figure 15, the predicted and obtained Mean Grade Equivalents for each of the ethnic subgroups is presented. The data is taken from Table 5.

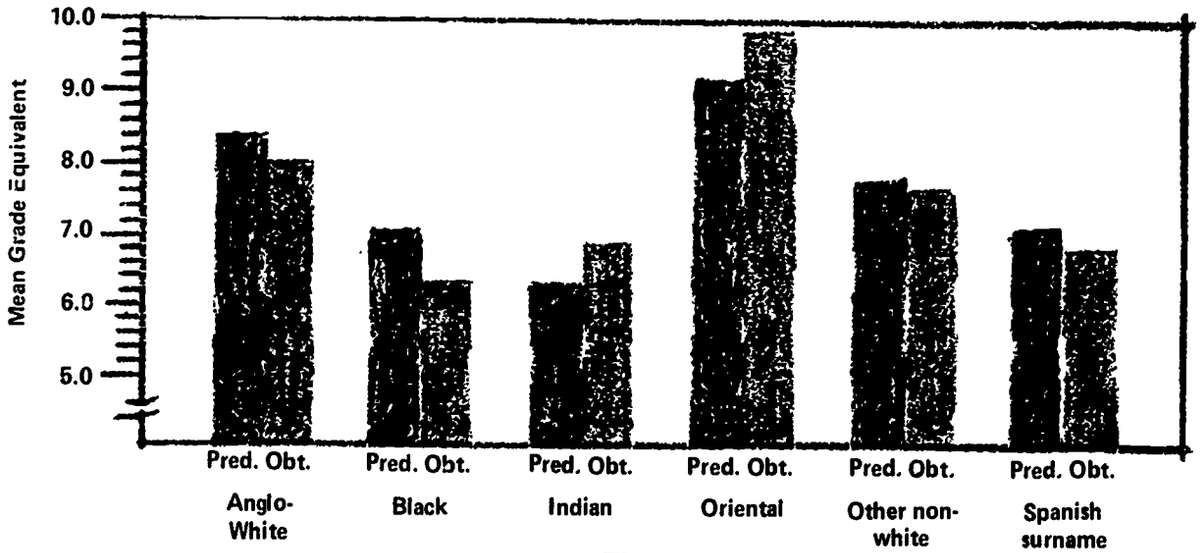


Figure 15
Comparison of Punctuation Predicted And Obtained
Mean Grade Equivalents by Ethnic Origin

It can be observed that only two of the subgroups equalled or excelled their predicted Mean Grade Equivalents. Those subgroups being: Oriental (+.7) and Indian (+.5). Blacks scored .7 below their predicted score, while Anglo-White, Spanish surname, and Other nonwhite scored .4, .3, and .1 below their predicted scores, respectively.

The following figure compares the Median Grade Equivalent score obtained by the ENAPA sample with the National norm, as well as the Far West and Southwest regional norms.

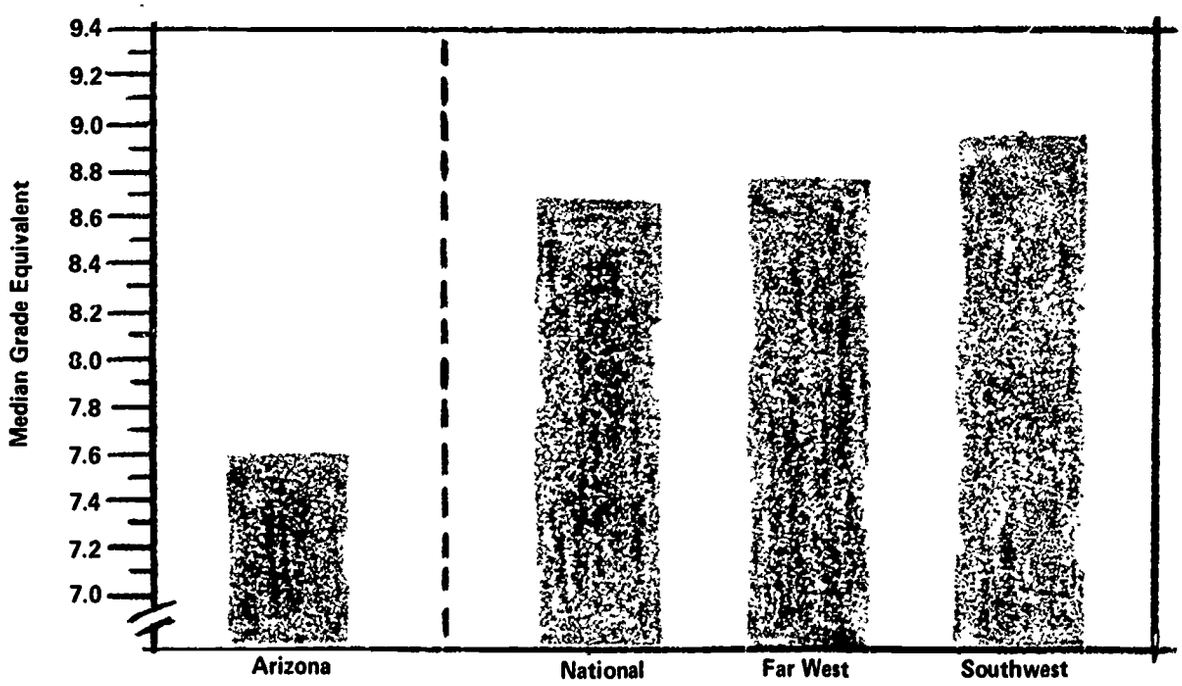


Figure 16

Punctuation Obtained Median Grade Equivalent Comparisons Between the Arizona Sample, National, Far West and Southwest Norms

In Appendix N, Table 28 presents the total number of students included in each of the various categories listed in Table 5.

In Figure 15, the predicted and obtained Mean Grade Equivalents for each of the ethnic subgroups is presented. The data is taken from Table 5.

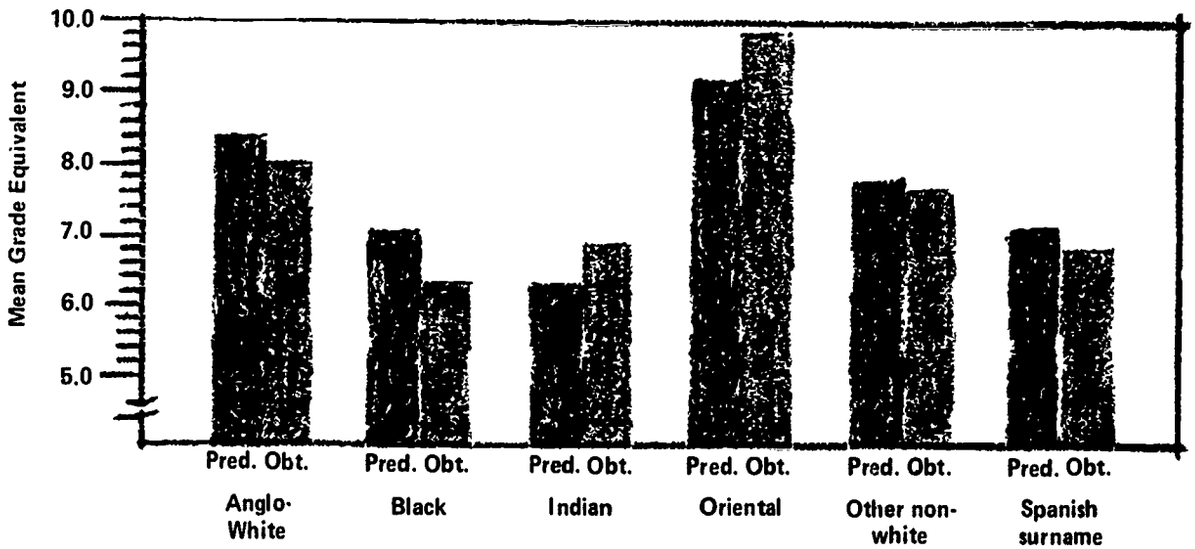


Figure 15
Comparison of Punctuation Predicted And Obtained
Mean Grade Equivalents by Ethnic Origin

It can be observed that only two of the subgroups equalled or excelled their predicted Mean Grade Equivalents. These subgroups being: Oriental (+.7) and Indian (+.5). Blacks scored .7 below their predicted score, while Anglo-White, Spanish surname, and Other nonwhite scored .4, .3, and .1 below their predicted scores, respectively.

The following figure compares the Median Grade Equivalent score obtained by the ENAPA sample with the National norm, as well as the Far West and Southwest regional norms.

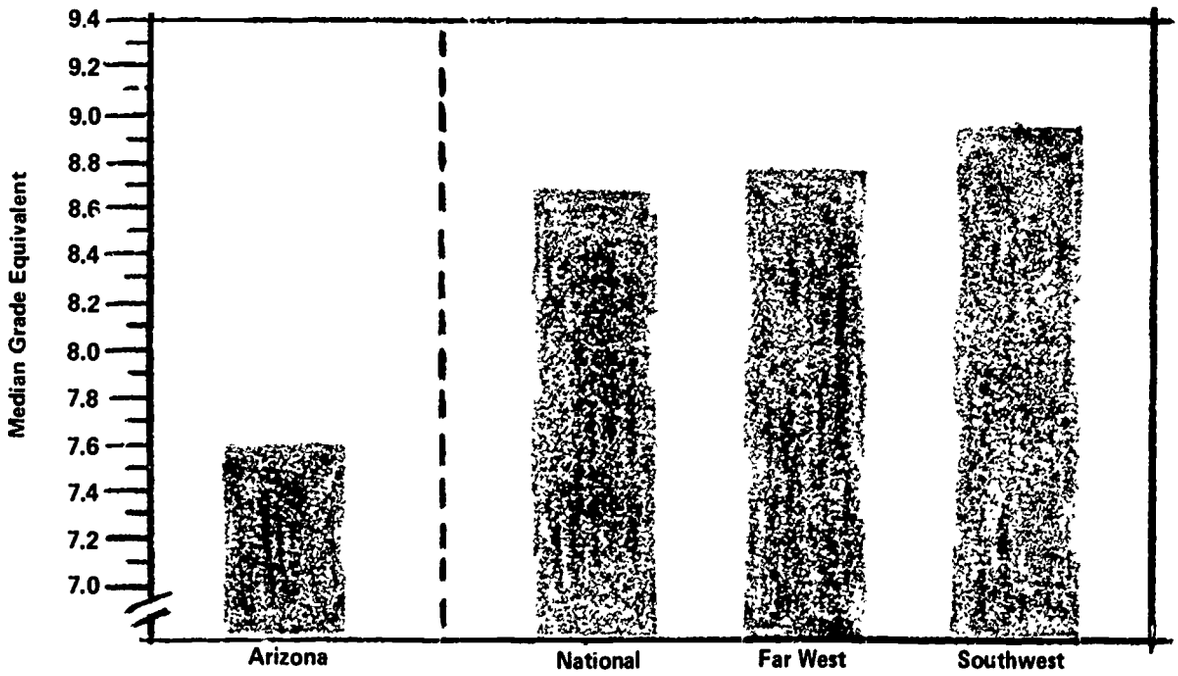


Figure 16

Punctuation Obtained Median Grade Equivalent Comparisons Between the Arizona Sample, National, Far West and Southwest Norms

The obtained Median Grade Equivalent in punctuation for the student sample in Arizona was 7.6. At the time of testing, the Median Grade Equivalent for the national level was 8.7.

The corresponding Median Grade Equivalents for the Far West and Southwest regions were 8.8 and 9.0, respectively.

The data in Figure 16 reveals that the Arizona sample was 1.1 below the National norm, 1.2 below the Far West norm, and 1.4 below the Southwest norm.

Figure 17 shows the Mean Grade Equivalent differences between the predicted score (8.2) of the students in the sample, and their obtained score (8.0). The figure also depicts the norm for eighth grade students nationally (8.7) at the time the test was administered.

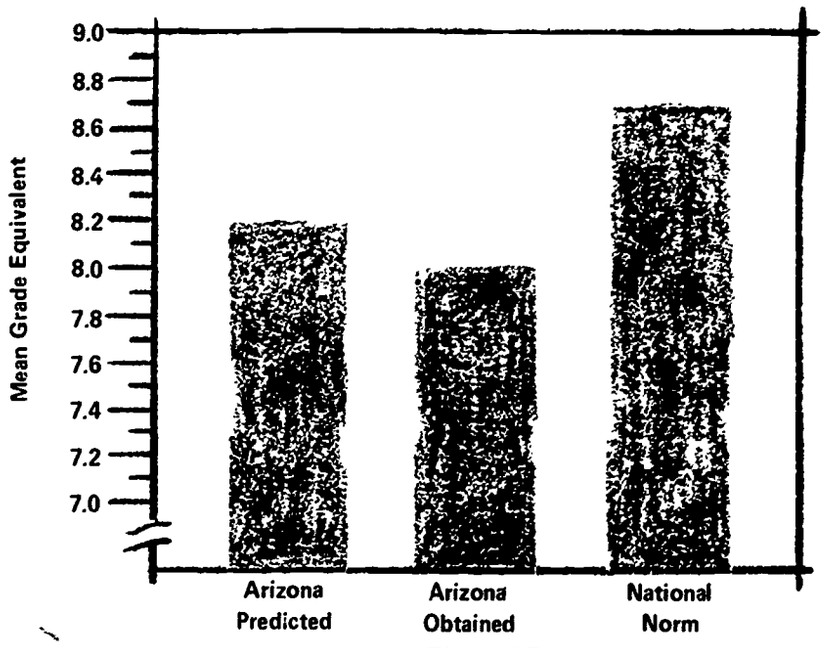


Figure 17
Comparison of Usage Predicted and Obtained Arizona Mean Grade Equivalents and National Norm

It can be observed that the total student sample obtained score is .2 lower than their predicted score. Also, their obtained score was .7 below the National norm.

The Mean Grade Equivalents, both predicted and obtained, for the student sample on the usage test are presented in Table 6 by ethnic subgroupings, as well as by group totals. Also, obtained scores for sex subgroupings are presented.

Table 6

Usage Mean Grade Equivalents For Total Arizona Sample By Ethnic and Sex Subgroups

Ethnic Origin	Predicted	Obtained		
	Total Group	Total Group	Male	Female
Anglo-White	8.4	8.3	7.8	8.7
Black	7.0	6.2	6.3	6.2
Indian	6.3	6.4	6.4	6.5
Oriental	9.2	9.2	8.5	9.6
Other nonwhite	7.8	6.8	6.8	6.8
Spanish surname	7.1	7.4	7.0	7.8
Total Group	8.2	8.0	7.6	8.4

The range of obtained Mean Grade Equivalents for the various total ethnic subgroup totals was 6.2 to 9.2.

The lowest total obtained Mean Grade Equivalent for a sex subgroup within an ethnic category was 6.2 for female Blacks, while the highest total obtained Mean Grade Equivalent was 9.6 for female Orientals, representing a difference of 3.4.

In Appendix N, Table 29 shows the total number of students included in each of the categories listed in Table 6.

In Figure 18, the reader will observe that the predicted and obtained Mean Grade Equivalents for each of the ethnic subgroups has been taken from Table 6 and graphically illustrated.

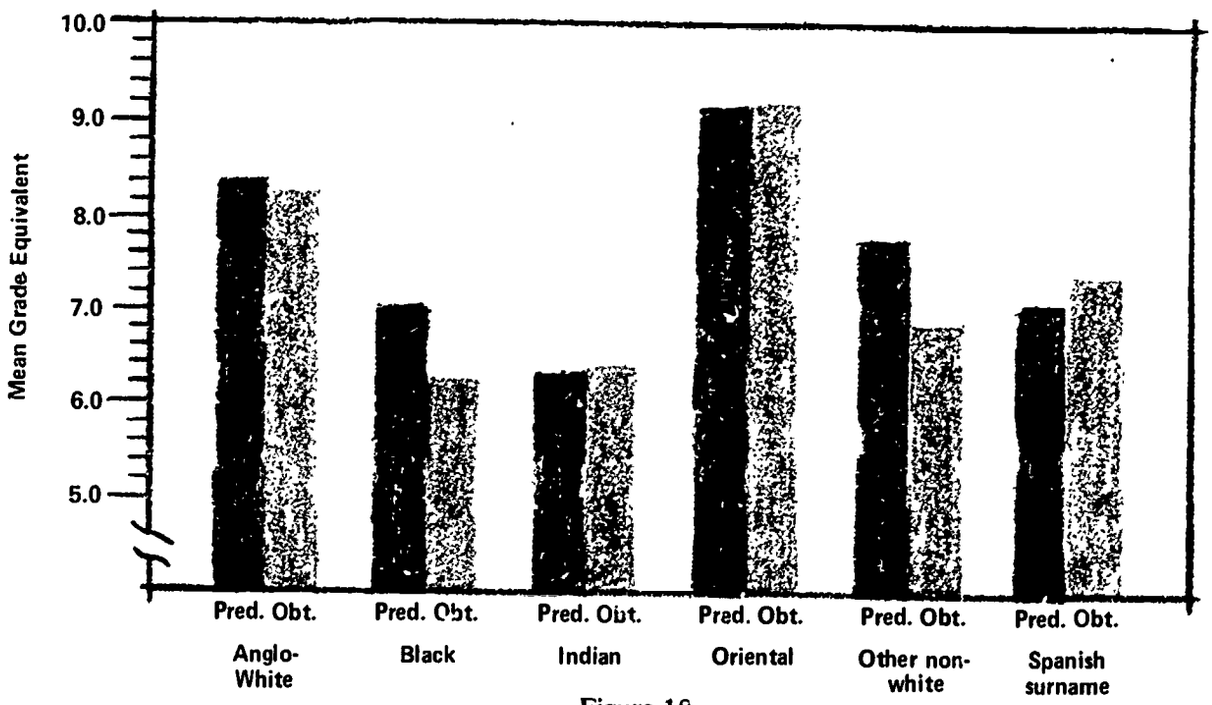


Figure 18
Comparison of Usage Predicted And Obtained
Mean Grade Equivalents by Ethnic Origin

It can be observed that three of the subgroups equalled or excelled their predicted Mean Grade Equivalent. Those subgroups being: Spanish surname (+.3), Indian (+.1), and Oriental (equal). The remain-

ing groups failed to achieve their predicted scores. Other nonwhite scored 1.0 below their predicted score, while Black and Anglo-White were .8 and .1 below, respectively.

