COMPARISON OF INTELLIGENCE AND ACHIEVEMENT LEVELS
OF LAOTIAN AND AMERICAN FOURTH-GRADE STUDENTS
IN FOUR SCHOOLS WITH AN ESL/BILINGUAL
PROGRAM

by

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[Signatures and dates for professors and department chair]

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The recent influx of immigrants and refugees into the United States from around the world, especially from Indo-
china, has significantly increased nationwide enrollment in public schools of children whose primary language is not English. Limited English proficiency (LEP) students generally have been shown to be several years behind other students on standardized achievement and intelligence tests, resulting in an increasing number of LEP students being placed in special education and eventually dropping out of school.

The purpose of this study was to determine whether an IQ differential existed between Laotian and American students on two language-free, culture-fair measures of intelligence. Additionally, the IQ scores of the two groups of students were related to their chronological ages and their scores on a standardized achievement test, with special attention to reading, language arts, mathematics, and science. A group of 21 Laotian LEP students and a group of 21 American students enrolled in the same ESL/bilingual elementary schools were administered Raven's Coloured Progressive Matrices (CPM; 1962)
and Standard Progressive Matrices (SPM; 1958). The Stanford Achievement Test (SAT; Gardner, Rudman, Karlsen, & Mervin, 1982) scores of the participants were obtained from school system records. Uncorrelated t tests were used to compare the scores of Laotian and American students, and the .05 level of confidence was used to establish significance of differences on all t tests.

The Laotian and American student groups did not differ significantly in intelligence level on either the CPM or SPM. On the SAT, the Laotian group scored significantly lower than the American group on the Social Science, Science, Reading, Listening, and Language subtests, as well as on Total SAT. On the Mathematics subtest, however, the Laotian students did not differ significantly from American students.

It was concluded that the Laotian LEP students displayed comparable intelligence levels to their American counterparts when measured on language-free IQ instruments, as well as comparable achievement levels on the language-free Mathematics subtest of the SAT.

References


Jerold P. Bauch

4-23-82

Jerold P. Bauch, Major Professor
CHAPTER III

RESEARCH PROCEDURES

Description of the Sample

The Metropolitan Board of Education has designated six school in Metropolitan Nashville-Davidson County as ESL/bilingual centers: Eakin Elementary School (grades K-6), Haywood Elementary School (grades K-4), H. G. Hill Elementary School (grades K-4), Sylvan Park Elementary School (grades K-4), Cameron Middle School (grades 5-8), and Hillsboro High School (grades 9-12). All LEP students who qualify for the ESL/bilingual program and choose to participate in it are transported to one of the above-mentioned schools. Laotian students were chosen for the focus of this study from the 17 nationalities in the program because they represent the largest group in the bilingual program and one of the most remote from the American style of life and educational system. The total population of Laotians in the ESL program during the 1987-1988 school year was 333. The sample for the study consisted of 21 of the 31 fourth-grade Laotian students enrolled in the four ESL/bilingual elementary schools (Eakin, Haywood, H. G. Hill, and Sylvan Park). Four Laotian students, newly enrolled in the program, were not included in the study because their school experience
would be new to them and, furthermore, the bilingual department prohibits administration of standardized tests to LEP students who have been in America and/or the ESL program for less than 6 months. The other six Laotian students not included in the sample had finished third grade but had been placed in a transition-4 class, which means they are not yet quite ready for the fourth grade and their instructional programs includes some third-grade subjects (according to individual need) and some fourth-grade subjects.

The control group consisted of 21 randomly selected fourth-grade American students attending the same target bilingual schools. American students were selected randomly for participation based on a procedure described by Borg and Gall (1979):

If a small population is used, another method of selecting a simple random sample is sometimes followed. This method involves placing a slip of paper with the names or identification number of each individual in the population in a container, mixing the slips thoroughly, and then drawing the required number of names or numbers. (p. 183)

Americans were chosen so that there would be the same number of American males and Laotian males, as well as the same number of American females and Laotian females.

Permission to Conduct the Study

The initial contact with the schools in the study involved a personal conference with each principal in which I explained the purpose of the study and the procedure planned for use in testing the students. After receiving permission
to conduct the study from each of the four principals whose schools were involved, students were identified who met the selection criteria for the sample groups based on classroom enrollment and the bilingual department's master listing. A letter then was sent to each Laotian parent (written in their native language) in order to seek their permission to administer the two intelligence measures to their child, as well as to obtain permission to use their child's Standardized Achievement Test scores in the study. The American students' parents received an English version of the permission letter. Of the returned permission forms from the American parents, 21 students' names were drawn randomly in order to make up the control group.

