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A COMPARATIVE STUDY OF ACHIEVEMENT TEST SCORES BETWEEN
BILINGUALLY INSTRUCTED AND NONBILINGUALLY INSTRUCTED
CHEROKEE INDIAN STUDENTS

The University of Oklahoma

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THE UNIVERSITY OF OKLAHOMA
GRADUATE COLLEGE

A COMPARATIVE STUDY OF ACHIEVEMENT TEST SCORES BETWEEN
BILINGUALLY INSTRUCTED AND NONBILINGUALLY
INSTRUCTED CHEROKEE INDIAN STUDENTS

A DISSERTATION
SUBMITTED TO THE GRADUATE FACULTY
in partial fulfillment of the requirements for the
degree of
DOCTOR OF EDUCATION

BY
HERBERT BACON
Norman, Oklahoma
1980

A COMPARATIVE STUDY OF ACHIEVEMENT TEST SCORES BETWEEN
BILINGUALLY INSTRUCTED AND NONBILINGUALLY
INSTRUCTED CHEROKEE INDIAN STUDENTS

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A COMPARATIVE STUDY OF ACHIEVEMENT TEST SCORES BETWEEN
BILINGUALLY INSTRUCTED AND NONBILINGUALLY
INSTRUCTED CHEROKEE INDIAN STUDENTS

CHAPTER I

INTRODUCTION

The State of Oklahoma has the largest Indian population in the United States. More than sixty tribes reside within the boundaries of Oklahoma, each with its own culture, values, and language. The Cherokee Nation is the largest of these tribes with a population of 21,555.¹

The Cherokee's history is often cited by historians and educators because of the tradition and accomplishments associated with the Cherokee tribe prior to Oklahoma statehood. One of the most meaningful accomplishments of the Cherokees was the establishment of an exceptional educational system. In 1852, the Cherokee's educational system consisted

¹U.S. Department of Commerce, Bureau of the Census, Nineteenth Census of the United States, 1970: General Population Characteristics, Fiscal Report PC (1)-B1, United States Summary.

of twenty-one schools and two academies which accommodated over 1,100 Cherokee Indian students.² According to Walker, the school system was run totally by the Cherokee Nation and produced a Cherokee population 90 percent literate in its native language. They used bilingual materials to an extent that Oklahoma Cherokees had a higher English literacy level than the white population of either Texas or Arkansas.³ Jackson reported that in 1905, the Cherokee Nation maintained one hundred and seventeen day schools open to Indians and whites alike, 112 schools exclusively Cherokee, and 17 schools exclusively Freemen. These schools had an enrollment of 6,506 Indians, 5,199 whites, and 1,022 Negroes.⁴

In 1907, the Cherokee Nation was dissolved with the new state of Oklahoma inheriting the Cherokee's school system. Once the transition was completed, the state of Oklahoma initiated an instructional program which omitted an important facet which previously had been an important element of the Cherokee Nation's educational system. Under the direction of the state of Oklahoma, bilingual instruction was omitted.⁵

²U.S. Department of Interior, Office of Indian Affairs, Report of the Commissioner of Indian Affairs to the Secretary of the Department of the Interior, for fiscal year 1845, p. 595.

³Willark Walker, "Notes on Native Writing Systems and the Design of Native Literacy Programs," Anthropological Linguistics, Vol. II, No. 5, 1968, p. 152.

⁴Joe C. Jackson, "The History of Education in Eastern Oklahoma from 1898 to 1915," (unpublished Doctor's Dissertation, Graduate College, University of Oklahoma, 1950), p. 89.

⁵State of Oklahoma, Constitution, Art. I, sec. 5.

The omission of this important facet from a successful educational system indicates that Oklahoma was following a philosophy which had been established nationwide by the federal government. This philosophy discouraged the use of Indian languages in the government schools. This attitude against the use of Indian languages in schools was first documented in 1868, by the Indian Peace Commission Report to Congress which stated:

. . . in the difference of languages today lies two-thirds of our trouble. Schools should be established in which children should be required to attend; their barbarous dialects would be blotted out and the English language substituted.⁶

This anti-Indian language attitude was evident nationwide and could be documented as late as 1944 when the House Indian Affairs Committee made recommendations which called for a resurgence of the efforts to eliminate the usage of Indian languages throughout the Indian boarding schools.⁷

Those schools in the Cherokee Nation that once catered to the educational needs of the Indian student were redirected to meet the needs of the non-Indian English speaking student. The Indian student who was culturally and linguistically

⁶U.S. Department of Interior, Office of Indian Affairs, Sixth Annual Report of the Superintendent of Indian Schools to the Secretary of Interior, 1887, p. 10.

⁷United States Congress, Senate, Committee on Labor and Public Welfare, Indian Education: A National Tragedy-A National Challenge, Hearing before Special Subcommittee of Indian Education, 91st Congress, 2d. session, 1969.