The following figure compares the Median Grade Equivalent score obtained by the ENAPA sample with the National norm, as well as the Far West and Southwest regional norms.

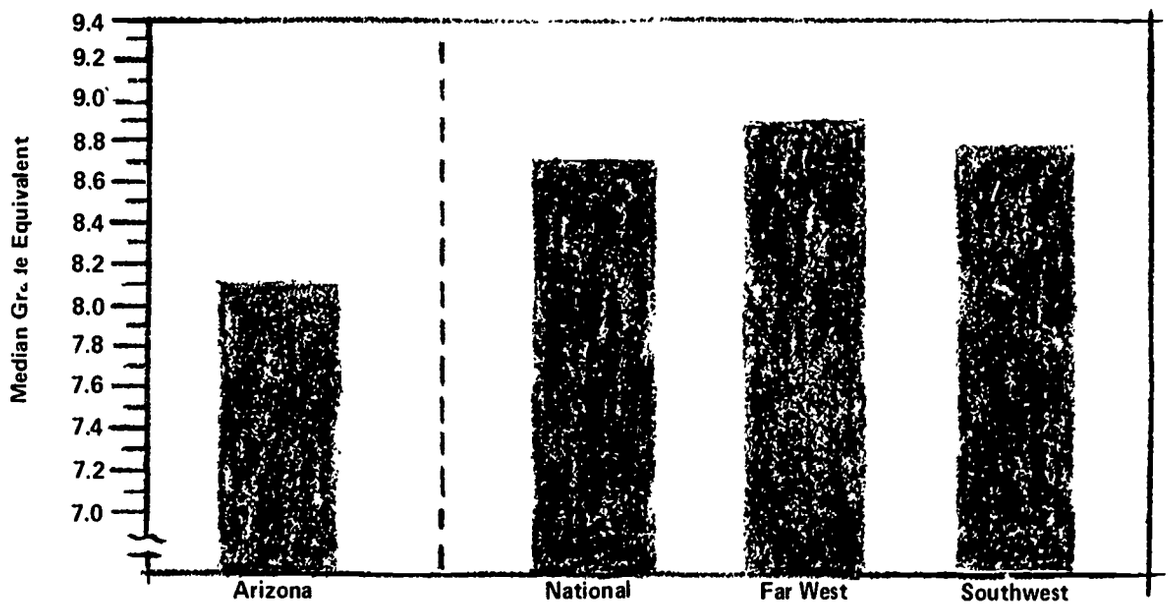


Figure 19

Usage Obtained Median Grade Equivalent Comparisons Between the Arizona Sample, National, Far West and Southwest Norms

The obtained Median Grade Equivalent in usage for the total eighth grade sample in Arizona was 8.1. The Median Grade Equivalent for the national level at the time this test was administered equalled 8.7.

The corresponding Median Grade Equivalents for the Far West and Southwest regions were 8.9 and 8.8, respectively.

The data in Figure 19 reveals that the Arizona sample was .6 below the National norm, .8 below the Far West norm, and .7 below the Southwest norm.

MATHEMATICS CONCEPTS

Figure 20 depicts the Mean Grade Equivalent differences between the predicted score (8.5) of the student sample, and their obtained score of 8.3. Also illustrated is the norm for eighth grade students nationally (8.7).

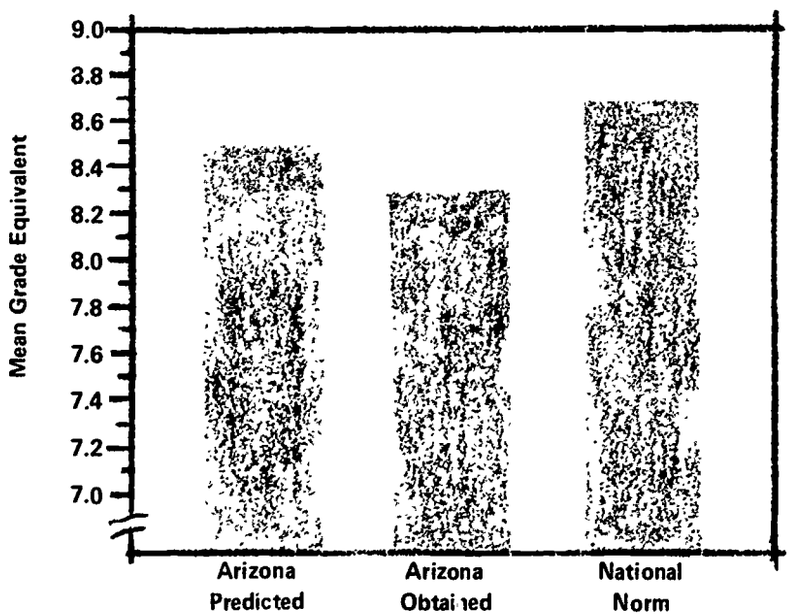


Figure 20

Comparison of Mathematics Concepts Predicted and Obtained Arizona Mean Grade Equivalents and National Norm

It can be observed that the obtained score is .2 lower than the predicted score, and .4 below the National norm.

The Mean Grade Equivalents, both predicted and obtained, for the sample on the mathematics concepts test are depicted in Table 7 by ethnic subgroupings and by group totals. Also, obtained scores for sex subgroups are presented.

Table 7

Mathematics Concepts Mean Grade Equivalents For Total Arizona Sample By Ethnic and Sex Subgroups

Ethnic Origin	Predicted	Obtained		
	Total Group	Total Group	Male	Female
Anglo-White	8.7	8.5	8.5	8.6
Black	7.4	7.0	7.0	6.9
Indian	6.9	6.7	6.9	6.6
Oriental	9.3	9.6	9.0	10.0
Other nonwhite	8.1	8.1	8.1	8.0
Spanish surname	7.5	7.4	7.6	7.2
Total Group	8.5	8.3	8.3	8.3

The average obtained Mean Grade Equivalents for the various total ethnic subgroups ranged from a low of 6.7 to a high of 9.6.

With the exceptions of Anglo-White and Oriental, the total obtained score within a given ethnic category was lower for female students than for male students.

The lowest total obtained Mean Grade Equivalent for a sex subgroup within an ethnic category was 6.6 for female Indians, while the highest total obtained Mean Grade Equivalent was 10.0 for female Orientals, representing a difference of 3.4.

In Appendix N, Table 30 presents the total number of students in each of the categories listed in Table 7.

In Figure 21, the reader will observe that the predicted and obtained Mean Grade Equivalents for each of the ethnic subgroups has been taken from Table 7 and graphically illustrated.

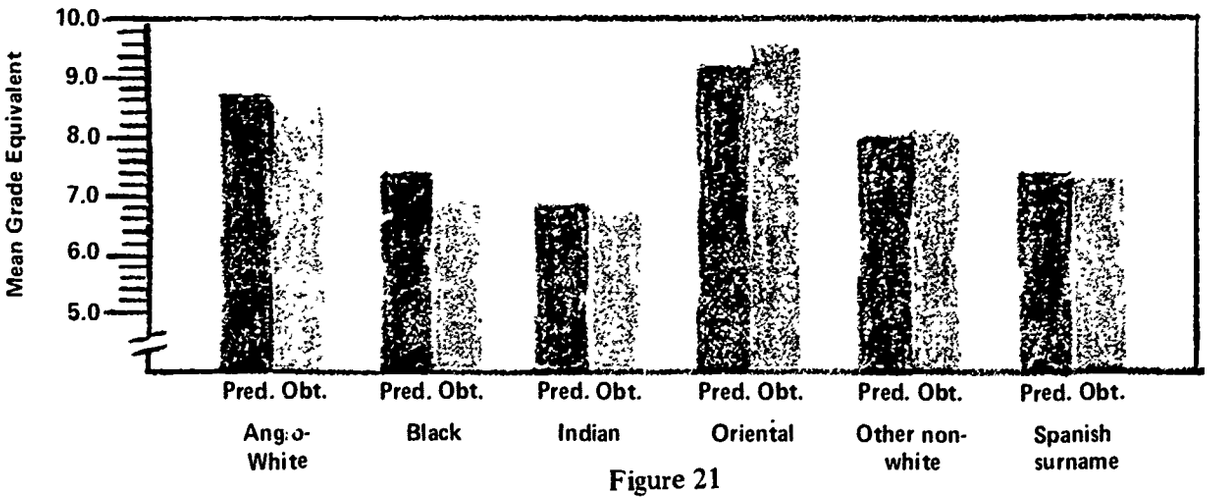


Figure 21

Comparison of Mathematics Concepts Predicted And Obtained Mean Grade Equivalents by Ethnic Origin

It can be observed that only one of the subgroups (Oriental) excelled their predicted Mean Grade Equivalent, while only one (Other nonwhite) equalled it. The subgroup which was furthest from reaching their predicted score was the Blacks (.4), while the other groups were: Anglo-White and Indian (.2), and Spanish surname (.1).

The following figure compares the Median Grade Equivalent score obtained by the ENAPA sample with the National norm, as well as the Far West and Southwest regional norms.

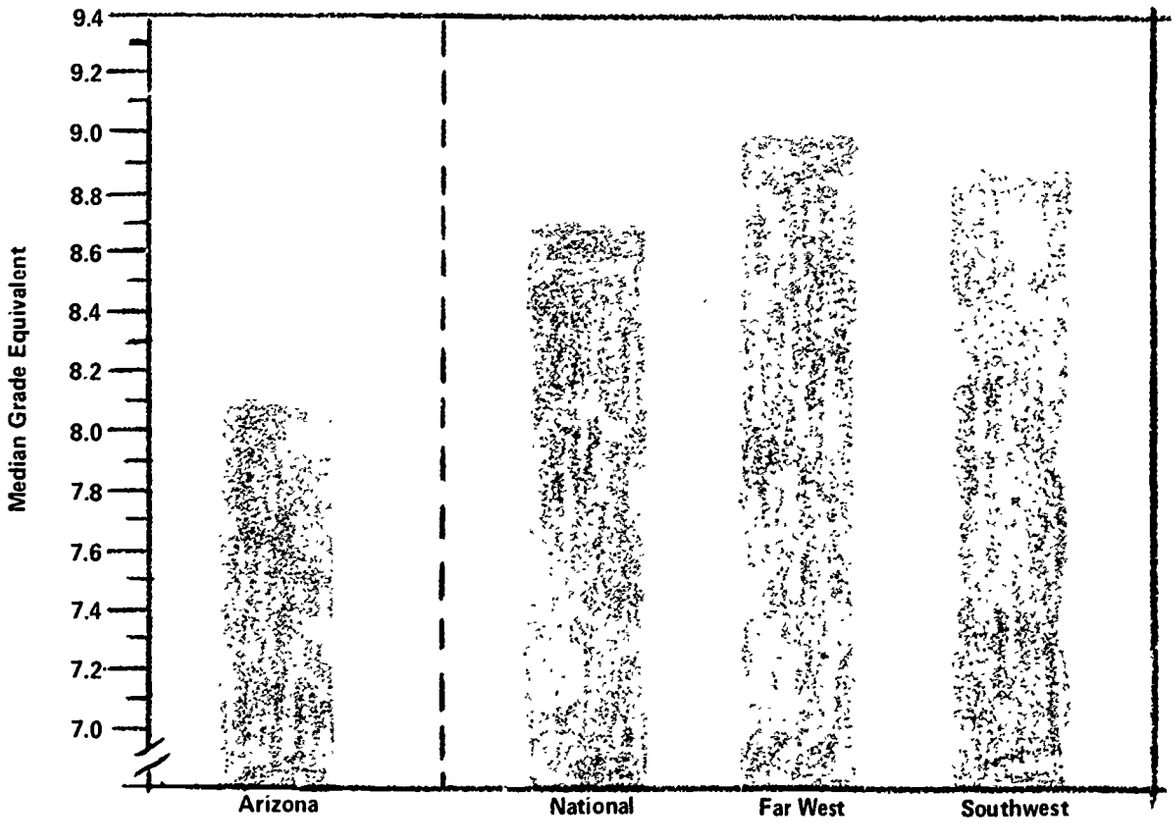


Figure 22
Mathematics Concepts Obtained Median Grade Equivalent Comparisons Between The Arizona Sample, National, Far West and Southwest Norms

The obtained Median Grade Equivalent in mathematics concepts for the total eighth grade sample in Arizona was 8.1. At the time of testing, the Median Grade Equivalent for the national level was 8.7. The Median Grade Equivalents for the Far West and Southwest regions were 9.0 and 8.9, respectively.

The data in Figure 22 shows that the Arizona sample was .6 below the National norm, .9 below the Far West norm, and .8 below the Southwest norm.

MATHEMATICS PROBLEM SOLVING

Figure 23 identifies the Mean Grade Equivalent differences between the predicted score (8.2) of the student sample, and their obtained score of 7.8. It also indicates the norm for eighth grade students nationally (8.7).

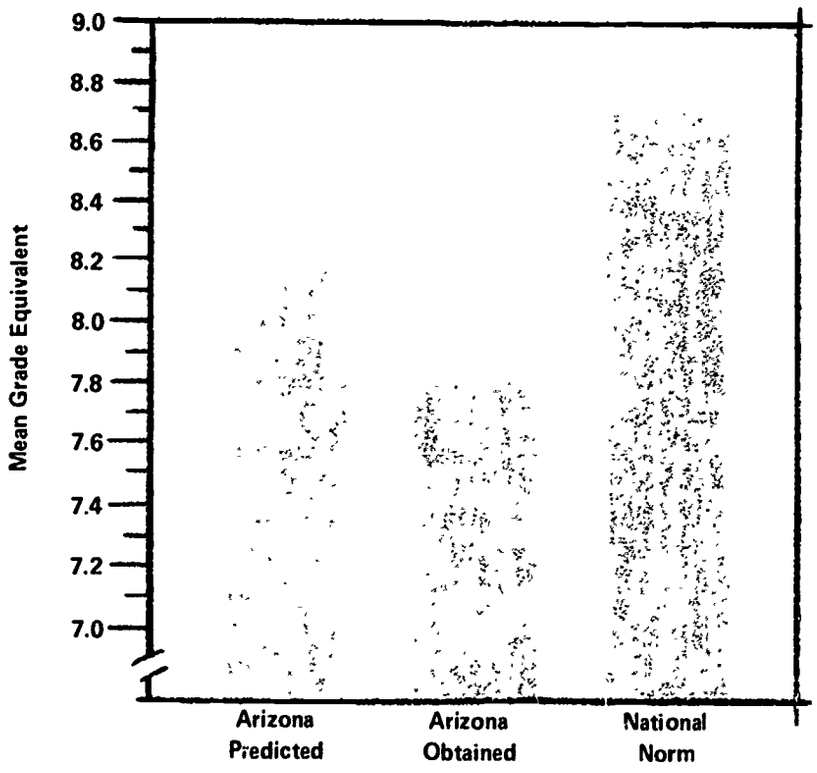


Figure 23

Comparison of Mathematics Problem Solving Predicted and Obtained Arizona Mean Grade Equivalents and National Norm

The reader can readily observe that the students scored .4 lower than their predicted score, and .9 below the National norm.

The Mean Grade Equivalents, both predicted and obtained, for the student sample on the mathematics problem solving test are illustrated in Table 8 by ethnic subgroupings. Also, obtained scores for sex subgroupings are presented.

Table 8
Mathematics Problem Solving Mean Grade Equivalents For Total Arizona Sample By Ethnic and Sex Subgroups

Ethnic Origin	Predicted	Obtained		
	Total Group	Total Group	Male	Female
Anglo-White	8.4	8.1	8.0	8.2
Black	7.2	6.5	6.5	6.5
Indian	6.7	6.6	6.4	6.7
Oriental	9.0	9.2	8.9	9.3
Other nonwhite	7.9	8.0	8.2	6.6
Spanish surname	7.3	6.9	7.0	6.8
Total Group	8.2	7.8	7.8	7.9

The range of the average obtained Mean Grade Equivalents for the various total ethnic subgroups was 6.5 to 9.2.

With the exception of Other nonwhite, Spanish surname, and Black, the total obtained score within a given ethnic category was lower for male students than for the females of the same ethnic origin.

The lowest total obtained Mean Grade Equivalent for a sex subgroup within an ethnic category was 6.4 for male Indians, while the highest total obtained Mean Grade Equivalent was 9.3 for female Orientals, representing a difference of 2.9.

In Appendix N, Table 31 gives the total number of students in each of the categories listed in Table 8.

In Figure 24, the reader will observe that the predicted and obtained Mean Grade Equivalents for each of the ethnic subgroups has been taken from Table 8 and graphically illustrated.