**Instrumentation**

Three instruments were used in this study. Raven's Coloured Progressive Matrices (1962) and Standard Progressive Matrices (1958) were used to measure levels of intelligence. The Stanford Achievement Test (Intermediate Level 1, Form E; Gardner, Rudman, Karlsen, & Mervin, 1982) was used to measure ability in the areas of social science, science, reading, listening, language, and mathematics.

**Administration**

All fourth-grade students in Metropolitan Nashville-Davidson County schools were administered the Stanford Achievement Test (SAT), Intermediate Level 1, Form E, in February 1987. Results from this testing were taken from
the records, with permission, from the Board of Education's Department of Testing for each student who participated in the study.

Raven's Coloured Progressive Matrices (CPM) and Standard Progressive Matrices (SPM) were administered individually to all 42 students (21 Laotian and 21 American) included in the study, in a quiet, vacant classroom or office at their respective school sites. The Laotian students, all of whom are dominant in the Lao language and use Lao as their primary language, were tested by a Laotian educator in their native language, following the test manuals for instruction. I presented the test instructions to the American students in the English language, according to the standard approach described by Raven (1958, 1962). Administration of the CPM and SPM required 30 minutes. The whole student sample took 1,200 minutes, or 20 hours, to complete the testing. Each school day is 7 hours in length, excluding lunch time; therefore, it took 3 days to administer the tests. An extra trip was made to Eakin Elementary School and Sylvan Park Elementary School to test two Laotian students who were absent on the day of initial testing. It was necessary on one occasion to reschedule the testing due to school closing for snow.

The CPM and SPM

Raven's Coloured Progressive Matrices (1962) is a non-verbal, culture-fair test of reasoning ability which is
suitable for measuring intelligence of children ages 5 to 11 years. Raven's Standard Progressive Matrices (1958) was designed to cover the widest possible range of mental ability and to be equally useful with persons of all ages. Both tests may be administered as an individual, a self-administered, or as a group test. Additionally, both the CPM and SPM can be used satisfactorily with people who cannot understand or speak English.

The CPM consists of 36 attractively colored multiple-choice matrix designs divided into three sets, or subsets A, AB, and B. Each set contains 12 matrices which begin with easy items and gradually increases to more difficult ones. The SPM consists of 60 black-and-white multiple-choice matrix designs divided into five sets, or subsets A, B, C, D, and E. Sets A and B of both the CPM and SPM are identical, except that the CPM is colored and the SPM is not. The first series of each test requires mainly ability in accuracy of discrimination, but later series become progressively more difficult, requiring capacity to form comparisons and other logical relations (see Appendix B for the easiest and most difficult CPM matrices [A1 and B12] and SPM matrices [C1 and E12]). If an examinee solves most of the CPM Set B problems correctly and the test seems too easy, sets C, D, and E of the SPM can be administered without interruption. Because the study sample of Laotian students contained members with ages greater than 11 years, both the CPM and SPM tests were administered. All study participants (N = 42) were first
given the CPM sets A, AB, and B and the CPM score was thus
derived (possible score = 36). Each participant was then
given the SPM sets C, D, and E and the SPM score was thus
derived (possible score = 36). In other words, one point is
given for each correct response. The number of problems
correctly solved represents the examinee’s total raw score
of intellectual capacity.

The CPM is available in the form of a removable board
of blocks, and as colored illustrations printed in a booklet.
The SPM is available only in booklet form. In the present
study, the printed booklet forms of both instruments were
used. Each test or page of the CPM consists of a colored
design matrix from which one part has been removed or is
missing. At the bottom of the page, six numbered pieces of
the same size and form as that of the missing part are ar-
ranged in two rows. Of all these six pieces, only one will
complete the pattern. The examinee can vocalize or point to
the selected answer with a finger when the test is taken
individually, as was the case in this study. The SPM book-
let is constructed in exactly the same manner as the CPM,
only is produced in black and white instead of in color.