Cherokee dominant did not readily adapt to monolingual English instruction nor to instruction geared to the non-Indian culture. The transition from Cherokee Nation administered schools to state of Oklahoma administered schools evidently resulted in the decline in the literacy level of Cherokees and resulted in a decline in the number of Indian students who completed school.⁸

In 1968, the federal government took positive action designed to aid the student whose primary language was other than English. The Bilingual Education Act reversed the federal government's stand on bilingual instruction in the classroom. President Lyndon B. Johnson called attention to the significance of the new law in these words:

This bill authorizes a new effort to prevent dropouts; new planning help for rural schools. It also contains programs for children whose first language is not English. Thousands of children of Latin descent, young Indians, and others will get a better--a better chance in school. . . .⁹

In 1969, the Oklahoma State Department of Education received notification that federal funds would be available for Oklahoma under the Title VII, Bilingual Education Program Act of 1968. The State Department of Education identified

⁸Arnold H. Leibowitz, "A History of Language Policy in American Indian Schools," Bilingual Education for American Indians, Curriculum Bulletin No. 3 of the Bureau of Indian Affairs, (Washington: U.S. Printing Office, 1971), p. 6.

⁹Theodore Anderson and Mildred Boyer, "Letter by President Lyndon B. Johnson," Bilingual Schooling in the United States, Vol. I, (Washington: United States Printing Office, 1968), p. 1.

the Cherokee Tribe in northeastern Oklahoma as having the greatest need for bilingual education. The State Department of Education invited Northeastern State College, Tahlequah, Oklahoma, to participate in the efforts to plan and implement a bilingual education program for the Cherokee students in the public schools in Adair, Cherokee, and Delaware Counties.¹⁰

The application proposal submitted by the Oklahoma State Department of Education and Northeastern State College for a bilingual education program was funded for the 1969-70 school year. Under this proposal the County Superintendent of Schools, Cherokee County, was designated as the grantee and the legal education agency. Northeastern State College was designated as the co-grantee with the responsibility for fiscal control of the program, and for the training of classroom teachers and teacher aides who were used in the bilingual program.

The Cherokee Bilingual Education Program became operational in four project schools selected from three rural counties in northeastern Oklahoma. The student population of the four project schools selected for the project was comprised of mostly Cherokee Indian students who came from homes where the dominant language was Cherokee. Each school in the project was classified as a single medium school insofar as they served many Indian children whose home language was different

¹⁰ Interview with Patricia Hammons, Oklahoma State Department of Education, Oklahoma City, Oklahoma, March, 1971.

from the school instructional language. The bilingual education program was designed to transfer from the Cherokee language as a medium of instruction to the English language. The direction of the curriculum was to move toward the language of a dominate culture and toward language acculturation. This language acculturation effort was implemented with a companion effort designed to reinforce the Cherokee culture. The curriculum taught in the project schools was treated equally or instruction was repeated from the Cherokee and English language to the other as needed. The transitional change in language was designed to be gradual.

Instruction in both the Cherokee and English languages was facilitated by the use of a teaching team consisting of a certified elementary teacher and a Cherokee speaking aide. This team was responsible for a plan to create an atmosphere in the elementary school which would permit the Cherokee speaking child to orient himself to formal education. It was anticipated that this atmosphere would result in higher achievement levels for the participating Cherokee students than those students who remained in the traditional English oriented classroom.

Since the inception of the Cherokee Bilingual Education Program in 1969, the program has experienced changes in direction and developed considerable expertise in bilingual instruction. Instructional materials were developed and printed in the Cherokee Syllabary which complimented the instructional

efforts of the classroom teachers and the Cherokee speaking teacher aides.

Need for the Study

The need for this study can best be demonstrated by the continued linguistic deprivation of Cherokee Indian students living in northeastern Oklahoma. Several studies have indicated the Cherokee Indian population in northeastern Oklahoma has Indian families who still speak the Cherokee language as the basic language in the home.

An investigation by Underwood of socio-economic conditions among the rural Cherokees, including a survey of 100 rural Indian households, revealed that 52 percent of all Cherokees under the age of twenty-five were illiterate compared with 13.9 percent for the population of Oklahoma as a whole. The survey showed that the homes of most Indian students did not contain facilities and a cultural environment which would equip the Indian student to adjust to the educational conditions generally faced in the schools to be attended. This study indicated that in 56 percent of the Cherokee households the residents spoke only Cherokee, 41 percent spoke only English and only 3 percent were bilingual.¹¹

A study was made in 1973 by linguist William Pulte.

¹¹Jerald Ross Underwood, "An Investigation of Educational Opportunity for the Indian in Northeastern Oklahoma," (unpublished Doctor's Dissertation, Graduate College, University of Oklahoma, 1966), p. 81.