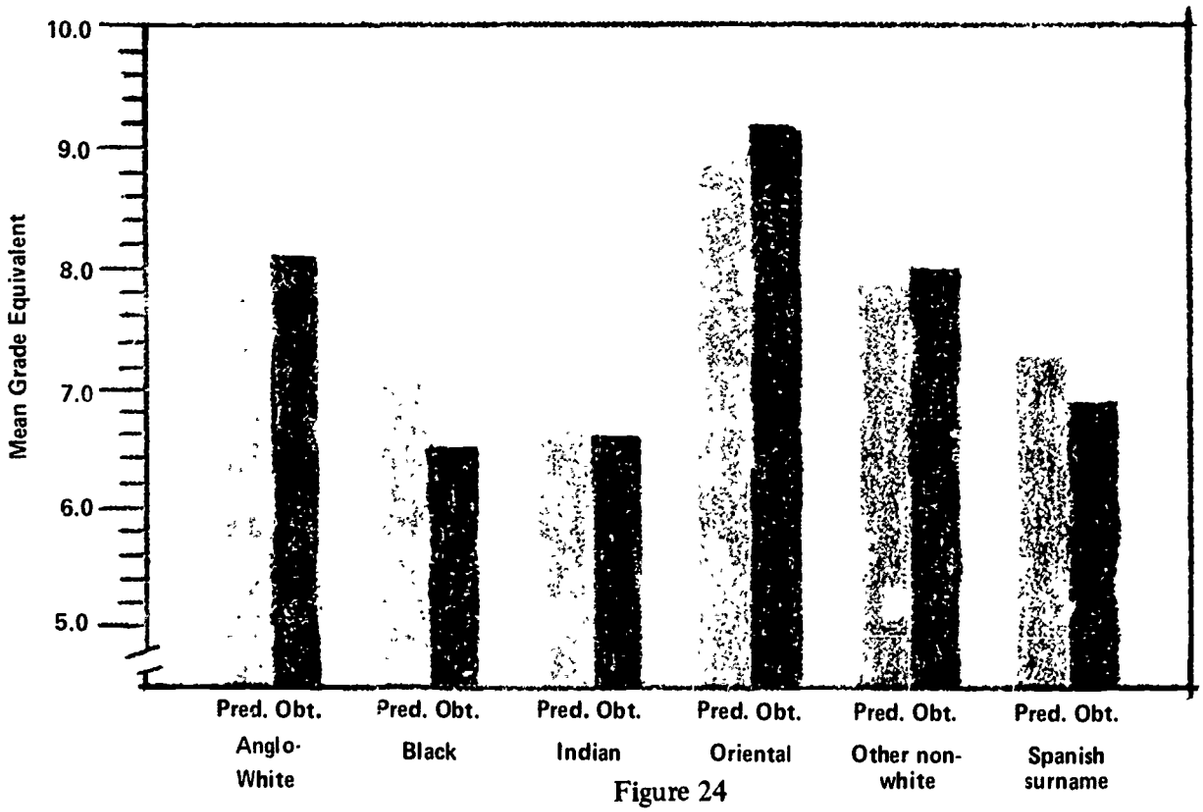


Figure 24

Comparison of Mathematics Problem Solving Predicted And Obtained Mean Grade Equivalents by Ethnic Origin

It can be observed that two of the subgroups excelled their predicted Mean Grade Equivalent. Those subgroups being: Oriental (+.2) and Other nonwhite (+.1). The remaining groups failed to achieve their predicted scores. The Black subgroup was .7 below their predicted score, with Spanish surname, Anglo-White, and Indian subgroups below their predicted scores by .4, .3, and .1, respectively.

The following figure compares the Median Grade Equivalent score obtained by the ENAPA sample with the National norm, as well as the Far West and Southwest regional norms.

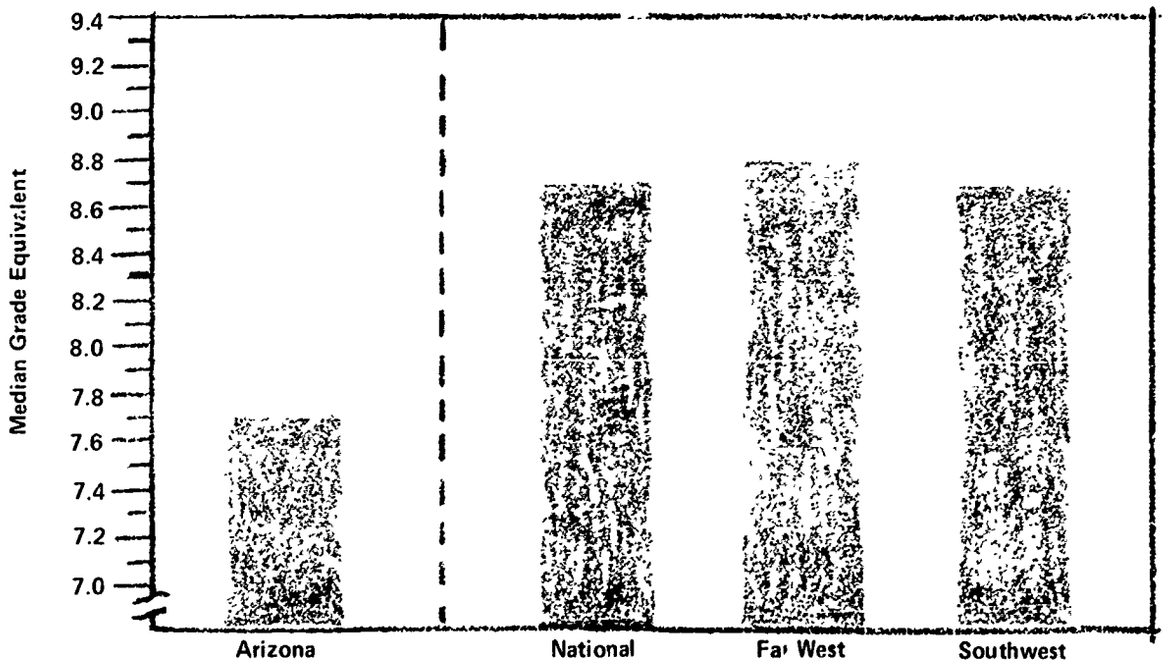


Figure 25

Mathematics Problem Solving Obtained Median Grade Equivalent Comparisons Between the Arizona Sample, National, Far West and Southwest Norms

The obtained Median Grade Equivalent in mathematics problem solving for the total eighth grade sample in Arizona was 7.7. The Median Grade Equivalent for the national level at the time this test was administered equalled 8.7.

The corresponding Median Grade Equivalents for the Far West and Southwest regions were 8.8 and 8.7, respectively.

The data in Figure 25 shows that the Arizona sample was 1.0 below the National norm, 1.1 below the Far West norm, and 1.0 below the Southwest norm.

SUMMARY FOR TOTAL ENAPA SAMPLE

The following tables and figures present the same data previously described, only in a more succinct manner for summarization purposes. Table 9 gives, for each test, the obtained and predicted mean grade equivalents for the total ENAPA sample, as well as by sex subgroupings.

Table 9

Comparison of Obtained and Predicted
ENAPA Scores For Each Test And
By Sex Subgroupings

Test	Predicted	Obtained		
	Total Group	Total Group	Male	Female
Vocabulary	8.1	8.2	8.2	8.2
Reading	8.2	8.2	8.0	8.3
Spelling	8.2	8.3	7.8	8.7
Capitalization	8.3	7.8	7.4	8.2
Punctuation	8.2	7.7	7.3	8.1
Usage	8.2	8.0	7.6	8.4
Mathematics Concepts	8.5	8.3	8.3	8.3
Mathematics Problem Solving	8.2	7.8	7.8	7.9

Two major p.. .its which can be made from this data are:

1. Students scored at or above the predicted scores in three areas--vocabulary (meaning of words), reading (understanding what is read), and spe.ling.
2. Greatest discrepancy between predicted and obtained scores was in the area of capitalization, punctuation, and mathematics problem solving.

This information is graphically illustrated in Figure 26.

✓ VOCABULARY
✓ READING
✓ SPELLING
CAPITALIZATION
PUNCTUATION
MATHEMATICS PROBLEM SOLVING

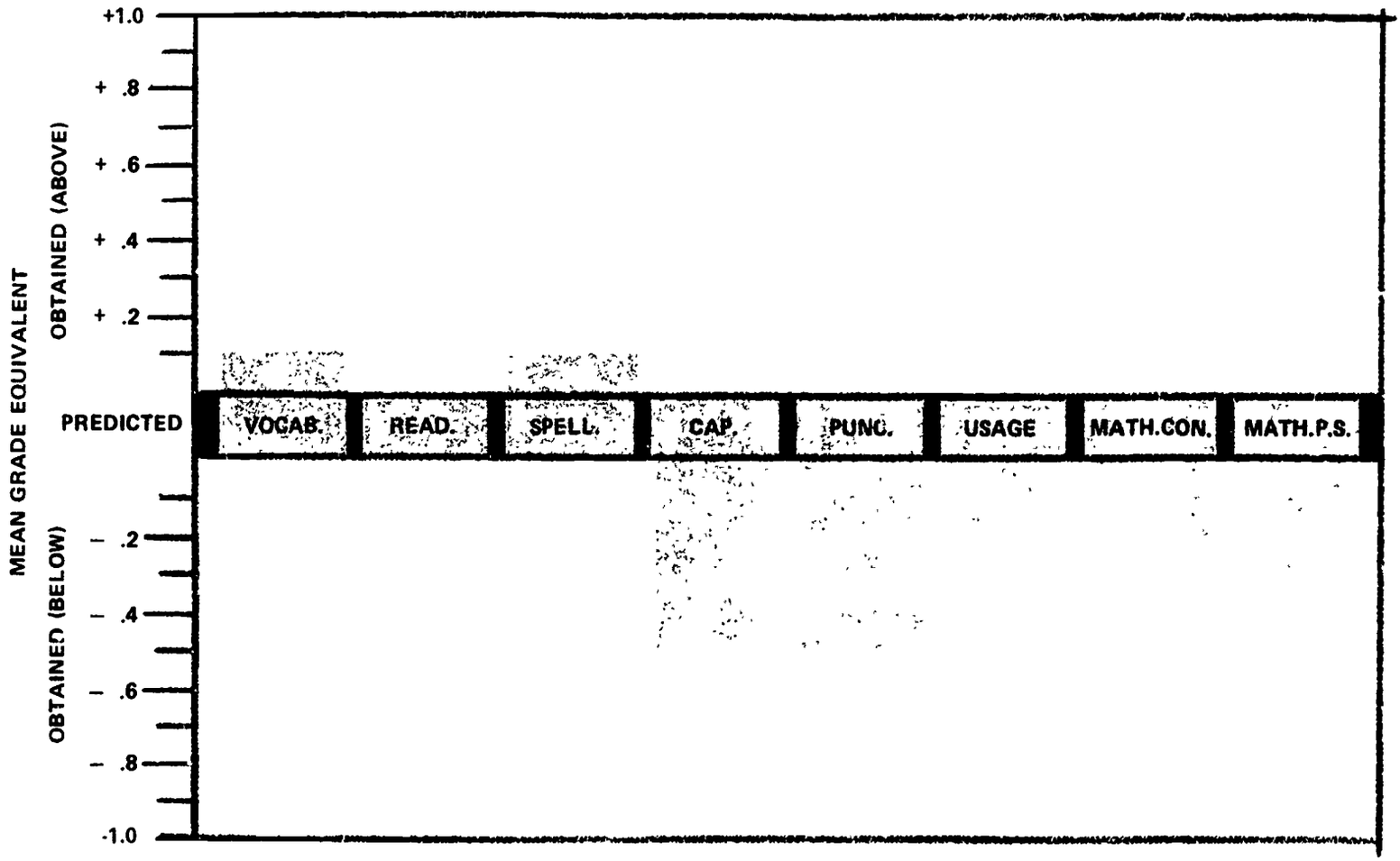


Figure 26

Comparison of Discrepancy Between
Predicted And Obtained Scores
For Each Test

The next major point from Table 9 is as follows:

3. Although the obtained score on mathematic concepts was below the predicted score, the student's score (along with spelling) was one of the closest to the national norm (-.2).

This information is illustrated in Figure 27, which presents the obtained and predicted scores of the ENAPA sample for each test along with the national norm.

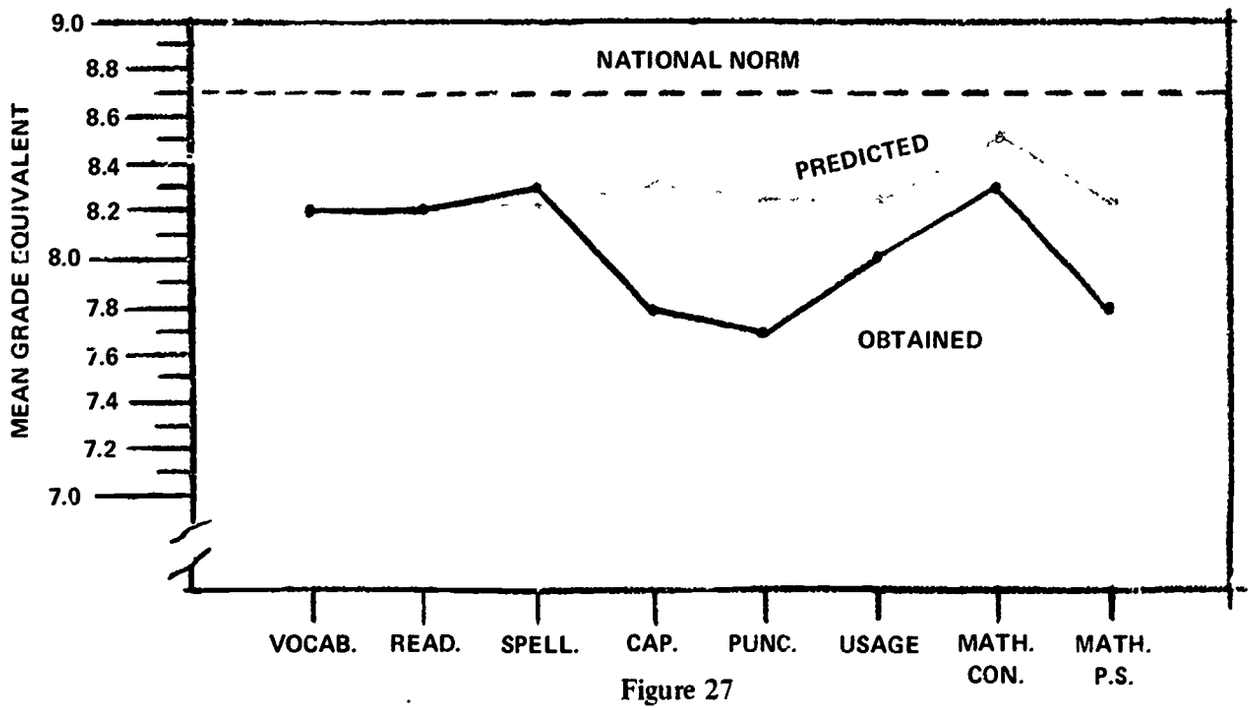


Figure 27

Comparison of Obtained and Predicted Scores For ENAPA Sample With National Norm

The next set of data in Table 9, which provides some summary information, is the comparison between male and female students. Figure 28 depicts this data in chart form.

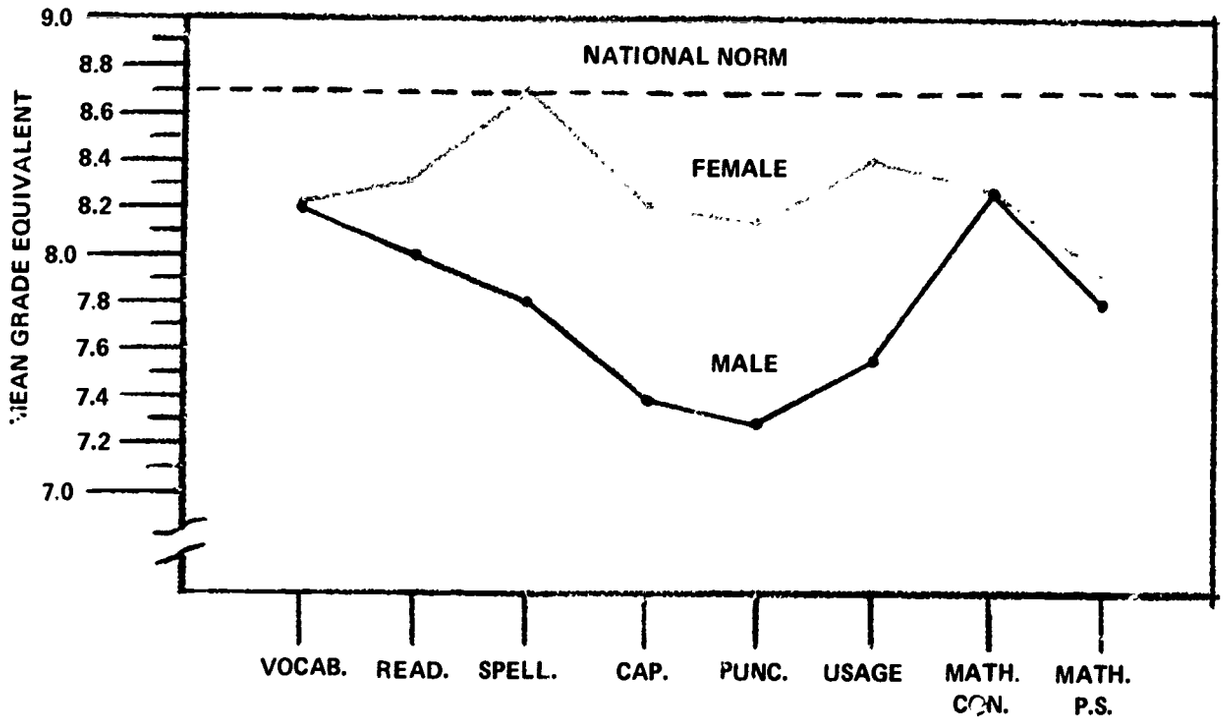


Figure 28

Comparison of Obtained Scores By Sex For ENAPA Sample With National Norm

From a perusal of the data, some of the following points may be gleaned:

1. Females scored the same as or higher than males in every area tested. The highest areas for females were spelling, usage, reading, and mathematics concepts, respectively. The lowest area for females was mathematics problem solving.
2. The reading discrepancy between males and females was .3 in favor of the females.
3. Males and females had the same or similar scores in the areas of vocabulary, mathematics concepts, and mathematics problem solving.
4. The greatest range of discrepancy between males and females included spelling (.9), usage (.8), and punctuation (.8).
5. Males scored lowest in the language skills areas of punctuation, capitalization, usage, and spelling, respectively.