Many cross-cultural studies have been conducted to eval-
uate the cultural fairness of the CPM and SPM. These tests
have been recommended as useful cross-cultural measures of
nonverbal intelligence in Argentina (Rimoldi, 1984),
Poland (Wysocki & Cankardas, 1957), America—Anglo, Black,
Mexican-American (Birkemeyer, 1965; Tulkin & Newbrough,
1968; Valencia, 1979, 1984), Singapore (Khatena & Gowan, 1967), Canada--White, Eskimo, Indian-Metis (MacDonald & Netherton, 1969), and Iran (Baraheni, 1974). Based on the review of the literature, the CPM and SPM tests were chosen for use in this study for the following reasons:

1. They are among the most culture-reduced tests available (Sigmon, 1983; Valencia, 1979). Burke (1958) described the CPM as perhaps as nearly "culture free" as any test can be.

2. They are among the most widely used intelligence tests in cross-cultural studies of children and adults who cannot understand or speak the English language (Khatena & Gowan, 1967; Valencia, 1979).

3. They are independent of acquired knowledge and reduce the influence of schooling and motor handicaps to a minimum (Martin & Wiechers, 1954; Raven, 1958, 1962).

4. The bright colors of the CPM attract children's attention.

5. The tests have no time limit so they assess one's power of thinking rather than speed.

6. There is no penalty for guessing, and children are encouraged to attempt all the problems.

7. The tests can be administered by psychologists, educators, or researchers and do not require administrator training.

8. The administration procedure allows the examiner to provide very specific and clear instructions with a minimum
of verbal interaction.

9. They do not require any verbal responses from the examinee.

10. They can be used either as an individual test, a self-administered test, or a group test (Raven, 1984).

11. They have high correlation with other intelligence tests such as the WISC (.91 reported by Martin & Wiechers, 1954), the revised Stanford-Binet Form L (.86 reported by Stacey & Gill, 1955), and the Wechsler-Bellevue (.60 in the block design form reported by Stacey & Gill, 1955).

12. The test is intended to be a pure measure of "g," the general factor common to all intelligence tests (Jensen, 1980).

The SAT

The Stanford Achievement Test is a battery of tests that reflects what is being taught at all grade levels in schools throughout the United States. The most widely used test of its kind over the longest period of time (Merenda, 1972), the SAT is considered as the grandfather of achievement test batteries (Gardner et al., 1982). The SAT first appeared in 1923 and has been revised continuously to reflect current curricula. It has had a long history of excellence (Subkoviak & Farley, 1982) and of steadily growing acceptance in the schools because of its being considered one of the best available achievement batteries (Davidson, 1985). The SAT for elementary grades has five levels: Primary I (1.5-2.4),
Primary II (2.5-3.4), Primary III (3.5-4.4), Intermediate I (4.5-5.4), and Intermediate II (5.5-6.9).

In this study, Intermediate Level I, Form E of the seventh edition (Gardner et al., 1982) was used. This latest edition, like its predecessors, "attempts to incorporate new testing technologies, adjust to changing curricula, and accommodate educators' requests for more and different types of information" (Davidson, 1985, pp. 1449-1450). The Intermediate Level I battery includes Word Study Skills, Reading Comprehension, Vocabulary, Listening Comprehension, Spelling, Language, Concept of Numbers, Mathematics Computation, Mathematics Applications, Science, and Social Science. All of these subtests were administered to all fourth-grade students in Metropolitan Nashville-Davidson County public schools, as previously mentioned. For purposes of this study, the participants' subtest scores were grouped into six subtest scores, as follows: (a) Social Science, (b) Science, (c) Reading (composed of Word Study Skills, Reading Comprehension, Vocabulary, and Spelling subtests), (d) Listening, (e) Language, and (f) Mathematics (composed of Concept of Numbers, Mathematics Computation, and Mathematics Application subtests).

Previous editions of the SAT often have been criticized of standardization bias against minorities. In the 1982 edition, the total norm group of 465,000 students from 300 school districts was chosen to represent the major geographic regions (Northeast, Midwest, Southeast, and West), different socioeconomic statuses, different enrollment sizes of public
and nonpublic school systems, and percentages of students of
different ethnic backgrounds (White, Black, Hispanic, and
others) with comparable data for the nation. On the other
hand, to avoid any apparent bias in the test, the test pub-
lishers invited representatives of minority groups to review
the test items and to check the directions for administra-
tion. The publishers also provide a practice test in each
elementary level to enable students to become familiar with
the tasks of the test and to learn how to respond to them,
which may reduce the bias caused by the use of item types
and formats unfamiliar to certain examinee subgroups. This
also produces a way to reduce test anxiety.