Pulte studied the language practices of four Cherokee communities in an attempt to determine to what extent the Cherokee families relied on the Cherokee language for basic communication. His study consisted of a survey of Indian households with at least one child enrolled in the first six grades of the four rural schools within the Indian communities. The population of this survey was 374 Indian households while the sample consisted of 118 Indian households. Pulte concluded, as a result of extensive interviews and other empirical observations, that the Cherokee language was alive and viable and that the Cherokee language was the basic language of communication for more than 50 percent of the Cherokee families in the community. The data from this study, regarding the parents' knowledge of and use of Cherokee, are displayed in Table I. The data in Table II are concerned with the extent to which the children in the household surveyed speak Cherokee.¹²

A study in 1975 employed the techniques of interviewing families in their homes to determine if they preferred to use Cherokee in the home or if they relied more on English as the basic vehicle for family communication. Five hundred nine families were interviewed in nine school districts serving nine Cherokee communities. Of the 509 families interviewed,

¹²William J. Pulte, "Cherokee: A Flourishing or Obsolescing Language," (unpublished manuscript, Anthropology Department, Southern Methodist University, August, 1973), p. 3.

TABLE I
PARENTS' USE OF CHEROKEE

		Indian Community				
		One	Two	Three	Four	Total
Number of households in which one or both parents are Cherokee speaking--						
Both:		55	21	21	21	118
One:		12	11	12	18	53
Language of parents with each other--						
Cherokee:		41	16	17	18	92
English:		8	5	4	2	19
Both:		3	0	0	1	4
Language of parents with children--						
Cherokee:		32	12	11	11	66
English:		6	3	5	6	20
Both:		3	1	1	1	6

SOURCE: Coker J. Denton, "A Needs Survey of Indian Education in Selected Schools of Northeastern Oklahoma," (a needs assessment compiled for the Cherokee Bilingual Education Program, Tahlequah, Oklahoma, 1975).

TABLE II
CHILDREN'S USE OF CHEROKEE

		Indian Community				
		One	Two	Three	Four	Total
Household in which parents prefer speaking Cherokee with each other. In how many do children respond in Cherokee, English, or both when spoken to in Cherokee by the parents?	Cherokee:	26	9	11	8	54
	English:	7	4	5	2	18
	Both:	8	3	0	7	18
Household in which parents prefer speaking Cherokee with each other and their children. In how many do the children respond in Cherokee, English, or both when spoken to in Cherokee?	Cherokee:	25	8	7	8	48
	English:	1	1	2	2	6
	Both:	6	3	2	1	12
Households in which parents prefer speaking Cherokee with each other. In how many do children use Cherokee, English, or both when speaking with each other?	Cherokee:	29	13	8	7	57
	English:	8	3	6	11	28
	Both:	4	0	2	0	6

SOURCE: Coker J. Denton, "A Needs Survey of Indian Education in Selected Schools of Northeastern Oklahoma," (a needs assessment compiled for the Cherokee Bilingual Education Program, Tahlequah, Oklahoma, 1975).

69 percent reported that they relied on the Cherokee language as the family language.¹³

These investigations into the use of the Cherokee language by rural Cherokee Indians living in northeastern Oklahoma indicated the language was still widely used in the Indian communities studied. Language deprivation caused by a community and home environment which used limited and often poor English affected the academic achievement of Cherokee Indian students who functioned in the public school where English was the medium of instruction.¹⁴ There was a need to determine if the bilingual instruction provided to Cherokee Indian students in selected rural schools was effective as compared to nonbilingual instruction provided to comparable Cherokee Indian students in comparable rural schools and communities.

Since the inception of the Cherokee Bilingual Education Program in 1969, the program has been evaluated on an annual basis. During each of the first three years of operation, the Cherokee Bilingual Education Program compared the academic achievement of participating Indian students to the academic

¹³Cherokee Bilingual Education Project Staff, "A Study of the Home Language Preference Among Cherokee Families Residing in Northeastern Oklahoma," (unpublished study conducted for the Cherokee Bilingual Program, Tahlequah, Oklahoma, 1975), p. 2.

¹⁴Coker J. Denton, "A Needs Survey of Indian Education in Selected Schools of Northeastern Oklahoma," (a needs assessment compiled for the Cherokee Bilingual Education Program, Tahlequah, Oklahoma, December, 1975).

achievement of the non-participating Indian students from a control school. Because the control school had a small number of Indian students, which resulted in questionable comparisons, the use of the control school was discontinued. Without the use of a control group with which to compare academic achievement, the annual evaluation of participating students was changed to compare the current year's academic achievement to the previous year's academic achievement on an individual and class basis.

Since the discontinuance of the control school, the instructional objectives of the Cherokee Bilingual Education Program have specified a predesignated grade equivalent gain to a specified percentage of the Indian students participating in the bilingual program.¹⁵ Instructional success of the program has been dependent upon reaching these objectives. The evaluation of these objectives did not indicate how effective bilingual instruction was as compared to nonbilingual instruction among Indian students. These evaluations did not indicate if there were carry over values from bilingual instruction.