Another area of interest is a comparison of the predicted and obtained scores for the various ethnic subgroups of the ENAPA sample on each test. Table 10 presents this data by predicted and obtained scores for each subgroup along with the total ENAPA predicted and obtained scores.

Table 10

Comparison of Obtained Scores For The ENAPA Sample And The Ethnic Subgroups With National Norm

Test	Total ENAPA Sample		Anglo-White		Black		Indian		Oriental		Other Nonwhite		Spanish Surname	
	Pre.*	Obt.**	Pre.	Obt.	Pre.	Obt.	Pre.	Obt.	Pre.	Obt.	Pre.	Obt.	Pre.	Obt.
Vocabulary	8.1	8.2	8.4	8.7	6.9	6.6	6.2	5.7	9.2	9.2	7.8	7.9	7.0	6.7
Reading	8.2	8.2	8.5	8.6	7.0	6.6	6.3	6.2	9.2	9.2	7.9	7.4	7.1	7.1
Spelling	8.2	8.3	8.5	8.5	7.0	7.0	6.2	6.9	9.3	10.3	7.9	7.4	7.1	7.5
Capitalization	8.3	7.8	8.6	8.1	7.0	6.4	6.2	6.6	9.4	9.4	8.0	7.2	7.2	7.0
Punctuation	8.2	7.7	8.4	8.0	7.0	6.3	6.3	6.8	9.2	9.9	7.8	7.7	7.1	6.8
Usage	8.2	8.0	8.4	8.3	7.0	6.2	6.3	6.4	9.2	9.2	7.8	6.8	7.1	7.4
Mathematics Concepts	8.5	8.3	8.7	8.5	7.4	7.0	6.9	6.7	9.3	9.6	8.1	8.1	7.5	7.4
Mathematics Problem Solving	8.2	7.8	8.4	8.1	7.2	6.5	6.7	6.6	9.0	9.2	7.9	8.0	7.3	6.9

* Pre. = Predicted Mean Grade Equivalents ** Obt. = Obtained Mean Grade Equivalents

Figure 29 illustrates the obtained scores only for each of the ethnic subgroups and the National norm.

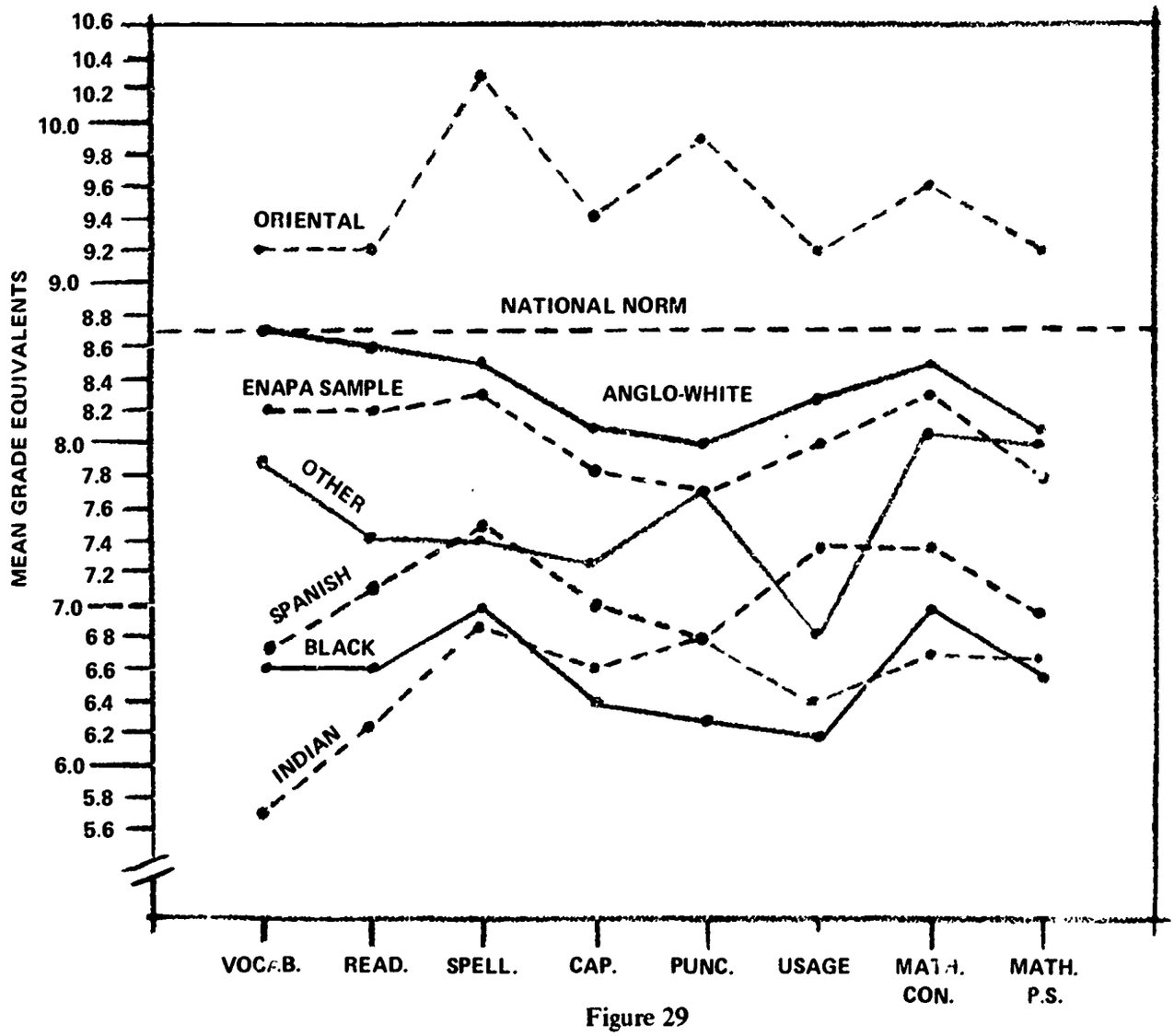


Figure 29

Comparison of Obtained Scores For the ENAPA Sample And The Ethnic Sub-groups With National Norm

The following points can be made regarding this data:

1. Three of the ethnic subgroups received their highest obtained scores in the area of spelling. Those subgroups being Oriental, Spanish surname, and Indian. For another subgroup, Black, the obtained score was the same in spelling and mathematics concepts. Both of these areas represented the highest obtained scores for that subgroup.
2. In two of these ethnic subgroups--Indian and Spanish surname--vocabulary was the lowest area within a group. In the case of the Oriental subgroup, their obtained score for vocabulary was the same in three other test areas.
3. Vocabulary was the highest area tested for Anglo-White students, while punctuation was the lowest area, followed closely by capitalization and mathematics problem solving.
4. The highest area for Blacks (along with spelling) and Other nonwhites was mathematics concepts.
5. It appears that no generalizations can be made from one ethnic subgroup to another and that each ethnic subgroup has its own scoring pattern between the various curriculum areas.

The next figure, Figure 30, graphically illustrates how well each groups' obtained score compared to the predicted score.

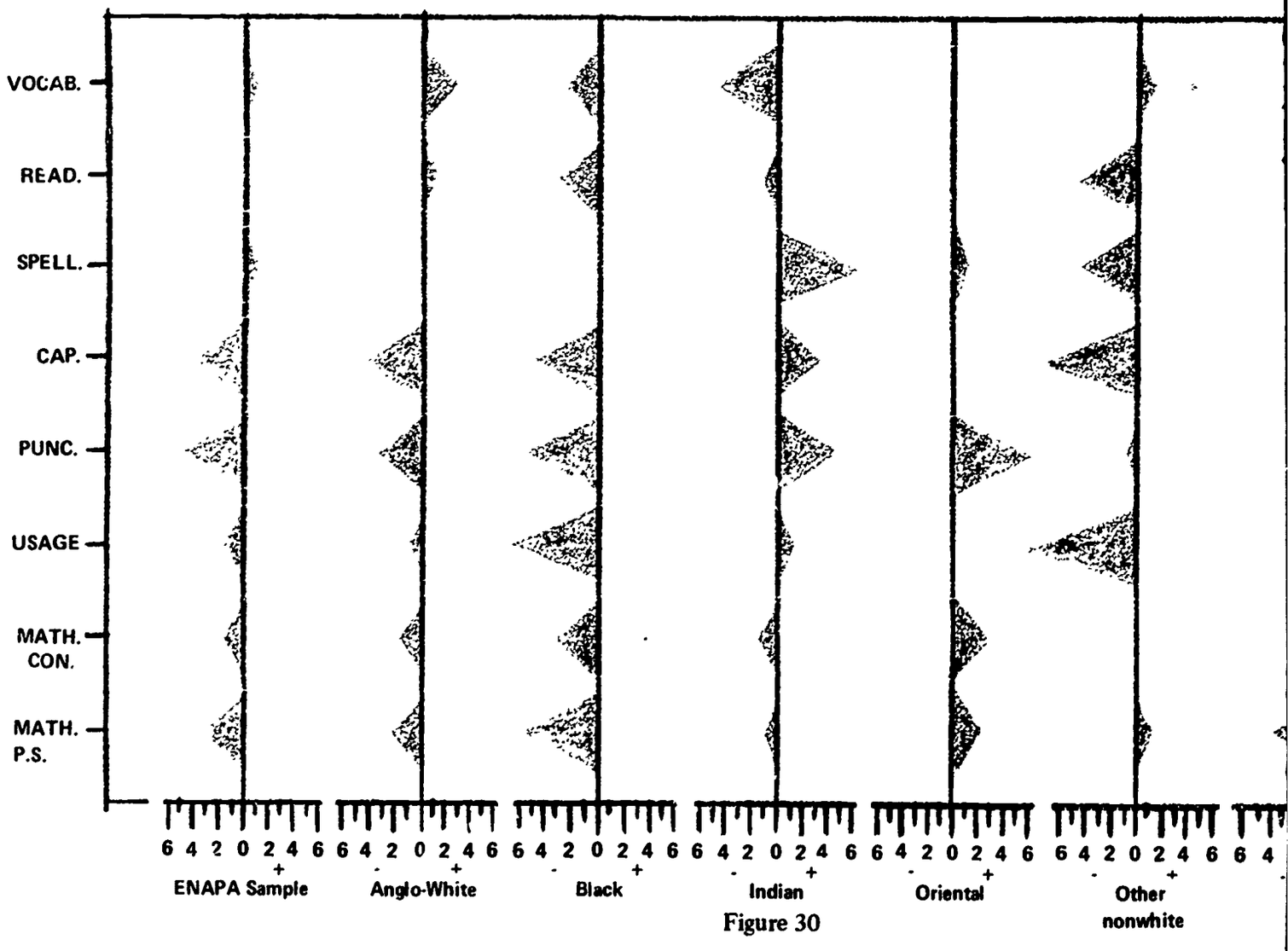


Figure 30

Discrepancy Between Obtained And Predicted Scores For The ENAPA Sample by Ethnic Subgroups

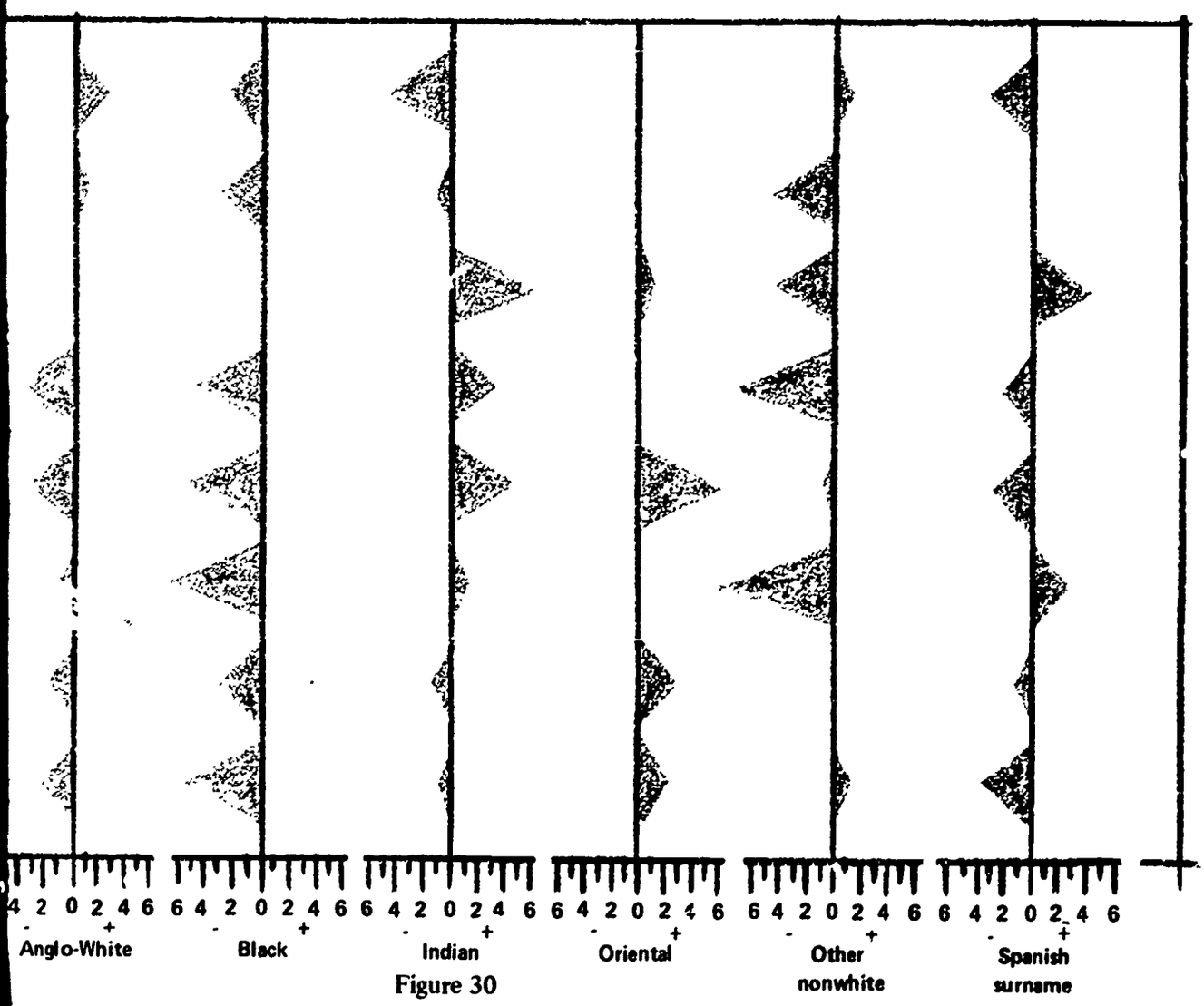
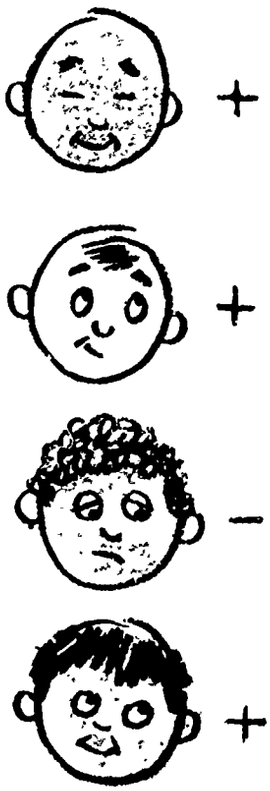


Figure 30

Discrepancy Between Obtained And Predicted Scores For The ENAPA Sample by Ethnic Subgroups

The following points can be gleaned from this data:



1. Orientals, without question, equalled or bettered their predicted scores in all areas.
2. Anglo-Whites exceeded or equalled their predicted scores in vocabulary, reading comprehension, and spelling. They were below their predicted scores in all other areas.
3. Blacks scored below their predicted scores in every area except spelling. This ethnic subgroup had the greatest overall discrepancy.
4. Indians exceeded their predicted scores in four areas--spelling, capitalization, punctuation, and usage, but were below in vocabulary, reading comprehension, mathematics concepts, and mathematics problem solving.
5. Other nonwhites equalled or exceeded their predicted scores in vocabulary, mathematics concepts, and mathematics problem solving. However, this subgroup had the greatest discrepancies in reading comprehension, spelling, capitalization, and usage of all groups.
6. Spanish surnamed equalled or exceeded their predicted scores in reading comprehension, spelling, and usage. This subgroup was below their predicted scores in five other areas, namely, vocabulary, capitalization, punctuation, mathematics concepts, and mathematics problem solving.

TITLE I PARTICIPANTS of the ENAPA SAMPLE

As stated earlier in Section Two, certain types of demographic data were collected for each student in the ENAPA sample. One factor considered was whether or not the student was currently involved as a participant in a Title I program. Title I is a federally funded program designed to address the needs of educationally handicapped children. Normally, these children live in poverty pockets and are usually behind in their academic work.