SAT test items are scored as correct or incorrect. Raw
scores on the SAT are the number of correct answers to each
item, not the number of objectives learned to mastery. Raw
scores can be converted to scaled scores, percentile ranks,
grade equivalents, stanines, and normal curve equivalents
which can be used to help evaluate a student in relation to
others or to compare a student's score across subtests.

The SAT at each level has a norm booklet, teacher's
directions for administering the instrument, practice sheets,
and an index of instructional objectives. The index for each
form and level provides a description of the behavior pre-
sumably measured by each item and enables comparison with
local curriculum objectives. Thus, indexes are useful in
enabling test users to ascertain the local validity of the
battery alone and beyond the general content validity.
The Metropolitan Nashville-Davidson County public school system selected the SAT as the achievement test to be used in its schools in 1984. In selecting this test, the State Department of Education compared the SAT to other, competing tests with respect to (a) how well the test reflects school curriculum, (b) the usefulness of the scores for the school's intended purposes, (c) the comparativity of the school's population to the norm groups of the test, and (d) the amount of time and money available for testing. The SAT was found to reflect Tennessee's school curriculum. It also carries the following advantages over other tests:

1. The directions for administering the SAT are detailed and clear.
2. A variety of machine-scored answer sheets as well as hand-scored ones are available.
3. There are two guides, one for teachers and one for administrators, dealing with score interpretation, in addition to the norm booklet.
4. There are work-out examples besides the practice test which reduce test anxiety and help students, especially minority students, become familiar with test-taking skills.

Data Analysis

To analyze the data generated by the Laotian student group and the American student group's CPM, SPM, and SAT scores, uncorrelated t tests were calculated. The results were compared in order to address the two main research
questions (i.e., whether LEP students score lower than American students on measures of intelligence that are language-free and culture-fair; whether LEP students score lower than American students on standardized achievement tests). The .05 level of confidence was used to establish significance of differences on all t-tests.
CHAPTER IV

RESULTS

The purpose of this chapter is to present an analysis of data gathered by administering two forms of a nonverbal, culture-fair intelligence test (Raven's Coloured Progressive Matrices and Standard Progressive Matrices) to a group of 21 fourth-grade Laotian students (12 females, 9 males) and a randomly selected group of 21 fourth-grade American students (12 females, 9 males), all enrolled in schools designated as ESL/bilingual centers in Metropolitan Nashville-Davidson County public schools. The chapter also presents an analysis of the Stanford Achievement Test scores of the two groups of students, administered by the school system to all fourth-grade students in February 1987.

The Laotian students ranged in age from 9.5 to 14.0 years while the American students ranged in age from 9.5 to 11.5 years. The average age of Laotian students was 1.4 years older than that of the American students. The American students also were more homogeneous in age. Figure 1 is a pictorial representation of the age frequency for the two groups of students.

In order to compare Laotian and American students, t tests were calculated between their mean scores on the two
Figure 1. Pictorial representation of the age frequencies for American and Laotian students.
intelligence tests and the SAT subtests. These calculations were done in order to address the study's research questions:

1. Is there a difference between measured intelligence for Laotian and American students on two nonverbal, culture-fair IQ tests?

2. Are American students likely to score higher than Laotian students on standardized achievement tests of Social Science, Science, Reading, Listening, Language, and Mathematics?

Data were analyzed using the Statistical Package for the Social Sciences (Nie, Hull, Bent, & Steinbrenner, 1975). All hypotheses were tested using the .05 level of confidence. This chapter describes the applied statistical procedures, analyzes the data between the two groups with respect to different variables, and presents the findings.

**Data Analysis**

**Measures of Intelligence**

In order to determine the intelligence levels of the Laotian and American students in the study, Raven's CPM and SPM were administered. To test for statistical differences between the two student groups' scores on these measures, t tests were applied in order to address the first null hypothesis, which stated: There are no significant differences between the IQ scores of Laotian students and their American counterparts on Raven's Coloured Progressive Matrices and Standard Progressive Matrices.
Table 1 presents the means and standard deviations of Laotian and American students' scores on these two tests, along with the corresponding t values and probability levels.