Because the Cherokee Bilingual Education Program did not have the availability of a control group with which to compare academic achievement on an annual basis or on a

¹⁵Cherokee Bilingual Education Project Staff, "1977-1978 Continuation Proposal," (unpublished Title VII proposal submitted to U.S. Office of Education, Washington, D.C., 1977), p. 35.

longitudinal basis, there was an absence of data relating to the comparative effectiveness of bilingual instruction. There has been a need for a study that would determine if Cherokee Indian students who received bilingual instruction improved significantly in specific academic areas after an intermediate period of time as compared to a comparable group of Cherokee Indian students who did not receive bilingual instruction. By measuring achievement several years after the delivery of bilingual instruction, this study would determine if the Cherokee Indian students who received bilingual instruction made more significant gains after receiving four and five consecutive years of bilingual instruction as compared to Cherokee Indian students who did not receive bilingual instruction. It is hoped that this study will provide credibility to the long term effectiveness of bilingual instruction of Cherokee Indian students.

Purpose of the Study

The purpose of this study was to determine if the eighth grade reading and mathematics achievement scores of Cherokee Indian students who received bilingual instruction in grade one through grade five were significantly different from the reading and mathematics achievement scores of comparable eighth grade Cherokee Indian students who did not receive bilingual instruction. A secondary purpose of this study was to determine whether the reading and mathematics

achievement of five-year bilingual education participants was significantly different from the four-year bilingual education participants.

The data derived from this study can be of value in determining the past effectiveness of bilingual instruction and in determining the carry over effectiveness of bilingual instruction. This information can aid in future planning and changes in bilingual education involving Cherokee Indian students. The results of this study can provide those rural schools that have Cherokee speaking Indian students, who may be linguistically deprived, with pertinent information about the effectiveness of bilingual instruction as presented through the Cherokee Bilingual Education Program.

Statement of the Problem

The problem under investigation was: What relationship exists between the reading and mathematics achievement of Cherokee Indian students who participated in the Cherokee Bilingual Education Program and the Cherokee Indian students who did not participate in the Cherokee Bilingual Education Program?

Hypotheses to be Tested

Hypothesis 1

There is no significant difference, operationally defined as the .05 confidence level, in the reading achievement means of Cherokee Indian Students who received bilingual

instruction through the Cherokee Bilingual Education Program for five years and comparable Cherokee Indian students who did not receive bilingual instruction when initial differences between the groups have been controlled with respect to their age, sex, I.Q., grade point average, speaker of Cherokee, degree of Indian blood, and father's educational level.

Hypothesis 2

There is no significant difference, operationally defined as the .05 confidence level, in the reading achievement means of Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education Program for four years and comparable Cherokee Indian students who did not receive bilingual instruction when initial differences between the groups have been controlled with respect to their age, sex, I.Q., grade point average, speaker of Cherokee, degree of Indian blood, and father's educational level.

Hypothesis 3

There is no significant difference, operationally defined as the .05 confidence level, in the adjusted reading achievement mean of Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education Program for four years and Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education Program for five years when initial differences between the groups have been controlled with respect to their age, sex, I.Q., grade point average, speaker of Cherokee,

degree of Indian blood, and father's educational level.

Hypothesis 4

There is no significant difference, operationally defined as the .05 confidence level, in the mathematics achievement means of Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education Program for five years and comparable Cherokee Indian students who did not receive bilingual instruction when initial differences between the groups have been controlled with respect to their age, sex, I.Q., grade point average, speaker of Cherokee, degree of Indian blood, and father's educational level.

Hypothesis 5

There is no significant difference, operationally defined as the .05 confidence level, in the mathematics achievement means of Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education Program for four years and comparable Cherokee Indian students who did not receive bilingual instruction when initial differences between the groups have been controlled with respect to their age, sex, I.Q., grade point average, speaker of Cherokee, degree of blood, and father's educational level.

Hypothesis 6

There is no significant difference, operationally defined as the .05 confidence level, in the adjusted mathematics achievement mean of Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education

Program for four years and Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education Program for five years when initial differences between the groups have been controlled with respect to their age, sex, I.Q., grade point average, speaker of Cherokee, degree of Indian blood, and father's educational level.

Definition of Terms

Bilingualism. Refers to the knowledge and use of two languages by the same person.

Bilingual Education. Bilingual education is the presentation of basic education to each limited English speaking child in his/her dominant language until the concurrent English as a Second Language lessons enable the child to understand and assimilate instruction in English.¹⁶

Cherokee Bilingual Education Program. This program provides structure, teaching techniques and materials, both instructional and supportive, that are conducive to bilingual instruction and are used when teaching any part or all of the school curriculum utilizing the two languages of Cherokee and English.

Cherokee Indian student. Those students who have documented their blood quantum through the Johnson-O'Malley federal program as being one quarter or more Indian and having documented their tribe.

¹⁶Bernard Cohen, "The Truth about Bilingual Education," Bilingual Journal, Vol. III, No. 1, Fall, 1978, p. 15.