Approximately 329, or 12.6%, of the students included in the ENAPA sample were also Title I participants. Of this figure, 173, or 52.6%, were male students, while 156, or 47.4%, were female students An approximate ethnic origin distribution is as follows:

Ethnic Origin	Percent
Anglo-White	33.6
Black	19.9
Indian	17.4
Oriental	.4
Other nonwhite	.4
Spanish surname	28.2

n considering the following data, the reader should be aware that the primary purpose of this project was not designed to gather data specifically concerning Title I participants. For that reason the ENAPA sample in all probability may not adequately represent all Title I participants. The best information available indicates that during the period of time this project was involved in its testing

activities the Title I participants in the ENAPA sample was approximately 9—10 percent of the total number of eighth grade Title I participants.

Table 11 presents the obtained and predicted average Mean Grade Equivalents for Title I participants by each test along with a distribution by sex subgroups. Also included are the predicted and obtained scores for the total Arizona sample.

Table 11

Test Comparisons of Title I Predicted And Obtained Scores to Total Sample Scores

Test	Title I				Total Ariz. Sample	
	Predicted	Obtained				
	Total Subgroup	Total Subgroup	Male	Female	Predicted	Obtained
Vocabulary	7.2	7.1	7.1	7.1	8.1	8.2
Reading Comprehension	7.3	7.2	7.1	7.4	8.2	8.2
Spelling	7.5	7.5	7.0	8.2	8.2	8.3
Capitalization	7.3	6.9	6.5	7.4	8.3	7.8
Punctuation	7.3	6.9	6.5	7.2	8.2	7.7
Usage	7.3	7.1	6.9	7.4	8.2	8.0
Mathematics Concepts	7.6	7.4	7.5	7.3	8.5	8.3
Mathematics Prob. Solving	7.3	7.1	7.1	7.1	8.2	7.8

The next two figures graphically illustrate data taken from Table 11. Figure 31 compares the predicted and obtained scores for the Title I participants. Also, the reader may observe comparisons of these two factors with the Arizona total sample scores as well as the National norm at the time the test was administered.

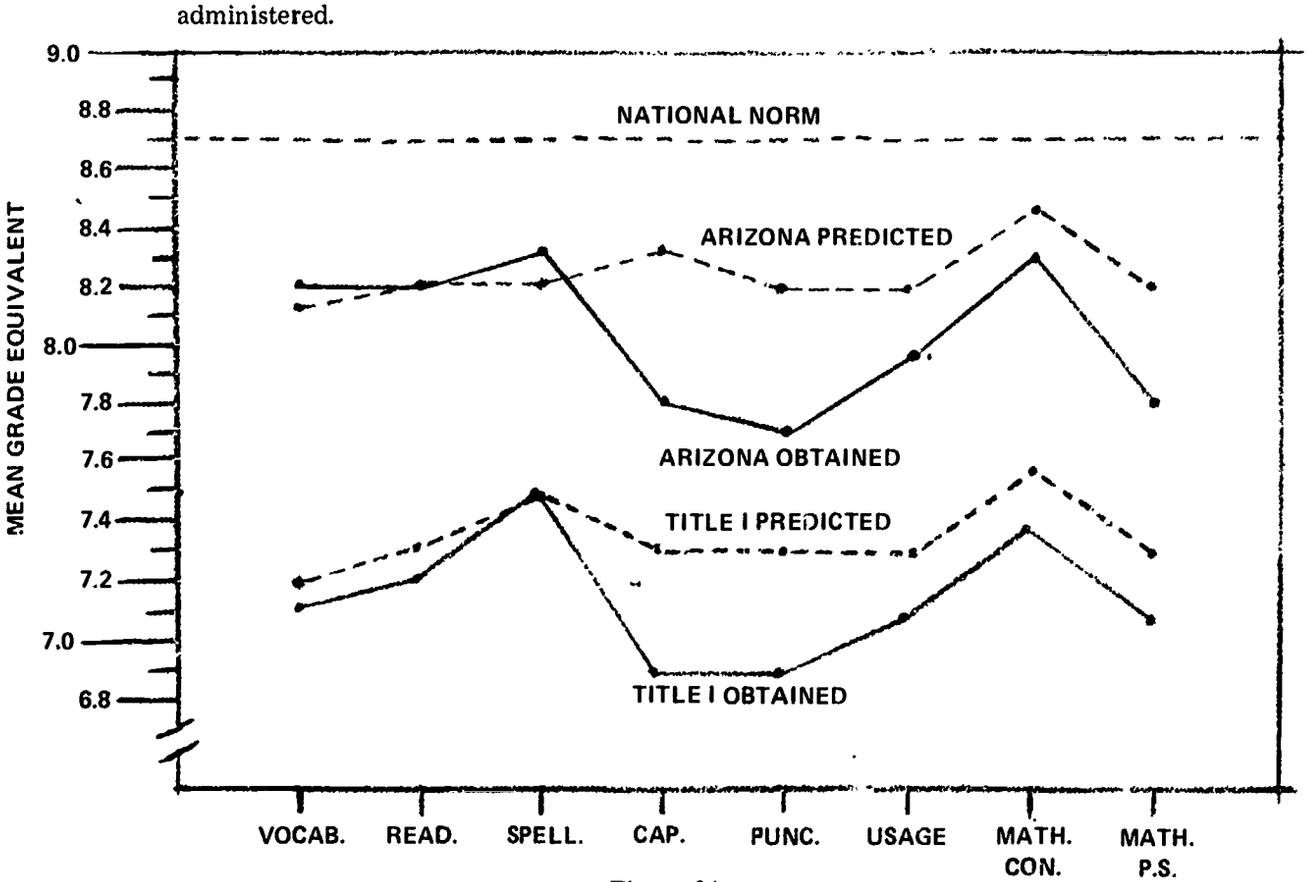


Figure 31

Test Comparisons of Title I Participants
Predicted And Obtained Scores With
ENAPA Sample

The following points can be made concerning the data in Figure 31:

1. The obtained scores of Title I participants appear to almost "mirror" the obtained scores of all students in the total ENAPA sample, except that the Title I scores are several "points" lower.
2. Whereas the total ENAPA sample scored above the predicted score for both vocabulary and spelling, the Title I participants scored below their predicted score in vocabulary and at their predicted score in spelling.
3. As with the remaining tests, Title I participants of the sample scored lower than their predicted score on reading comprehension, capitalization, punctuation, usage, mathematics concepts, as well as mathematics problem solving.
4. While Title I participants scored higher in mathematics concepts than in reading and vocabulary, their mathematics problem solving was lower than these areas.
5. Title I participants scored lowest on the language skills areas of punctuation, capitalization, and usage.

Figure 32 presents the total Title I participant subgroup data by sex, and also compares this data to the total ENAPA sample sex subgroup scores found in Table 11.

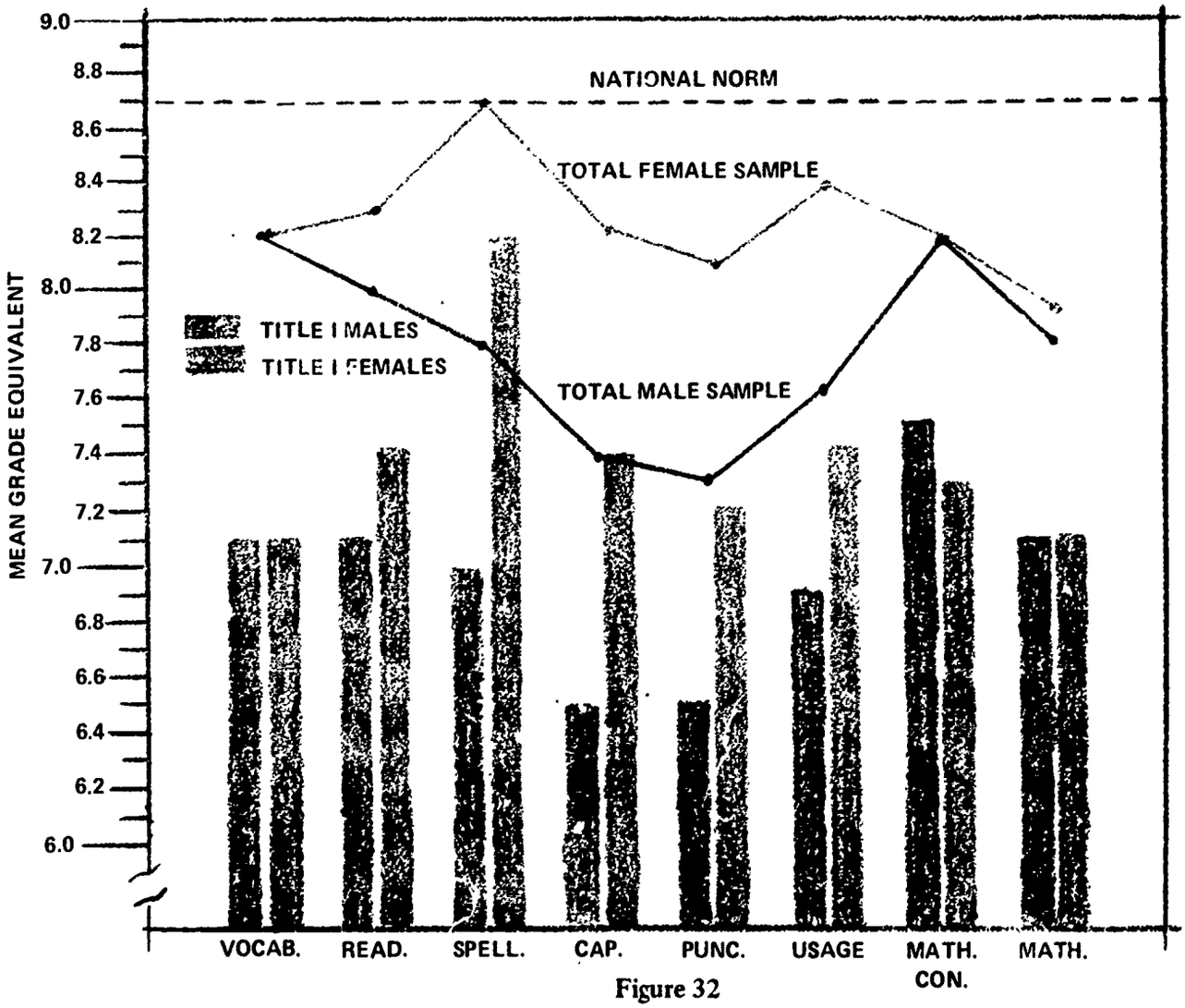
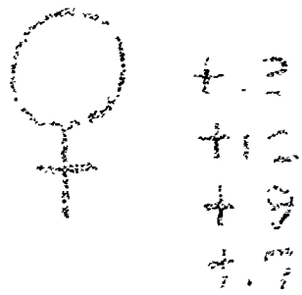


Figure 32

Test Comparisons of Male And Female Predicted
And Obtained Scores of Title I Participants
And The Total ENAPA Sample

The following points can be made from the data in Figures 31 and 32:



1. Very similar to the total sample, Title I female participants scored the same as or higher than the males in all areas tested except one -- mathematics concepts -- in which the males scored .2 "points" higher than the females.
2. As with the total ENAPA sample, the reading discrepancy between males and females in Title I programs was .3 in favor of the females.
3. Moreover, like the total ENAPA sample, males and females in Title I programs had the same or similar scores in the areas of vocabulary and mathematics problem solving.
4. The greatest range of discrepancy between Title I males and females was in the area of spelling (females +1.2), followed closely by capitalization (females +.9), and punctuation (females +.7).

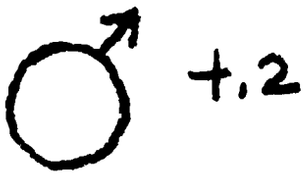


Table 12 presents the Title I participants obtained Mean Grade Equivalent scores by ethnic subgroups. Only four of the six subgroups are listed as the remaining two groups were too small in number to have any representativeness.

Table 12

Comparison of Title I Ethnic Subgroup Obtained Mean Grade Equivalents to Total Title I Participant Scores

	Total Title I Group	Anglo-White	Black	Indian	Spanish Surname
Vocabulary	7.1	8.3	5.9	5.3	6.0
Reading Comprehension	7.2	8.2	5.9	5.9	6.3
Spelling	7.5	8.2	6.2	6.2	7.3
Capitalization	6.9	7.6	5.6	6.1	6.5
Punctuation	6.9	7.7	5.3	6.3	6.1
Usage	7.1	7.7	5.8	6.2	7.0
Mathematics Concepts	7.4	7.6	6.4	6.5	6.9
Mathematics Prob. Solving	7.1	7.6	6.2	6.4	6.6

Figure 33 reveals the data from Table 12 along with ENAPA total sample data found in Table 11.

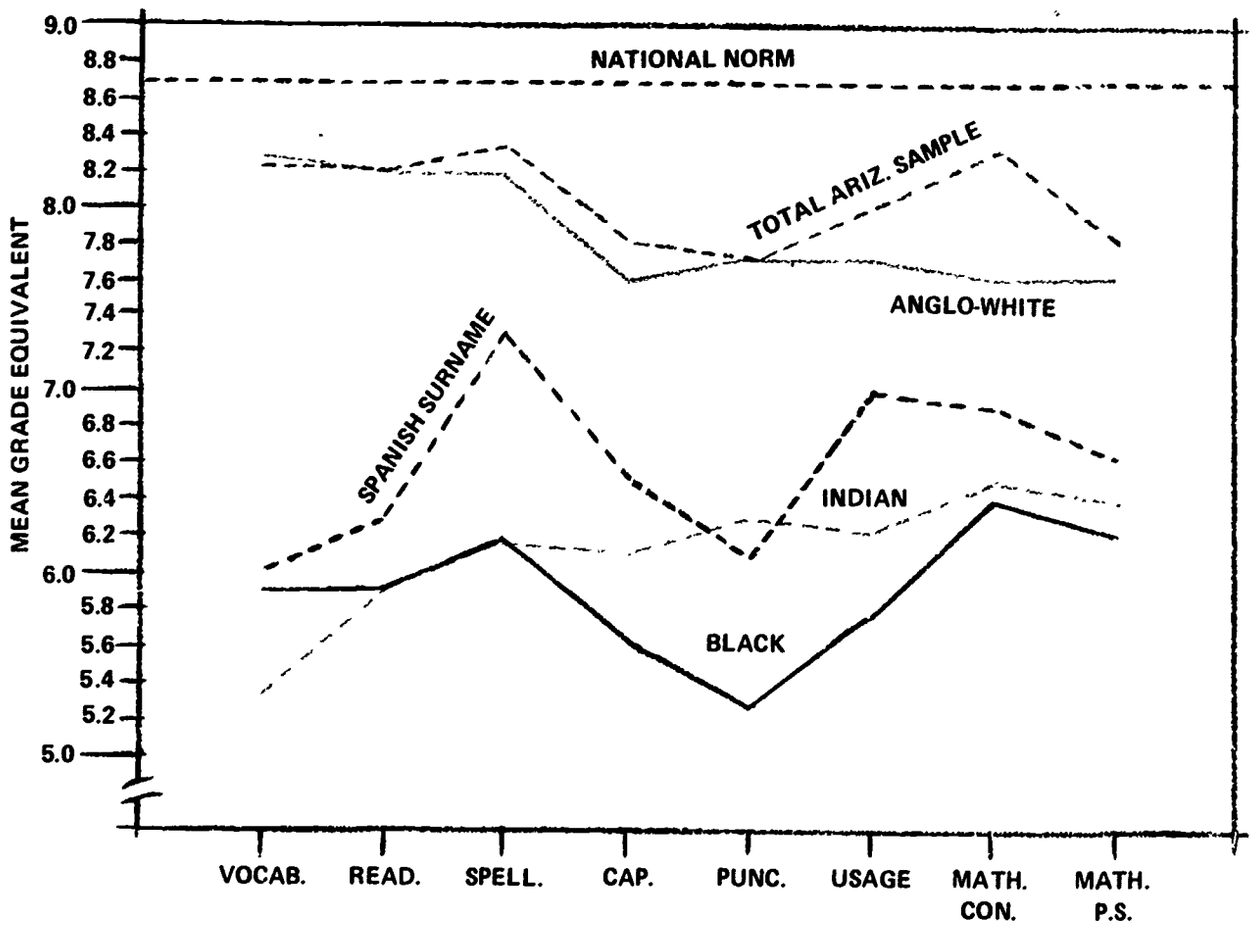


Figure 33

Title I Participants And ENAPA Sample
Comparisons of Obtained
Scores on Each Test

The following points can be made:

Anglo-White Title I participants made scores equal to or higher than the total ENAPA sample in several curriculum areas--reading comprehension, punctuation, and vocabulary. They were only .1 below the total ENAPA sample in spelling and .2 below in the areas of mathematics problem solving and capitalization.

It may prove interesting to the reader to compare data from Figure 33 and Table 12 with previous ENAPA data found in Table 10.

When comparing Table 10 with Table 12, it can be noted that on every test, Title I participants of a particular ethnic origin scored lower than the total sample for that same ethnic group.

As would be expected when comparing these same tables, the Title I participant scores of a particular ethnic origin are quite similar to the total sample of that same ethnic group. The high and low areas are usually the same (See point 1, page 82).

As with the total sample ethnic division, it appears that no generalizations between ethnic groups can be made for the Title I participants as each group has its own scoring pattern among the various curriculum areas.