Table 1
Means, Standard Deviations, and t Values of Laotian and American Students on the CPM and SPM

<table>
<thead>
<tr>
<th></th>
<th>Americans</th>
<th></th>
<th>Laotians</th>
<th></th>
<th>two-tailed probability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N  X  SD</td>
<td>N  X  SD</td>
<td>t   df</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPM</td>
<td>21 27.33 4.21</td>
<td>21 24.19 6.54</td>
<td>1.85 40</td>
<td>.071</td>
<td></td>
</tr>
<tr>
<td>SPM</td>
<td>21 32.52 8.83</td>
<td>21 30.38 8.96</td>
<td>0.78 40</td>
<td>.440</td>
<td></td>
</tr>
</tbody>
</table>

As can be seen from the table, American students obtained a CPM mean raw score of 27.33 and a standard deviation of 4.21 while Laotian students had a mean of 24.19 and a standard deviation of 6.54. The obtained t value for the CPM was 1.85, which was not significant at the .05 level of confidence. This means that there was no significant difference between the test scores of American and Laotian students on the CPM.

On the SPM, American students obtained a mean raw score of 32.52 and standard deviation of 8.83. The Laotian students had a mean of 30.38 and a standard deviation of 8.96. The calculated t value of 0.78 was not significant at the .05 level. Thus, there was no significant difference between the test scores of American and Laotian students on the SPM.
As these results show, the differences between the two groups of students on Raven's CPM and SPM were not statistically significant, thus null hypothesis 1 was accepted. The American fourth-grade students who participated in the study did not exhibit higher levels of intelligence when compared with the Laotian refugee students in the same grade as measured by the nonverbal, culture-fair tests of Raven.

**Measure of Achievement**

The mean scores of American and Laotian students in SAT subtests (Social Science, Science, Reading, Listening, Language, and Mathematics) were compared. To test for statistical significance of differences between the two groups' test scores on these variables, a t test was applied to the total sample (N = 42) in order to investigate six null hypotheses. Table 2 presents the means and standard deviations of the SAT subtest scores for the two groups of students, along with corresponding t values and probabilities of making the Type I error.

Null hypothesis 2 stated: There are no significant differences between the standardized achievement test scores of Laotian and American students in Social Science. As shown in Table 2, the American students had a mean raw score of 43.48 and a standard deviation of 11.25 on the Social Science subtest, while the Laotian students had a mean of 32.29 and a standard deviation of 11.09. The calculated t value of the difference in scores between the two groups was 3.25
Table 2

Means, Standard Deviations, and $t$ values for American and Laotian Students on SAT Subtests and Total SAT

<table>
<thead>
<tr>
<th></th>
<th>Americans</th>
<th></th>
<th>Laotians</th>
<th></th>
<th>$t$</th>
<th>df</th>
<th>two-tailed probability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\bar{X}$</td>
<td>SD</td>
<td>$\bar{X}$</td>
<td>SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>43.48</td>
<td>11.25</td>
<td>32.29</td>
<td>11.09</td>
<td>3.25</td>
<td>40</td>
<td>.002</td>
</tr>
<tr>
<td>Science</td>
<td>43.48</td>
<td>11.16</td>
<td>31.57</td>
<td>10.27</td>
<td>3.60</td>
<td>40</td>
<td>.001</td>
</tr>
<tr>
<td>Reading</td>
<td>88.05</td>
<td>20.77</td>
<td>63.86</td>
<td>19.89</td>
<td>3.85</td>
<td>40</td>
<td>.000</td>
</tr>
<tr>
<td>Listening</td>
<td>59.14</td>
<td>9.35</td>
<td>39.05</td>
<td>10.87</td>
<td>6.43</td>
<td>40</td>
<td>.000</td>
</tr>
<tr>
<td>Language</td>
<td>72.19</td>
<td>12.70</td>
<td>56.05</td>
<td>18.05</td>
<td>3.35</td>
<td>40</td>
<td>.002</td>
</tr>
<tr>
<td>Mathematics</td>
<td>79.38</td>
<td>19.53</td>
<td>72.14</td>
<td>18.29</td>
<td>1.24</td>
<td>40</td>
<td>.222</td>
</tr>
<tr>
<td>Total SAT</td>
<td>385.71</td>
<td>76.34</td>
<td>294.95</td>
<td>76.13</td>
<td>3.86</td>
<td>40</td>
<td>.000</td>
</tr>
</tbody>
</table>

which, on a two-tailed test, was significant at or beyond the .05 level of confidence. This indicates that the American student group scored significantly higher than the Laotian student group on the Social Science subtest, thus causing null hypothesis 2 to be rejected.