Academic Achievement. The accomplishment in specific subject areas of instruction within a school system as measured by an achievement test.

Reading Achievement. Reading achievement shall be those achievement test results which combine the subtests of reading comprehension and reading vocabulary.

Mathematics Achievement. Mathematics achievement shall be those achievement test results which combine the subtests of mathematics concepts and mathematics computation.

Acculturation. Acculturation is defined as the process and result of adopting the culture traits of another group.

I.Q. Intelligence or I.Q., is an index of an individual's development, determined by dividing his mental age by his chronological age and multiplying by one hundred.

Adjusted means. The actual means achieved by the groups participating in this study are adjusted to compensate for differences on the control variables.¹⁷

Single-Medium School. A single-medium school is bilingual insofar as it serves children whose home language is different from the school language, the area language, or the national language. This may be the only language used for all subjects at all times. In the single-medium school,

¹⁷W. James Popham, Educational Statistics, Use and Interpretation, (New York: Harper and Row, Publishers, 1967), p. 225.

only one language is used for instruction throughout the school except when teaching the second language as a subject.¹⁸

Grade Point Average. Grade point average (GPA) is a numerical index assigned to students by the public school using, in this instance, A = 4.00, B = 3.00, C = 2.00, D = 1.00, F = 0.00.

Basic Assumptions

In conducting research in the educational areas it is often necessary to make certain assumptions before initiating the investigation. The following basic assumptions were made for this study:

1. The control group of Cherokee Indian students did not receive bilingual instruction nor were they exposed to bilingual materials.
2. Each Indian student who participated in the Cherokee Bilingual Education Program received comparable bilingual instruction and materials.
3. Teachers in the Cherokee Bilingual Education Program received comparable training and preparation in the bilingual teaching techniques and strategies used in the classroom.
4. The project schools that participated in the Cherokee Bilingual Education Program and the control schools which did not receive bilingual education, taught the same basic

¹⁸Anderson, Bilingual Schooling, Vol. II, p. 67.

curriculum during each year of operation.

5. Those students who participated as treatment and control groups originally entered the experiment having similar cultural backgrounds.

6. All treatment and control students who were speakers of Cherokee in the eighth grade could speak Cherokee when they began school.

7. Those students who participated as treatment and control groups came from homes that were comparable socio-economically.

8. All experimental and control students who participated in this study received comparable instruction, materials and curriculum during the sixth, seventh, and eighth grades when bilingual instruction was not offered.

Importance of Study

The Cherokee Indian students who suffer from linguistic deprivation are worthy of study and attention, for they have special needs uncharacteristic of the average monolingual English speaking student. Monroe Sweetland stated, "The most significant failure in American Education is our failure to provide equality of educational opportunity to the non-English speaking child."¹⁹ This study provides knowledge of the long

¹⁹L. Madison Coombs, "A Summary of Pertinent Research in Bilingual Education," Bilingual Education for American Indians, Curriculum Bulletin No. 3 of the Bureau of Indian Affairs, (Washington, D.C.: U.S. Printing Office, 1971), p. 10.

term effectiveness of bilingual instruction for Cherokee Indian students who participated in the Cherokee Bilingual Education Program. The results of this study are of value to school personnel who have linguistically deprived Indian students in their schools.

Limitations of the Study

There were five limiting factors which entered into the study which could have had some bearing upon the results.

The first limiting factor was the size of the sample. The sample used in the study was almost the total population of the students who received bilingual instruction but was only a small sample of Cherokee Indian students in north-eastern Oklahoma.

The second limiting factor was that a pretest was not administered to the treatment and control groups during the second or third grades. The third limiting factor was that the materials and bilingual practices developed by the Cherokee Bilingual Education Program were new and therefore the lack of standardization may have affected the outcome of the study.

The fourth limiting factor was the lack of control by the Cherokee Bilingual Education Program over the assignment of teachers who taught at the various levels in the bilingual program. The fifth limiting factor was the presence of bilingual Cherokee teacher aides in the classrooms of most

control students during the first five years of school.

Organization of the Study

This study consists of five chapters. Chapter I presents the background and need for the study, the statement of the problem, assumptions, definitions, limitations, and hypotheses.

Chapter II contains a review of literature in three areas. First, the literature that relates to bilingual instruction and how bilingual instruction affects the academic achievement of Indian students. Second, the literature that relates to the predictor variables that are important to this study and third, the review of related research.

Chapter III provides a description of the design of the study. The process for selecting the subjects is discussed along with the evaluation instruments that were used in this study.

Chapter IV presents the analysis of the data. A discussion of the statistical tests of significance used is provided.

Chapter V summarizes the findings of the investigation. Recommendations for further research is included in this chapter.

CHAPTER II

REVIEW OF THE LITERATURE

The literature and research were reviewed in the following areas: bilingual education for American Indians; the variables that affect academic achievement; and the review of related research.