APPENDIX A 1971 — 72 ENAPA Advisory Committee

AUDIO VISUAL

Ralph Ferguson

CONSULTANTS

Elizabeth Cook, Reading
Carl Beisecker, Mathematics
Raymond Van Diest, Music
Frank Williams, Health

DEPUTY ASSOCIATE SUPERINTENDENT

Mary Jo Livix

DRIVER EDUCATION

Jay Smith

DRUG EDUCATION

Robert Bell

EPDA & CCP

Charles Ardolino

EQUAL EDUCATION

Henry Arredondo
Eloise Banks

INDIAN EDUCATION

Mamie Sizemore
James Turner

PLANNING AND EVALUATION

William Raymond
Richard Ruff
Gerald Cline

SPECIAL EDUCATION

Karen Davis
Gay Hardy
Joe Pasanella

TITLE I, ESEA

Beatrice Bates
Don Johnson
Paul Lemons

TITLE I, MIGRATORY

Louis Chacon
J.O. Maynes, Jr.
William Padilla

TITLE II, LIBRARY

Mary Choncoff

TITLE III, ADULT EDUCATION

Sterling Johnson
James Showers

TITLE III, ESEA

Deane Hurd
Fred Sughrue
Jesse Udall

VOCATIONAL EDUCATION

Carol Norris

VOCATIONAL REHABILITATION

Alfonso Ainsa

APPENDIX B 1971—72 ENAPA Financial Funding Sources

	Amount Budgeted
Planning and Evaluation	$10,877
Title III, ESEA	17,000
Title I, ESEA	3,000
Title I, Migratory	2,000
Title II, Library	2,500
Vocational Education	3,000
Special Education	2,500
	$40,877

THE ARIZONA NEEDS ASSESSMENT MODEL

The plan that follows was developed under the direction of the Arizona Directors of Planning and Evaluation and of ESEA Title III. EPIC Diversified Systems Corporation served as the consulting firm.

Implementation of the plan will be the responsibility of the Director of Planning and Evaluation. He is in the best position to guarantee that, when the plan is followed, it will result in a comprehensive State educational needs assessment. In carrying out the plan, he will work closely with the State Director of ESEA Title III and other division directors.

In the process of identifying the components of the Arizona plan, it is important to recognize that the use of the term "phase" in the reporting of needs assessment activities previously carried out by the State, is not relevant in the following description of the Arizona Needs Assessment Model.

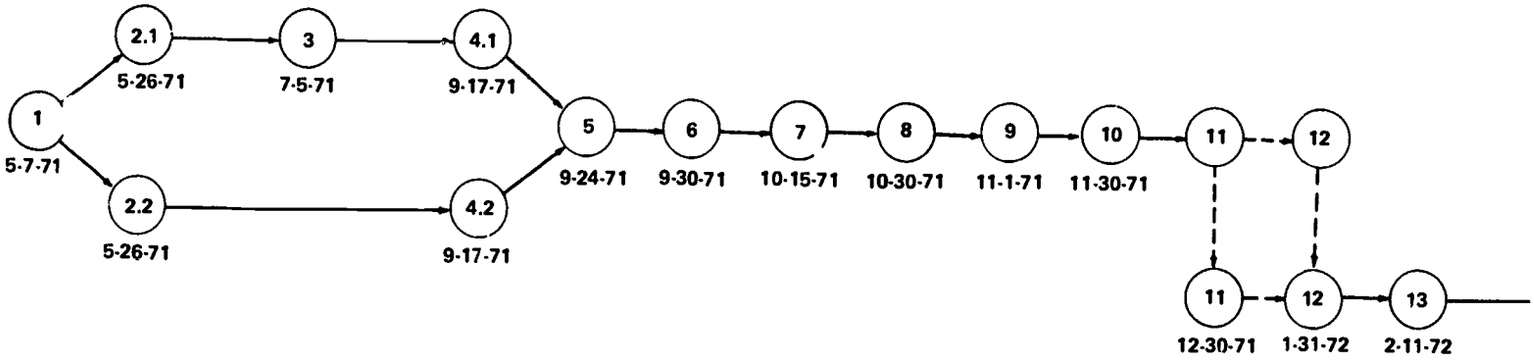
Since the State of Arizona does not have a formally adopted set of educational goals, part of Phase I of the plan is devoted to developing such a set. Another part of Phase I will be to get information about how various segments of school and community populations would rate the importance of attaining each goal. Finally, the goal(s) identified as being most important will be used in implementing Phase II.

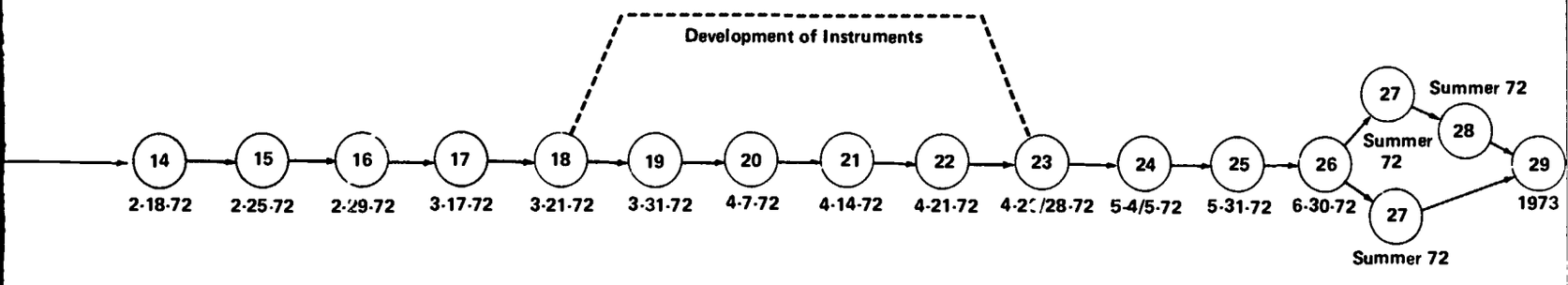
Phase II activities will be oriented to identifying desired and existing levels of competence of learners, with regard to the goal(s) identified as being most important in Phase I. If, for instance, learner competency in basic skills is considered to be most important, Phase II activities will be used to determine where the learner should be and where he is. If a discrepancy occurs between learner status and desired level of competency, that information will be used in the implementing of Phase III.

Phase III will be the educational decision-making portion of the plan. When discrepancies are noted in the Phase II portion, long-and short-term learner-oriented objectives, associated with the critical goals and learner discrepancies, will be developed. These objectives will serve as guidelines for directing State and Federal resources toward realizing the critical goals.

As each Phase II is completed, the information derived from it will be used, for the development of long- and short-term learner objectives, in another Phase III. After each Phase III is implemented, the next most important goal(s) from Phase I, will be used to initiate another Phase II. Periodic up-dating and validating of the rank-order priorities of goals in Phase I is a part of the overall Arizona Needs Assessment Model.

DESCRIPTION OF ACTIVITIES IN THE ARIZONA EDUCATIONAL NEEDS ASSESSMENT MODEL




Development of Instruments
14
2-18-72
15
2-25-72
16
2-29-72
17
3-17-72
18
3-21-72
19
3-31-72
20
4-7-72
21
4-14-72
22
4-21-72
23
4-28-72
24
5-4/5-72
25
5-31-72
26
6-30-72
27
Summer 72
28
Summer 72
29
1973
27
Summer 72

DESCRIPTION OF ACTIVITIES IN THE ARIZONA EDUCATIONAL NEEDS ASSESSMENT MODEL

1 Phase I begins.

2.1 State goals for Arizona are finalized.

2.2 A meeting will be held, involving all interested divisions, to consider the strata of the sample to be used in identifying goal priorities.

3 State goals will be rewritten to focus on the learner with respect to desired behavioral outcomes in the cognitive, effective and psychomotor domains of behavior.

4.1 An instrument will be developed including the following components: (1) collection of demographic information from the respondent and (2) the respondent's ranking of the importance he/she attaches to each learner goal. The instrument will be entitled: Goal Ranking Instrument.

4.2 The sample to be used will be finalized with respect to incorporating all strata identified in Step 2.2. In addition, sampling techniques will be specified in order to assure representative sampling of each component in the strata.

5 Validation of the Goal Ranking Instrument will take place, using a pilot sample representing the strata identified in Step 4.2. The validation will focus on: (1) level of language used in the goals and (2) directions in filling out the instrument.

6 Those schools that are identified in the sample will be asked for cooperation in the collection of data from the Goal Ranking Instrument.

APPENDIX C (Continued)

7 Final commitments on the part of the school's cooperation will be recorded at the Arizona Department of Education.

8 Instruments will be mailed out to the people identified in the sample, with a cover letter describing the importance of returning the information.

9-10 The first phase of the data collection will involve the comparison of the number of returned instruments to the number mailed.

10-11 Follow-up letters and telephone calls will be used to increase the number of returned instruments. The criterion of return is set at 60%.

12 Compilation of the Phase I Final Report. This will involve the ranking of priorities by each component within the stratified sample and also the computation of an overall ranking, across these strata. Using these data, top priority goal(s) will be identified for operationalization in Phase II.

In addition, overall procedures for conducting Phase II will be included.

11-12 Phase II will begin with the initial consideration of the learner sample to be used in the developing and writing of learner performance objectives in the cognitive, effective and psychomotor domains of behavior. This information will be included in the Phase I Report.

13 A meeting will be held, involving all interested department personnel in the Arizona Department of Education, to consider the parameters of the learner sample and how it will be stratified.

APPENDIX C (Continued)

14 The sample will be finalized, using a three-stage stratified sample of counties, districts and schools.

15-16 Three meetings will be held, in different geographical locations in Arizona, with the superintendent of the districts identified in Step 14. The purpose of these meetings will be to explain to the superintendents the rationale underlying the needs assessment program and the necessary procedures for carrying it out. A commitment on their part with respect to cooperation will then be sought.

16-17 District meetings will be held in order to explain the needs assessment program to the participating teachers. These meetings will be conducted by the respective district superintendents, along with Arizona Department of Education personnel, if requested.

18-19 Three workshops will be held, involving the participating teachers at different geographical locations in Arizona, for the purpose of developing and writing learner performance objectives in the cognitive, affective and psychomotor domains of behavior. Each workshop will last three days, at which time performance objectives will be written at the school and district levels. Two considerations should be pointed out at this time. First, a learner need is being defined as the situation that exists when learner performance is below that which is desired -- consequently, there is a need for performance objectives. Second, the generation of performance objectives will begin at the school level; because it is felt that, since more information is available at this level in terms of student performance, the generation of valid performance objectives can readily be assured.

20 Using the performance objectives generated at the school and district levels, county and state level performance objectives will be developed to incorporate those objectives at the school and district levels.

21 Packets of standardized cognitive instruments will be sent to the participating teachers.

22 Each teacher will then compare his school's objectives with the instruments mailed to him and select that instrument which he feels best measures his objectives. The teachers will then go through the same process for their district level objectives. The purpose of this step is to assure the content validity of the cognitive measuring instrument. The teachers in each district will then elect a district representative that will represent them in the final selection of a cognitive measuring instrument at the state level.

18-23 Arizona Department of Education personnel will develop and validate affective and psychomotor measuring instruments using information from the teacher's workshops in Steps 18-19.

18-23 A meeting will be held in Phoenix involving all district representatives, for the purpose of selecting a cognitive measuring instrument. Using the information from the teachers they represent, the district representatives will again review the measuring instruments and reach consensus on the instrument. In this way, consistency in test information is assured across the total sample. In addition, the district representatives will review the affective and psychomotor instruments that were developed by Arizona Department of Education personnel, using the information compiled during the teacher workshops in Steps 18-19. Their recommendations will then be incorporated into the final instrument.

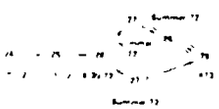
APPENDIX C (Continued)

24 The previously selected and developed instruments will be administered to the student sample. In order to assure consistency in administration procedures and, therefore, assure reliability, only qualified personnel in the selected schools will administer the instruments.

25 The data will be analyzed, using the appropriate statistical techniques. Various comparisons will be made, using the collected demographic data, in order to not only identify learner needs by school, district, county and state, but also by sub-groupings within the student sample.

26 A final report of Phase II will be compiled and will include the identified learner needs by state, county, district, school and sub-grouping within the student sample. Some examples of sub-groupings might be sex, ethnic representation, rural vs. urban, school size, etc.

27 The second stage of Phase II will begin with the identification of an enlarged student sample incorporating additional grade levels and/or content areas. This implies that needs assessment is continuous in nature, in that it will recycle each year to identify learner needs as they relate to the goals specified in Phase I.



27 Phase III begins with the specification of long and short range performance objectives for the student population of Arizona. These objectives will be based upon the needs assessment information from Phase II.

28 Various divisions of the Arizona Department of Education can then compare "present" and "proposed" project objectives to the objectives generated in Step 27 as a means of increasing the effectiveness of the projects implemented within the state. Effectiveness could be defined as the degree to which a given project or program relates to the needs of children.

29 Sometime in 1973, Phase I will again be conducted to determine if any changes and/or additions are necessary in the goals of education for Arizona and their priorities.

APPENDIX D Description of Selected Iowa Tests of Basic Skills*

Seven tests of the battery of tests in the Iowa Tests of Basic Skills were selected for use in this phase of ENAPA. The following is a brief description and time limits on each test used.

VOCABULARY TEST

This test assesses student knowledge of the meanings of words. The test publisher indicates that in the construction of the vocabulary test, the major guides in the selection of words were frequency of usage, as determined from standard sources, balanced inclusion of the parts of speech, and representation of various subject matter. Three general skills are tested:

(1) use of tools involved in word recognition (phonic, context clues, etc.),

(2) knowledge of the meanings of words, and

(3) sensitivity to fine differences in meaning, as well as judgment in choosing the most appropriate word in a given context.

The student time limit allotted to this test is 17 minutes.

*Adapted from the ITBS Teachers' Guide for Administration, Interpretation, and Use. Houghton Mifflin Company, Boston.

READING COMPREHENSION

This test measures the ability to understand what is read. The publisher classifies the skills tested under four headings:

(1) details — the recognition and understanding of stated or implied factual details and relationships

(2) purpose -- the ability to discern the purpose or main idea of a paragraph or selection

(3) organization — the ability to organize ideas

(4) evaluation — the evaluation of what is read

The manual also indicates that because of the close correlation in test performance on items of these four skills, they have not derived a separate score for each type. The time limit for this test is 55 minutes.

SPELLING TEST

This test is one of four tests in the ITBS which assesses language skills. The spelling test employs an item classification system in which the student identifies whether or not a word contains spelling errors.

The types of errors presented include:

(1) double letter

(2) final e; e before suffix

(3) f, ft, ph, v substitutions

(4) interchanged letters

(5) c, ck, k substitutions

(6) l, el, le substitutions

(7) miscellaneous and multiple errors

(8) no mistakes

(9) omitted letters

(10) plural forms

(11) r, er, or substitutions

(12) s, sc, sh, c, ch, t, z substitutions

(13) t, ed substitutions

(14) vowel substitutions

(15) w, u, ou, ue substitutions

TT
SS
ff

r er

T
ED

(16) x, xs, xc, cc substitutions

(17) y, ey, i substitutions

The test is administered along with the next three tests in a single period of 67 working minutes. The spelling test takes 12 minutes of this time allotment.

CAPITALIZATION TEST

The second test used to assess language skills is a 15 minute test in which the student is asked to find errors, if any, in capitalization. Approximately 26 different types of capitalization areas may be tested.

Some of these are:*

I

CAMEL

FEBRUARY

THOMAS ROAD

(1) the pronoun "I"

(2) names of persons or animals

(3) first word of a sentence

(4) certain abbreviations

(5) names of months

(6) names of countries

(7) names of streets and avenues

(8) names of buildings

(9) proper adjectives

(10) specific brand names

PUNCTUATION TEST

This test, which has a 20 minute time limit, is the third test of language skills. Like the previous test, students correct punctuation errors, if any. Eight major punctuations are considered -- use of:

?

,

:

!

(1) period

(2) question mark

(3) comma

(4) apostrophe

(5) double quotation marks

(6) colon

(7) semicolon to separate co-ordinate clauses not joined by a conjunction

(8) exclamation mark

USAGE TEST

The last test of language skills is the Usage Test, which has a 20 minute time limit. Skills assessed include:

PRONOUNS

VERBS

ADVERBS

(1) use of promouns

(2) use of verbs

(3) use of adjectives and adverbs

(4) avoidance of double negative

(5) avoidance of redundancies

(6) homonyms commonly confused

(7) miscellaneous word forms

MATHEMATICS CONCEPTS TEST

This test, one of two in the area of mathematics, tests understanding of the number system, as well as mathematical terms and operations. Concepts which might be tested include:

(1) currency

(2) decimals

(3) equations, inequalities, and number sentences

(4) fractions

(5) geometry

(6) measurement

(7) numeration and number systems

(8) percents — meaning and use

(9) ratio and proportion

(10) sets

(11) The Mathematics Concepts Test

This test and the next test are administered in a single period of 60 working minutes. The Mathematics Concepts Test takes 30 minutes of this total time.

MATHEMATICS PROBLEM SOLVING TEST

This test, the second in the arithmetic skill area, tests several of the same concepts as the previous test, but in a functional setting of practical problem situations. The concepts tested include:

(1) currency

(2) decimals

(3) fractions

3/8

(4) geometry

(5) measurements

(6) percents

(7) ratio and proportion

(8) whole numbers

0/0

Addition, subtraction, multiplication, and division processes may be used in solution of the problem. The time limit for this test is 30 minutes.

APPENDIX E SUMMARY STATISTICS FOR ENAPA SAMPLE MEAN TEST SCORES

INTRODUCTION

For a given test, each of the eight tables presented in this appendix provides the following information by ethnic group — sample size, sample standard deviation, sample mean, standard error of the mean, and 95 percent confidence interval for the mean.