Null hypothesis 3 stated: There are no significant differences between the standardized achievement test scores of Laotian and American students in Science. Table 2 shows that the American students obtained a mean raw score of 43.48 and a standard deviation of 11.16 on the Science subtest, while the Laotian students had a mean of 31.57 and a standard deviation of 10.27. The obtained $t$ value of the difference in scores between the two groups was 3.60 which
was significant at or beyond the .05 level of confidence. This result means that the group of American students scored significantly higher on the Science subtest than did the group of Laotian students, thus causing null hypothesis 3 to be rejected.

Null hypothesis 4 stated: There are no significant differences between the standardized achievement test scores of Laotian and American students in Reading. As is shown on Table 2, the American students obtained a mean raw score of 88.05 and a standard deviation of 20.77 on this subtest. The mean raw score for Laotian students was 63.86 and the standard deviation was 19.89. The calculated $t$ value of 3.85 was significant at or beyond the .05 level of confidence. This result indicates that the group of American students scored significantly higher than the group of Laotian students on the Reading subtest; therefore, null hypothesis 4 was rejected.

Null hypothesis 5 stated: There are no significant differences between the standardized achievement test scores of Laotian and American students in Listening. Table 2 shows that, on this subtest, American students had a mean raw score of 59.14 and standard deviation of 9.35 while the Laotian students obtained a mean of 39.05 and standard deviation of 10.85. The $t$ value of 6.43 proved to be significant at or beyond the .05 level of confidence, indicating that the American student group scored significantly higher than the Laotian student group on this subtest. This result rejects null hypothesis 5.
Null hypothesis 6 stated: There are no significant differences between the standardized achievement test scores of Laotian and American students in Language. As is shown in Table 2, American students had a mean raw score of 72.19 and standard deviation of 12.70 on the Language subtest, while Laotian students had a mean of 56.05 and standard deviation of 18.05. The obtained t value of 3.35 was significant at or beyond the .05 level of confidence. Once again, the American students scored significantly higher than the Laotian students on the subtest. Null hypothesis 6, therefore, is rejected.

Null hypothesis 7 stated: There are no significant differences between the standardized achievement test scores of Laotian and American students in Mathematics. Table 2 shows that the American student group obtained a mean raw score of 79.38 and standard deviation of 19.53 on the Mathematics subtest, while the Laotian students had a mean score of 72.14 and standard deviation of 18.29. Although the Laotian students obtained a lower mean score than the American students, the calculated t value of the difference between the two scores (t = 1.24) was not significant at the .05 level of confidence. This result indicates that Laotian students' Mathematics subtest score did not differ significantly from the American students' score; therefore, null hypothesis 7 was accepted.

Table 2 also shows that the American students' Total SAT mean raw score was 385.71, with a standard deviation of
76.34, while the Laotian students' Total SAT mean raw score was 294.95, with a standard deviation of 76.13. The difference between these two groups' scores produced a $t$ value of 3.86 which was significant at or beyond the .05 level of confidence. Thus, on Total SAT, the group of American students scored significantly higher than the group of Laotian students.

As can be seen from the data presented, the American students in this study scored consistently higher than their Laotian counterparts in all but one subtest of the SAT. The differences between the mean scores of the two groups were significant at better than the .01 level of confidence on the Social Science, Science, Reading, Listening, and Language subtests (refer to Table 2). The only subtest in which the two groups were not significantly different is Mathematics. This pattern of results is consistent with other research with LEP students. Mathematics is the only subject matter least influenced by knowledge of language. The language of mathematics is more abstract and universal and the fact that the Laotian students approximated their American counterparts in this subject area may indicate support for their comparable intellect. Knowledge and skills related to social science, science, reading, listening, and language, on the other hand, are directly influenced by the culture and the length and breadth of involvement with a particular language. The fact that the group of Laotian students did not perform at the level of their American counterparts in these areas
may be a natural consequence of their being brought up with a different language and culture.

**Summary**

This chapter presented frequency distributions, graphic representations, and t-test results of the total scores of 21 American and 21 Laotian fourth-grade students on the CPM, SPM, and six subscales of the SAT. No significant differences were found between the mean scores of American and Laotian students in the CPM and SPM intelligence tests. The American participants consistently scored higher than the Laotian participants, however, in the Social Science, Science, Reading, Listening, and Language subtests of the SAT. No significant difference was found between the two groups of students on the Mathematics subtest of the SAT. On Total SAT score, the American students were significantly higher than the Laotian students; this was a reflection of the subtest scores obtained by the two groups of students.