Bilingual Education for American Indians

A review of the literature has revealed that bilingual education in general and Indian bilingual education in particular have been utilized in the school curriculum in the United States on a sporadic basis for over one hundred years. The American Indian has been forced by government policy to refrain from using his native language in the Indian boarding schools provided by the government. It has only been in recent years that the government has again reversed its policy toward the use of the Indian languages in the educational setting.¹

¹Arnold H. Leibowitz, "A History of Language Policy in American Indian Schools," Bilingual Education for American

According to Leibowitz, the government's negative policy decision toward the use of Indian language in educational institutions was documented as early as 1868, when a report by the Indian Peace Commission to the Congress stated that two-thirds of the trouble between the American Indian and the white people was caused by the Indians using their native language rather than learning to communicate in the English language. The Peace Commission recommended that Indian boarding schools be established for Indian children that would require they learn to speak the English language.²

During those years of uncertainty between the American Indians and the white people, the period from 1850 through the 1890's, several of the American Indian tribes were receiving bilingual instruction in school. According to Leibowitz, missionaries were conducting schools for Indian children in the Indian language which was in opposition to government policy and resulted in the Indian Peace Commission Report requiring all schools to provide instruction in English. President Grant, in 1870, harshly criticized the practices of the missionaries, denouncing their insistence on using native dialects in their schools.³

Leibowitz reported that in 1871, the Appropriation

Indians, Curriculum Bulletin No. 3 of the Bureau of Indian Affairs, (Washington, D.C.: U.S. Printing Office, 1971), p. 2.

²Ibid., p. 2.

³Ibid.

Act was passed which contained a rider that would affect bilingual education for all Indians attending educational institutions funded by the government. The act declared:

"Hereafter, no Indian Nation or tribe within the territory of the United States shall be acknowledged or recognized as an independent tribe or power with whom the United States may contract by treaty."⁴ After the treaty period came to an end in 1871, government schools conducted exclusively in English began to be established, gradually displacing the mission schools and their bilingual approach.

During the period of uncertainty from 1850 through the 1890's the Cherokee Nation, which had been forcibly removed from their native lands in North Carolina, Georgia, and Tennessee along the infamous Trail of Tears, was relocated in Oklahoma and had adjusted to the unwanted change. They reorganized their tribal government which had been patterned after the government of the United States and organized an educational system that was so effective that according to Walker, "it produced a population ninety percent literate in its native language and used bilingual materials to such an extent that Oklahoma Cherokees had a higher English literacy level than the white populations of either Texas or Arkansas."⁵

⁴Ibid.

⁵Willard Walker, "Notes on Native Writing Systems and the Design of Native Literacy Programs," Anthropological Linguistics, Vol. 11, No. 5, 1968, p. 152.

The Cherokees' efforts in bilingual instruction were facilitated greatly by the fact that they had a written language.

Other members of the five civilized tribes, the Creeks, Choctaws, and Seminoles followed the educational pattern of the Cherokees by establishing their own school systems which also proved to be effective.⁶ Bilingual instruction was discontinued in the schools operated by the different tribes when Oklahoma became a state and assumed the responsibility of providing education for all children residing within the state.

Leibowitz indicated that by 1886, every Indian pupil attending government boarding schools was prohibited from studying in any language other than English. Aside from the forced use of the English language, Indian dress and religious practices were prohibited in schools and all males were ordered to cut their hair short although many Indians believed in the supernatural significance of long hair. Further, Indian students were punished for speaking their own language. They remained in these schools for eight years under military discipline during which time the students were not allowed to see their parents.⁷

According to Leibowitz, in 1928, the Meriam Report

⁶United States Congress, Senate, Committee on Labor and Public Welfare, Indian Education: A National Tragedy-A National Challenge, Hearings before Special Subcommittee of Indian Education, 91st Cong., 1st sess., 143 (1969).

⁷Leibowitz, Bilingual Education, p. 6.

stressed to the Secretary of Interior and to Congress the need for a relevant instructional curriculum based on the needs and background of the Indian students and it deplored the failure of the schools to take into consideration or to accommodate the language of the Indian child. The government followed the recommendations of the Meriam Report until the early 1940's when the lack of funds, probably due to the World War II expenditures, put an end to the efforts initiated by the Meriam Report.⁸

Leibowitz reported that in 1944, the House Indian Affairs Committee made recommendations which called for a return to the same policies which the Meriam Report of 1928 discredited. It criticized, for example, a "tendency in many reservation day schools to adapt the education to the Indian and to his reservation way of life" and again called for the removal of young Indians from their homes and their placement in off reservation boarding schools.⁹

In the 1950's, an effort was started in the government to get rid of Indian trust land and relocate Indians into cities. In 1953, Congress passed a law which transferred federal jurisdiction over Indian reservations to individual states. In 1953, House Concurrent Resolution 108 called for the end of federal service to Indians, including education,

⁸Ibid., p. 4.