ORGANIZATION

The stated summary statistics for the eight tests are provided in the following tables:

INTERPRETATION

Sample Size. The number of students who participated in the testing program.

Sample Mean. The arithmetic average score.

Sample Standard Deviation. Approximately 68 percent of the students' scores in the sample will fall within the range from one standard deviation below the sample mean to one standard deviation above the sample mean.

Standard Error of the Mean. The odds are about two to one that the obtained sample mean does not deviate more than plus or minus one standard error of the mean from the mean of all children that the sample represents. Or to say it another way, if one took repeated samples of size N where N is the size of the original sample, then 68 percent of the sample means would be within the range from one standard error of the mean below the sample mean to one standard error of the mean above the sample mean.

Ninety-Five Percent Confidence Interval. There is a 95 percent chance that the true mean of all students the sample represents falls within the range of scores which define the 95 percent confidence interval.

TABLE 13

Summary Statistics For
Vocabulary Test

Ethnic Group	Sample Size	Sample Standard Deviation	Standard Error of the Mean	Sample Mean	95 Percent Confidence Interval
Anglo-White	1,849	1.82	.04	8.7	8.6 – 8.8
Black	138	1.76	.15	6.6	6.3 – 6.9
Indian	63	1.50	.19	5.7	5.3 – 6.1
Oriental	16	1.90	.49	9.2	8.2 – 10.1
Other nonwhite	12	1.54	.46	7.9	7.0 – 8.8
Spanish surname	365	1.71	.09	6.7	6.6 – 6.9
Group Total	2,444	2.01	.04	8.2	8.1 – 8.3

TABLE 14

Summary Statistics For Reading Comprehension Test

Ethnic Group	Sample Size	Sample Standard Deviation	Standard Error of the Mean	Sample Mean	95 Percent Confidence Interval
Anglo-White	1,850	1.72	.04	8.6	8.5 – 8.7
Black	139	1.66	.14	6.6	6.4 – 6.9
Indian	63	1.39	.18	6.2	5.8 – 6.5
Oriental	16	1.54	.40	9.2	8.5 – 10.0
Other nonwhite	12	1.60	.48	7.4	6.5 – 8.4
Spanish surname	364	1.62	.09	7.1	6.9 – 7.3
Group Total	2,445	1.85	.04	8.2	8.1 – 8.3

TABLE 15

Summary Statistics For
Spelling Test

Ethnic Group	Sample Size	Sample Standard Deviation	Standard Error of the Mean	Sample Mean	95 Percent Confidence Interval
Anglo-White	1,843	2.13	.05	8.5	8.4 – 8.6
Black	137	2.36	.20	7.0	6.6 – 7.4
Indian	62	2.39	.30	6.9	6.3 – 7.5
Oriental	16	1.67	.43	10.3	9.4 – 11.1
Other nonwhite	12	2.53	.76	7.4	5.9 – 8.8
Spanish surname	362	2.14	.11	7.5	7.3 – 7.7
Group Total	2,433	2.22	.45	8.2	8.1 – 8.3

Summary Statistics For
Capitalization Test

Ethnic Group	Sample Size	Standard Deviation	Standard Error of the Mean	Sample Mean	95 Percent Confidence Interval
Anglo-White	1,844	2.17	.05	8.1	8.0 – 8.2
Black	137	2.11	.18	6.4	6.0 – 6.8
Indian	62	2.06	.26	6.6	6.0 – 7.2
Oriental	16	2.14	.55	9.4	8.3 – 10.5
Other nonwhite	12	2.42	.73	7.2	5.8 – 8.7
Spanish surname	362	1.96	.10	7.0	6.8 – 7.2
Group Total	2,434	2.21	.45	7.8	7.7 – 7.9

TABLE 17

Summary Statistics For
Punctuation Test

Ethnic Group	Sample Size	Sample Standard Deviation	Standard Error of the Mean	Sample Mean	95 Percent Confidence Interval
Anglo-White	1,843	2.19	.05	8.0	7.9 – 8.1
Black	138	2.19	.19	6.3	6.0 – 6.7
Indian	62	2.03	.26	6.8	6.3 – 7.3
Oriental	16	1.90	.49	9.9	9.0 – 10.9
Other nonwhite	12	2.35	.71	7.7	6.3 – 9.1
Spanish surname	362	1.96	.10	6.8	6.6 – 7.0
Group Total	2,434	2.24	.05	7.7	7.6 – 7.8

TABLE 18

Summary Statistics For
Usage Test

Ethnic Group	Sample Size	Sample Standard Deviation	Standard Error of the Mean	Sample Mean	95 Percent Confidence Interval
Anglo-White	1,844	2.12	.05	8.3	8.2 – 8.4
Black	138	1.78	.15	6.2	5.9 – 6.5
Indian	62	1.78	.23	6.4	6.0 – 6.9
Oriental	16	2.43	.63	9.2	8.0 – 10.4
Other nonwhite	12	2.06	.62	6.8	5.5 – 8.0
Spanish surname	362	1.96	.10	7.4	7.2 – 7.6
Group Total	2,435	2.16	.04	8.0	7.9 – 8.1

TABLE 19

Summary Statistics For
Mathematics Concepts Test

Ethnic Group	Sample Size	Sample Standard Deviation	Standard Error of the Mean	Sample Mean	95 Percent Confidence Interval
Anglo-White	1,842	1.88	.04	8.5	8.4 – 8.6
Black	139	1.58	.13	7.0	6.7 – 7.2
Indian	62	1.26	.16	6.7	6.4 – 7.1
Oriental	16	1.78	.46	9.6	8.7 – 10.5
Other nonwhite	12	1.86	.56	8.1	7.0 – 9.2
Spanish surname	364	1.51	.08	7.4	7.3 – 7.6
Group Total	2,436	1.89	.04	8.3	8.2 – 8.4

TABLE 20

Summary Statistics For Mathematics
Problem Solving Test

Ethnic Group	Sample Size	Sample Standard Deviation	Standard Error of the Mean	Sample Mean	95 Percent Confidence Interval
Anglo-White	1,838	1.89	.04	8.1	8.0 – 8.2
Black	138	1.54	.13	6.5	6.2 – 6.7
Indian	61	1.63	.21	6.6	6.1 – 7.0
Oriental	16	1.51	.39	9.2	8.4 – 9.9
Other nonwhite	12	1.70	.51	8.0	7.0 – 9.0
Spanish surname	363	1.60	.08	6.9	6.7 – 7.1
Group Total	2,429	1.92	.04	7.8	7.7 – 7.9

APPENDIX F

TABLE 21 Listing of School Districts Used in the Stratified Random Selection Sample Process

	Elementary District	County	1970–71 ADM	8th Grade Membership at Year End 1970–71
Stratum #1	Tucson #1	Pima	39,334	4,756
	Washington #6	Maricopa	19,915	2,418
	Scottsdale #48	Maricopa	19,372	2,418
	Mesa #4	Maricopa	14,828	1,861
	Cartwright #83	Maricopa	11,233	1,353
	Tempe #3	Maricopa	11,219	1,170
	Phoenix #1	Maricopa	10,871	1,026
	Roosevelt #66	Maricopa	10,298	1,095
	Alhambra #68	Maricopa	9,427	1,213
	Madison #38	Maricopa	6,620	875
	Yuma #1	Yuma	6,497	761
	Glendale #40	Maricopa	6,078	765
	Creighton #14	Maricopa	5,724	743
	Flagstaff #1	Coconino	5,575	593

Table 21 (Continued)

	Elementary District	County	1970–71 ADM	8th Grade Membership at Year End 1970–71
Stratum #2	Sunnyside #12	Pima	5,542	563
	Isaac #5	Maricopa	5,497	539
	Amphitheater #10	Pima	4,973	66.
	Paradise Valley #69	Maricopa	4,828	493
	Douglas #27	Cochise	3,578	393
	Osborn #8	Maricopa	3,441	411
	Chandler #80	Maricopa	3,244	393
	Flowing Wells #8	Pima	3,015	316
	Prescott #1	Yavapai	2,948	347
	Dysart #89	Maricopa	2,782	239
	Nogales #1	Santa Cruz	2,704	283
Stratum #3	Casa Grande #4	Pinal	2,673	353
	Murphy #21	Maricopa	2,658	251
	Balsz #31	Maricopa	2,535	281
	Wilson #7	Maricopa	2,147	222
	Avondale #44	Maricopa	2,146	221
	Kingman #4	Mohave	2,097	278
	Sierra Vista #40	Cochise	2,021	269

Table 21 (Continued)

	Elementary District	County	1970–71 ADM	8th Grade Membership at Year End 1970–71
Stratum #4	Coolidge #21	Pinal	1,919	207
	Chinle #24	Apache	1,878	153
	Window Rock #8	Apache	1,848	161
	Winslow #1	Navajo	1,844	205
	Globe #1	Gila	1,821	258
	Bisbee #2	Cochise	1,806	215
	Miami #40	Gila	1,763	196
	Mammoth #8	Pinal	1,657	192
	Eloy #11	Pinal	1,630	156
	Ft. Huachuca Accom. #00	Cochise	1,611	119
Stratum #5	Peoria #11	Maricopa	1,561	184
	Safford #1	Graham	1,535	179
	Holbrook #3	Navajo	1,506	177
	Laveen #59	Maricopa	1,477	155
	Crane #13	Yuma	1,475	166
	Deer Valley #97	Maricopa	1,312	156
	Tuba City #15	Coconino	1,258	131
	Ajo #15	Pima	1,254	158
	Ray #3	Pinal	1,220	138
	Littleton #65	Maricopa	1,203	139

Table 21 (Continued)

	Elementary District	County	1970–71 ADM	8th Grade Membership at Year End 1970–71
Stratum #6	Superior #15	Pinal	1,166	162
	Morenci #30	Greenlee	1,164	131
	Marana #6	Pima	1,145	144
	Yuma City (Parker) #27	Yuma	1,103	126
	Willcox #13	Cochise	1,096	141
	Snowflake #5	Navajo	1,081	101
	Whiteriver #20	Navajo	1,074	101
	Ganado #19	Apache	1,005	93
	Somerton #11	Yuma	1,001	72
	Lake Havasu #25	Mohave	1,001	135
Stratum #7	Tolleson #17	Maricopa	980	97
	Buckeye #33	Maricopa	926	101
	Cottonwood–Oak Creek #6	Yavapai	921	102
	Kayenta #27	Navajo	904	93
	Litchfield #79	Maricopa	885	112
	Rice #20	Gila	874	0
	Gilbert #41	Maricopa	866	102
	Page #8	Coconino	809	90
	Apache Junct. #43	Pinal	760	79
	Florence #1	Pinal	725	83

Table 21 (Continued)

	Elementary District	County	1970–71 ADM	8th Grade Membership at Year End 1970–71
Stratum #8	Indian Oasis #40	Pima	723	67
	Round Valley Con. #10	Apache	713	97
	Benson #9	Cochise	699	81
	Sacaton #18	Pinal	680	0
	Copper Belt #41	Gila	639	59
	Kyrene #28	Maricopa	638	61
	Sahuarita #30	Pima	632	77
	Williams AFB Accom. #510	Maricopa	615	62
	Thatcher #4	Graham	607	75
	Tombstone #1	Cochise	595	68
Stratum #9	Bullhead City #15	Mohave	594	84
	Williams #2	Coconino	583	63
	Catalina Foothills #16	Pima	576	84
	Showlow #10	Navajo	574	72
	Pinetop-Lakeside #32	Navajo	565	65
	Gila Bend #24	Maricopa	553	52
	Puerco #18	Apache	545	71
	Duncan #2	Greenlee	542	53
	Clifton #3	Greenlee	540	67
	Stanfield #24	Pinal	489	55

Table 21 (Continued)

	Elementary District	County	1970–71 ADM	8th Grade Membership at Year End 1970–71
Stratum #10	Bagdad #20	Yavapai	489	66
	Wickenburg #9	Maricopa	488	64
	Liberty #25	Maricopa	488	55
	Payson #10	Gila	464	53
	Fowler #45	Maricopa	434	50
	Colorado City #14	Mohave	425	37
	Maricopa #20	Pinal	410	44
	Wellton #24	Yuma	410	40
	Camp Verde #28	Yavapai	409	53
	Oracle #2	Pinal	389	51
Stratum #11	St. Johns #1	Apache	368	49
	Riverside #2	Maricopa	361	40
	Pima #6	Graham	340	37
	Naco #23	Cochise	329	37
	Mohave Valley #16	Mohave	320	43
	Ft. Thomas #7	Graham	320	40
	Queen Creek #95	Maricopa	318	19
	Mohawk Valley #17	Yuma	309	32
	Tanque Verde #13	Pima	289	38
	Cave Creek #93	Maricopa	263	41

Table 21 (Continued)

	Elementary District	County	1970–71 ADM	8th Grade Membership at Year End 1970–71
Stratum #12	Arlington #47	Maricopa	259	24
	Gadsden #32	Yuma	253	32
	Solomonville #5	Graham	249	38
	Chino Valley #51	Yavapai	247	27
	St. David #21	Cochise	240	30
	Kenilworth #28	Pinal	235	27
	Grand Canyon #4	Coconino	221	16
	Elfrida #12	Cochise	220	37
	Verde #3	Yavapai	218	21
	Picacho #33	Pinal	215	18
Stratum #13	Pendergast #92	Maricopa	208	26
	Fredonia #6	Coconino	205	27
	Toltec #22	Pinal	204	9
	McNary #23	Apache	197	23
	Palominas #49	Cochise	195	20
	Sitgreaves #33	Navajo	185	18
	Joseph City #2	Navajo	176	23
	Humbolt #22	Yavapai	172	29
	Palo Verde #49	Maricopa	161	23
	Union #62	Maricopa	157	20

Table 21 (Continued)

	Elementary District	County	1970–71 ADM	8th Grade Membership at Year End 1970–71
Stratum #14	Quartzsite #4	Yuma	151	27
	Mayer #43	Yavapai	142	18
	Higley #60	Maricopa	141	18
	Tubac–Amado #5	Santa Cruz	140	17
	Seligman #40	Yavapai	137	14
	Hyder #16	Yuma	126	17
	Continental #39	Pima	122	9
	Keams Canyon #25	Navajo	117	20
	Bowie #14	Cochise	115	14
	Patagonia #6	Santa Cruz	115	0
Stratum #15	Bonita #16	Graham	111	13
	Eleven Mile Corner Accom. #00	Pinal	107	8
	Canon #50	Yavapai	106	10
	Vail #20	Pima	104	13
	Nadaburg #81	Maricopa	103	17
	Peach Springs #8	Mohave	100	8
	J. O. Combs #44	Pinal	100	7
	San Simon #18	Cochise	90	8
	Wenden #19	Yuma	89	10
	Ruth Fisher #90	Maricopa	84	12

Table 21 (Continued)

	Elementary District	County	1970–71 ADM	8th Grade Membership at Year End 1970–71
Stratum #16	Chloride #11	Mohave	80	5
	Ash Fork #31	Yavapai	78	13
	Aquila #63	Maricopa	78	8
	Calabasas #3	Santa Cruz	76	7
	Salome #30	Yuma	75	10
	Patagonia J. H. #21	Santa Cruz	73	28
	Pomerene #64	Cochise	71	14
	Mary E. Dill #51	Pima	70	9
	Santa Cruz #28	Santa Cruz	64	0
	Pearce #22	Cochise	61	9
Stratum #17	Red Rock #5	Pinal	57	5
	Double Adobe #45	Cochise	56	0
	Sonoita #25	Santa Cruz	48	0
	Pine #12	Gila	47	4
	Ash Creek #53	Cochise	47	0
	Maine Consolidated #10	Coconino	46	0
	Morristown #75	Maricopa	46	6
	Beaver Creek #26	Yavapai	45	2
	Young #5	Gila	38	3
	Yarnell #52	Yavapai	37	4

Table 21 (Continued)

	Elementary District	County	1970–71 ADM	8th Grade Membership at Year End 1970–71
Stratum #18	McNeal #55	Cochise	36	0
	Cochise #26	Cochise	35	7
	Alpine #7	Apache	35	4
	Owens Whitney #6	Mohave	33	5
	Navajo Comp. Sta. #5	Apache	32	0
	Concho #6	Apache	31	5
	Theba #94	Maricopa	31	6
	San Fernando #35	Pima	30	3
	Skull Valley #15	Yavapai	25	21
	Sentinel #71	Maricopa	25	1
Stratum #19	Kirkland #23	Yavapai	24	0
	Bouse #26	Yuma	23	2
	Mobile #86	Maricopa	23	0
	Pinedale #9	Navajo	21	2
	Portal #34	Cochise	21	3
	Yucca #13	Mohave	19	0
	Hillside #35	Yavapai	18	0
	Valentine #22	Mohave	18	0
	Littlefield #9	Mohave	14	0
	Hackberry #3	Mohave	13	4

Table 21 (Continued)

	Elementary District	County	1970–71 ADM	8th Grade Membership at Year End 1970–71
Stratum #20	Vicksburg #3	Yuma	13	1
	Nutrioso #4	Apache	13	4
	Apache #42	Cochise	12	0
	Chevelon Butte #5	Coconino	12	0
	Lochiel #9	Santa Cruz	12	0
	Moccasin #10	Mohave	11	0
	Horse Mesa Accom. #509	Maricopa	11	1
	Packard #33	Gila	9	3
	Mt. Lemmon Accom. #00	Pima	7	0
	Crown King #41	Yavapai	5	0
	Walnut Grove #7	Yavapai	3	0
	Champie #14	Yavapai	3	0
	Blue #22	Greenlee	2	1

APPENDIX C

Table 22 Alphabetical Listing of School Districts Selected for the Sample as a Result of the Stratified Random Selection Process

District and No.	County	District and No.	County
Ajo #15	Pima	Keams Canyon #25	Navajo
Alhambra #68	Maricopa	Kingman #4	Mohave
Apache Junct. #43	Pinal	Madison #38	Maricopa
Bisbee #2	Cochise	Mammoth #8	Pinal
Bonita #16	Graham	Mesa #4	Maricopa
Bouse #26	Yuma	Mobile #86	Maricopa
Cartwright #83	Maricopa	Morristown #75	Maricopa
Champie #14	Yavapai	Payson #10	Gila
Chino Valley #51	Yavapai	Phoenix #1	Maricopa
Chloride #11	Mohave	Quartzsite #4	Yuma
Cochise #26	Cochise	Roosevelt #66	Maricopa
Colorado City #14	Mohave	Scottsdale #48	Maricopa
Continental #39	Pima	Sitgreaves #33	Navajo
Flowing Wells #8	Pima	Tanque Verde #13	Pima
Ganado #19	Apache	Tempe #3	Maricopa
Gila Bend #24	Maricopa	Thatcher #4	Graham
Glendale #40	Maricopa	Tucson #1	Pima
Hyder #16	Yuma	Vicksburg #3	Yuma
Indian Oasis #40	Pima	Walnut Grove #7	Yavapai
Kayenta #27	Navajo	Washington #6	Maricopa
		Yuma #1	Yuma

APPENDIX H Procedures Used to Select a Representative District in Stratum #19

In Stratum #19, Kirkland School District (Yavapai County) was originally selected by the random process to represent the stratum. Correspondence with the school district revealed that they did not have any eighth grade students. Valentine School District #22 (Mohave County) was then randomly selected to represent the stratum. After checking Department records and calling the district, it was determined that the school only accommodated students up through the sixth grade level. The random selection process was utilized again to select Hackberry School District #3 (Mohave County). The school district informed us that they only had three students at the eighth grade level. All of these students were transported to another school district for classes.