⁹Ibid., p. 3.

in an attempt to hasten Indian assimilation.¹⁰

Theodore Anderson pointed out that the American Indians are not immigrants to the United States; therefore their attitudes, the difficulties involved in a viable education for them, the history of past mistakes, and many other factors are unique as compared to the other language groups in this country.¹¹ A statement by Ohannessian of the Center for Applied Linguistics reinforces Theodore Anderson on this point:

The American Indian's resistance to assimilation into the larger American culture cannot be compared with that of others who have left the mainstream of their own culture and freely chosen to live in a different one.¹²

Theodore Anderson indicated that there are many educational problems involving American Indians. This isolation and cultural difference, combined with at least occasional contact with the white culture, cause great social and psychological problems which hinder the acquisition of high quality education. Anderson felt that these difficulties become translatable into high dropout rates, widespread confusion as to self-identity, poor performance on scholastic aptitude tests, and disciplinary problems. The lack of culturally relevant educational programs is one of the more

¹⁰Ibid., p. 5.

¹¹Theodore Anderson and Mildred Boyer, Bilingual Schooling in the United States, Vol. II (Washington, D.C.: U.S. Government Printing Office, 1970), p. 212.

¹²Ibid.

probable perpetrators of these factors. Many of the Indian tribes have characteristics which hinder adaptability to the Anglo classroom because they tend to live in and for the present, they are generally non-competitive, there is a respect for individual autonomy, the Indian child's experience in the home is largely nonverbal, and it is the custom to be seen but not heard around adults, to mention a few of the cultural differences. What educators may interpret as lack of interest in learning may be a result of the Indian distaste for public competition.¹³

In 1970, a national study into the educational problems of the American Indian found that one of the curriculum areas requiring attention was that of language instruction. The National Study of American Indian Education, under the direction of Robert Havighurst, found that Indian pupils accept the need to learn English and regard skills in English as more important than knowledge of their native language. There were also strong positive attitudes toward the tribal languages and many parents and pupils supported learning them. In relation to language and language instruction, it was recommended that special language and reading programs should be developed and used which were appropriate to particular Indian communities. In areas where the native language was generally spoken at home, the national study recommended

¹³Ibid., p. 210.

a bilingual program in grades k-3 with teachers who are bilingual, or skilled in teaching English to speakers of other languages and with teacher aides who were familiar with local languages.¹⁴

The direction of bilingual education since 1850 has changed on several occasions. The last directional change for bilingual education for the American Indian was in 1969, when the Bilingual Education Act was signed by President Lyndon B. Johnson. According to Tennant, the Bilingual Education Act recognized the special needs of children of limited English speaking ability in the United States and provided financial assistance to local educational agencies to develop and carry out new bilingual education programs.¹⁵

Tennant indicated the Bilingual Education Act launched education in a new direction for thousands of children whose mother tongue was not English. He also pointed out that the limited funds available for Title VII necessarily restrict the program to scattered and experimental projects. Educational programs which represent a complete reversal in national policy need time to find acceptance not only by

¹⁴Robert J. Havighurst, The National Study of American Indian Education, The Education of Indian Children and Youth, Vol. V (Minneapolis, Minnesota: University of Minnesota, 1970), p. 31.

¹⁵Edward A. Tennant, "The Bilingual Education Act and the American Indian," Bilingual Education for American Indians, Curriculum Bulletin No. 3 of the Bureau of Indian Affairs, (Washington, D.C.: United States Printing Office, 1971), p.33.

teachers and administrators but by the very communities to which they are offered. Schools setting up bilingual programs under Title VII were far more than isolated laboratories chosen to test the advantages of a new educational hypothesis. They were showcases for everyone from the lawmakers who passed the Bilingual Education Act to the parents of children who are now taught in a language other than English. It was up to those model schools to convince parents, teachers, school boards, statesmen, and the Office of Education that bilingual education really is advantageous for the child, for the community, and for the country. The model schools had the task of demonstrating that bilingual instruction was effective for Indian children.¹⁶

Tennant pointed out that in 1969, the Office of Education funded five Indian language programs: Cherokee in Gentry, Arkansas; Pomo in Ukiah, California; Navajo and Keresan in Grants, New Mexico; Cherokee in Tahlequah, Oklahoma; and Navajo in Blanding, Utah. These programs for four Indian languages were all in public schools since BIA schools and private, non-profit schools operated by Indian tribal organizations did not become eligible for Title VII funds until the spring of 1970, when amendments were made to the Bilingual Education Act.¹⁷

¹⁶Ibid., p. 33.

¹⁷Ibid., p. 34.