It was decided to group the remaining districts in this stratum (with the exception of Mobile School District which had previously been selected because of their high expenditure of funds per student) in alphabetical order. Each district was contacted by telephone in turn until one was located that had eighth grade students. The list was as follows:

District	County
Bouse #26	Yuma
Hillside #36	Yavapai
Littlefield #9	Mohave
Pinedale #9	Navajo
Portal #34	Cochise
Yucca #13	Mohave

Using this process, the Bouse School District #26 was selected.

APPENDIX I

School Districts Added to the Sample Due to Their High Per Pupil Expenditures

Two of the five school districts selected to be included in the sample because of their high dollar expenditures per ADA did not have any eighth grade students. Those districts were Blue #22 (Greenlee County), and Crown King #41 (Yavapai County). Substitutes for those districts were made by selecting the next district with the highest dollar expenditure per ADA. The selection list was as follows:

District	County	Expenditures per ADA
Blue #22	Greenlee	$4,436.14
Mobile #86	Maricopa	3,235.06
Walnut Grove #7	Yavapai	2,936.36
Crown King #41	Yavapai	2,648.52
Champie #14	Yavapai	2,531.59
Pinal Spec. #99	Pinal	2,316.55
Cochise #26	Cochise	2,275.25
Keams Canyon #25	Navajo	2,065.73
Mt. Lemmon Accom. #00	Pima	2,057.27
Chloride #11	Mohave	1,905.04
Hyder #16	Yuma	1,895.21

Pinal Special #99 was not included in the sample because they only had students who were trainable, not educable.

Cochise #26 had been selected to be in the sample through the stratified random selection process, so another district would be selected to strengthen the representation of students from this "type" of district.

Mt. Lemmon Accom. #00 did not have any eighth grade students.

Chloride #11 had been selected to be in the sample through the stratified random selection process, so another district would be selected to strengthen the representation of students from this "type" of district.

The final districts selected because of their high expenditures per ADA were:

Mobile #86
Walnut Grove #7
Champie #14
Keams Canyon #25
Hyder #16

APPENDIX J School Districts Added to the Sample Due to Their Low Per Pupil Expenditures

District	County	Expenditures per ADA
1. Thatcher #4	Graham	$465.05
2. Colorado City #14	Mohave	533.83
3. Quartzsite #4	Yuma	536.57
4. Apache Junct. #43	Pinal	539.25
5. Mammoth #8	Pinal	539.80

APPENDIX K

District and No.	County	8th Grade 1970–71 Membership End of Year	Percent of Total 1970–71 ADM	No. of Students to be Included in the Sample	No. of Students Actually Included in the Sample
Ajo #15	Pima	158	.731	18	30
Alhambra #68	Maricopa	1,213	5.613	140	157
Apache Junct. #43	Pinal	79	.366	9	14
Bisbee #2	Cochise	215	.995	25	30
Bonita #16	Graham	13	.060	2	4
Bouse #26	Yuma	2	.009	1	2
Cartwright #83	Maricopa	1,353	6.26	157	170
Champie #14	Yavapai	0	.000	1	2
Chino Valley #51	Yavapai	27	.125	3	6
Chloride #11	Mohave	5	.023	1	7
Cochise #26	Cochise	7	.032	1	4
Colorado City #14	Mohave	37	.171	4	7
Continental #39	Pima	9	.042	1	4
Flowing Wells #8	Pima	316	1.462	37	43
Ganado #19	Apache	93	.430	11	13
Gila Bend #24	Maricopa	52	.241	6	8
Glendale #40	Maricopa	765	3.540	89	88

APPENDIX K (Continued)

District and No.	County	8th Grade 1970–71 Membership End of Year	Percent of Total 1970–71 ADM	No. of Students to be Included in the Sample	No. of Students Actually Included in the Sample
Hyder #16	Yuma	17	.079	1	4
Indian Oasis #40	Pima	67	.320	8	9
Kayenta #27	Navajo	93	.430	11	14
Keams Canyon #25	Navajo	20	.093	2	8
Kingman #4	Mohave	278	1.287	32	36
Madison #38	Maricopa	875	4.049	101	114
Mammoth #8	Pinal	192	.889	22	26
Mesa #4	Maricopa	1,861	8.611	215	161
Mobile #86	Maricopa	0	.000	1	1
Morristown #75	Maricopa	6	.028	1	3
Payson #10	Gila	53	.245	6	11
Phoenix #1	Maricopa	1,026	4.748	119	124
Quartzsite #4	Yuma	27	.125	3	6
Roosevelt #66	Maricopa	1,095	5.067	127	137
Scottsdale #48	Maricopa	2,418	11.190	280	300
Sitgreaves #33	Navajo	18	.083	2	4
Tanque Verde #13	Pima	38	.176	4	7

APPENDIX K (Continued)

District and No.	County	8th Grade 1970–71 Membership End of Year	Percent of Total 1970–71 ADM	No. of Students to be Included in the Sample	No. of Students Actually Included in the Sample
Tempe #3	Maricopa	1,170	5.414	135	111
Thatcher #4	Graham	75	.347	9	12
Tucson #1	Pima	4,756	22.009	550	518
Vicksburg #3	Yuma	1	.005	1	2
Walnut Grove #7	Yavapai	0	.000	1	1
Washington #6	Maricopa	2,418	11.190	280	338
Yuma #1	Yuma	761	3.522	88	73
	TOTALS	21,609	99.999	2,505	2,609

APPENDIX L Racial-Ethnic Comparison Between The ENAPA Sample And The Actual Population

The Racial-Ethnic Survey published by the Department of Education in June of 1972, gives the following racial-ethnic breakdown for students at the eighth grade level in the public schools (except seven districts on whom data was not submitted).

Students Included In 1972

Racial-Ethnic Survey

	Number of Students	Percent of 8th Grade Population
Spanish surname	7,104	19.05
Other White	26,940	72.22
Black	1,418	3.80
Oriental	172	0.46
American Indian	1,635	4.38
Other nonwhite	32	0.09
Total	37,301	100.00

The number of students participating in the state needs assessment sample changes from test to test because all the tests were not administered on the same day. In some cases students were absent on subsequent testing days. The figures listed below are the largest amount of students that took any one of the several tests administered. For comparison purposes, these data are accurate enough to allow the reader to make valid comparisons.

Students Included In Eighth Grade Sample

	Number of Students	Percent of 8th Grade Population
Anglo-White	1,850	75.66
Black	139	5.69
Indian	63	2.58
Oriental	16	0.65
Other nonwhite	12	0.49
Spanish surname	365	14.93
Total	2,445	100.00

Comparison of Student Percentages in the 1972 Racial-Ethnic Survey And Student Percentages in the Needs Assessment Sample

	Racial-Ethnic Survey	Needs Assessment Sample	Difference
Anglo-White	72.22	75.66	+ 3.44
Black	3.80	5.69	+ 2.16
Indian	4.38	2.58	- 1.80
Oriental	0.46	0.65	+ 0.19
Other nonwhite	0.09	0.49	+ 0.40
Spanish surname	19.05	14.93	- 4.12
Total	100.00	100.00	

APPENDIX M

Form Used To Collect Demographic Data For Each Student Included In The

TEACHER _____ SCHOOL _____ DISTRICT _____

NAME OF STUDENT	SEX		DATE OF BIRTH		RACE						TITLE I		TITLE III		PRE-SCHOOL		FAMILY INCOME			LA T		
	MALE	FEMALE	MONTH	YEAR	ANGLO WHITE	SPAN. SURNAME	BLACK	INDIAN	ORIENTAL	OTHER	YES	NO	YES	NO	YES	NO	$0 – 3,000	3,000 – 10,000	10,000 – +	ENGLISH	ENG. & SPAN.	SPANISH
1.																						
2.																						
3.																						
4.																						
5.																						
6.																						

DIX M

Form Used To Collect Demographic Data For Each Student Included In The ENAPA Sample

SCHOOL _____ DISTRICT _____

SEX		DATE OF BIRTH		RACE						TITLE I		TITLE III		PRE-SCHOOL		FAMILY INCOME			LANGUAGE IN THE HOME							
MALE	FEMALE	MONTH	YEAR	ANGLO WHITE	SPAN. SURNAME	BLACK	INDIAN	ORIENTAL	OTHER	YES	NO	YES	NO	YES	NO	$0 – 3,000	3,000 – 10,000	10,000 – +	ENGLISH	ENG. & SPAN.	SPANISH	INDIAN	ENG. & IND.	ENG. & OTHER	ORIENTAL	OTHER

APPENDIX N

Support Data for Section Three

Number of students in Table 1

Table 24 presents the total number of students included in each of the various categories listed in Table 1 of Section Three.

VOCABULARY

Table 24

Total Number of Students Included
In Each of the Data
Cells for Table 1

Ethnic Origin	Sex of Student		Group Total
	Male	Female	
Anglo-White	906	928	1,849
Black	67	70	138
Indian	33	30	63
Oriental	6	10	16
Other nonwhite	10	2	12
Spanish surname	194	169	365
Group Total	1,217	1,209	2,444

As the reader will note, all the columns, when added together, do not total 2,444 as shown in the table. Also, if the lines are added across (male plus female), they do not necessarily equal the totals shown for a given ethnic group. This apparent discrepancy is accounted for by the fact that in some instances demographic data was missing, making it impossible to report the sex of the student. When this occurred, the student was only included in the group total for their particular ethnic group. In those cases where the student's sex was known but information was not available concerning their ethnic origin, their score was included only in the group total at the bottom of the table.

In those cases where neither sex nor ethnic origin was known, the student's grade equivalent was not included in the data. However, these scores were included in the data used to obtain the Median Grade Equivalent for the Arizona sample, which were presented in Figure 4. For this reason, 165 more students are included in the Arizona Median Grade Equivalent score (Figure 4), than in the Arizona Mean Grade Equivalent score (Table 1).

Median Grade Equivalent comparisons of the Arizona sample with the national norm and two regional norms are presented in Figure 4.

Number of students in Table 2

Table 25 presents the total number of students included in each of the various categories listed in Table 2.

Table 25

READING

Total Number of Students Included
In Each of the Data
Cells for Table 2

Ethnic Origin	Sex of Student		Group Total
	Male	Female	
Anglo-White	906	929	1,850
Black	68	70	139
Indian	33	30	63
Oriental	6	10	16
Other nonwhite	10	2	12
Spanish surname	193	169	364
Group Total	1,217	1,210	2,445

As the reader will note, all the columns, when added together, do not total 2,445 as shown in the table. Also, if the lines are added across (male plus female), they do not necessarily equal the totals shown for a given ethnic category. The reason for this discrepancy is the same as mentioned in the explanation of the previous table.

For this reason, 164 more students are included in the Arizona Median Grade Equivalent score (Figure 7), than in the Arizona Mean Grade Equivalent score (Table 2).

Number of students in Table 3

Table 26 presents the total number of students included in each of the various categories listed in Table 3

SPELLING

Table 26

Total Number of Students Included
In Each of the Data
Cells for Table 3

Ethnic Origin	Sex of Student		Group Total
	Male	Female	
Anglo-White	904	925	1,843
Black	66	70	137
Indian	32	30	62
Oriental	6	10	16
Other nonwhite	10	2	12
Spanish surname	191	170	362
Group Total	1,210	1,207	2,433

As with the previous tables and for the same reason, all the columns when added together do not total 2,433 as shown in the table. Also, if the lines are added across (male plus female), they do not

necessarily equal the totals shown for a given ethnic category. Please note that 176 more students are included in the Arizona Median Grade Equivalent score (Figure 10), than in the Arizona Mean Grade Equivalent score (Table 3).

Number of students in Table 4

Table 27 presents the total number of students included in each of the various categories listed in Table 4.

Table 27

Total Number of Students Included
In Each of the Data
Cells for Table 4

Ethnic Origin	Sex of Student: Male	Sex of Student: Female	Group Total
Anglo-White	904	926	1,844
Black	66	70	137
Indian	32	30	62
Oriental	6	10	16
Other nonwhite	10	2	12
Spanish surname	191	170	362
Group Total	1,210	1,208	2,434

Please note that as in previous tables, all the columns when added together do not total 2,434 as shown in the table. Also, if the lines are added across (male plus female), they do not necessarily

equal the totals shown for a given ethnic category. The reason for this discrepancy is the same as that discussed in Table 24. For this reason, 175 more students are included in the Arizona Median Grade Equivalent (Figure 13), than in the Arizona Mean Grade Equivalent score (Table 4).

Number of students in Table 5

Table 28 presents the total number of students included in each of the various categories listed in Table 5.

PUNCTUATION

Table 28

Total Number of Students Included
In Each of the Data
Cells for Table 5

Ethnic Origin	Sex of Student		Group Total
	Male	Female	
Anglo-White	903	926	1,843
Black	67	70	138
Indian	32	30	62
Oriental	6	10	16
Other nonwhite	10	2	12
Spanish surname	191	170	362
Group Total	1,210	1,208	2,434

As the reader will note, all the columns when added together do not total 2,434 as shown in the table. Also, if the lines are added across (male plus female), they do not necessarily equal the totals shown for a given ethnic category. Reasons for this discrepancy are described in Table 24. For the reason discussed, 175 more students are included in the Arizona Median Grade Equivalent score (Figure 16), than in the Arizona Mean Grade Equivalent score (Table 5).

Number of students in Table 6

Table 29 presents the total number of students included in each of the various categories listed in Table 6.

USAGE

Table 29

Total Number of Students Included
In Each of the Data
Cells for Table 6

Ethnic Origin	Sex of Student		Group Total
	Male	Female	
Anglo-White	903	927	1,844
Black	67	70	138
Indian	32	30	62
Oriental	6	10	16
Other nonwhite	10	2	12
Spanish surname	191	170	362
Group Total	1,210	1,209	2,435

As per all the tables in this Appendix to this point, all the columns when added together do not total 2,435 as shown in the table. Also, if the lines are added across (male plus female), they do not necessarily equal the totals shown for a given ethnic category. As a result, as per the discussion in Table 24, 174 more students are included in the Arizona Median Grade Equivalent score (Figure 19), than in the Arizona Mean Grade Equivalent score (Table 6).

Number of students in Table 7

Table 30 presents the total number of students included in each of the various categories listed in Table 7.

Table 30

Total Number of Students Included
In Each of the Data
Cells for Table 7

Ethnic Origin	Sex of Student		Group Total
	Male	Female	
Anglo-White	904	924	1,842
Black	67	71	139
Indian	32	30	62
Oriental	6	10	16
Other nonwhite	10	2	12
Spanish surname	194	169	364
Group Total	1,214	1,206	2,436

As the reader will note, all the columns when added together do not total 2,436 as shown in the table. Also, if the lines are added across (male plus female), they do not necessarily equal the totals shown for a given ethnic category. For understanding of this discrepancy, read the discussion under Table 24. For this reason, 173 more students are included in the Arizona Median Grade Equivalent score (Figure 22), than in the Arizona Mean Grade Equivalent score (Table 7).

Number of students in Table 8

Table 31 presents the total number of students included in each of the various categories listed in Table 8.

MATHEMATICS PROBLEM SOLVING

Table 31

Total Number of Students Included In Each of the Data Cells for Table 8

Ethnic Origin	Sex of Student: Male	Sex of Student: Female	Group Total
Anglo-White	901	923	1,838
Black	67	70	133
Indian	31	30	61
Oriental	6	10	16
Other nonwhite	10	2	12
Spanish surname	193	169	363
Group Total	1,214	1,206	2,436

Please read the discussion under Table 24 to understand the reason why all the columns when added together do not total 2,429 as shown in the table. Also, if the lines are added across (male plus female), they do not necessarily equal the totals shown for a given ethnic category. As a result of this discrepancy, 180 more students are included in the Arizona Median Grade Equivalent score (Figure 25), than in the Arizona Mean Grade Equivalent score (Table 8).