In 1970, five new Indian bilingual education programs were funded while four of the previous year's projects received continuation funding. The Cherokee program in Gentry, Arkansas, was discontinued. In 1971, seven additional Indian bilingual education programs were funded which included programs located on reservations in BIA schools.¹⁸ The total number of Indian bilingual programs funded by the end of 1971 was sixteen. All project schools in the Title VII program were to serve as models and for this reason the number of student participants was very limited.¹⁹

The Bilingual Education Act of 1969 has produced the impetus for the development of bilingual education programs in the United States and it has been the largest single factor in bringing Indian bilingual education back into the public schools in Oklahoma. Of more than three hundred Indian tribes in the United States, each with its own dialect, customs, and heritage, only sixteen Indian bilingual education programs were selected for funding in the first three years of operation. Those tribes selected for funding were selected because of their documented linguistic deprivation, poor academic achievement, and sufficient numbers of Indian students to merit the development of a model bilingual education program.²⁰

¹⁸Ibid.

¹⁹Ibid., p. 35.

²⁰Anderson, Bilingual Schooling, p. 2.

According to Mills, Cowen, and Guess, a bilingual education program is designed to meet the special educational needs of children who have limited English speaking ability, who come from environments where the dominant language is one other than English and who come from low income families. They indicated that the United States Office of Education endorses English as being of primary importance in the education process but also recognizes that the use of the children's mother tongue can help to prevent retardation in school performance until the student has control of the English language. The Office of Education also indicates that the development of literacy in both the mother tongue and English results in more broadly educated adults.²¹

The pre-statehood period which was so successful in developing a Cherokee population that was ninety percent literate in the Cherokee language and was more literate in English than the white population of several surrounding states, seemed to give priority to learning to read and write in the native language over that of English. Bilingual instruction today differs from this approach in that the dominant language is not given top priority.

Cohen pointed out that the utilization of a child's dominant language was one of the most misunderstood processes

²¹Faynell Mills, Agnes Cowen, and Wilma Guess, Bilingual-Bicultural Education in the Classroom, (Oklahoma City: State Department of Education, 1977), p. 7.

about bilingual education. School systems which conduct bilingual education programs are not attempting to eliminate the use of English. Native language instruction is a temporary process to be used only until English as a second language has improved sufficiently to enable a child to be successfully instructed in English. It may take one to three years for a child to make a transition from dominant or native language instruction into an English educational environment.²²

Cohen further indicated the need to begin bilingual instruction in the dominant language. He felt that a child who begins school speaking only his native language will take a year or two to fully understand instruction from a regular English speaking classroom teacher. Without bilingual education, this child obtained an educational fluency within two or three years. However, by that time, the child has fallen two or three years behind in the academic areas. Bilingual education attempts to eliminate this deficit by utilizing the latest English language learning techniques and supplementing them with the presentation of instruction in the child's dominant language along with developmental reading in the same tongue.²³

According to Cohen, bilingual education also provides

²²Bernard Cohen, "The Truth About Bilingual Education," Bilingual Education, Vol. III (Fall, 1978), p. 15.

²³Ibid., p. 16.

that a youngster continue taking a language maintenance program after completing an academic transition from his native language into an English academic program. This is not a luxury item or one which is primarily aimed at enhancing a child's cultural awareness. Research has clearly shown that acquisition and application of bilingual learning capabilities enhance academic potential. As a result of such research, many of the more wealthy school systems in America provide their youngsters with second language education at an early age even when English is the only language spoken. These programs are based on the fact that bilingual education has been shown to increase intelligence test scores.²⁴

Cohen reported that a study conducted at McGill University compared one group of youngsters who were similar except for the fact that they were in a monolingual education program. The bilingually instructed group performed better on tests of language arts, mathematics, and intelligence. Despite the common and erroneous belief that intelligence scores remain constant, bilingual education is one of the educational experiences which seems to result in an upgraded intelligence.²⁵

Another McGill University study reported on by Anderson indicated that if the bilingualism is balanced, bilingual

²⁴Ibid.

²⁵Ibid.

nineteen year-olds in Montreal are markedly superior to monolinguals on verbal and non-verbal tests of intelligence and appear to have greater mental flexibility, a superiority in concept formation, and a more diversified set of mental abilities.²⁶

Ballesteros concluded that bilingual education must be valued as an asset, not considered as a liability. It is not to be viewed as a remedial program. On the contrary, Ballesteros felt that bilingual education should eliminate the necessity of remedial instruction by providing the student with sound educational concepts in both the native language and acquired second language.²⁷ Ballesteros indicated in his writings that bilingual education is an effective program approach that provides the student the opportunity to maintain both his or her home language and culture in addition to having a knowledge of the dominant language, English. It gives security and a positive self-image to students and provides them a chance to be comfortable and happy in school. Bilingual education enhances the affective domain.²⁸

Variables that Affect Academic Achievement

A review of literature was conducted of selected

²⁶Anderson, Bilingual Schooling, p. 51.

²⁷David Ballesteros, "Bilingual/Bicultural Education: Beyond the Seventies," Bilingual Education for Latinos, Washington: Association for Supervision and Curriculum Development, 1978), p. 98.

²⁸Ibid., p. 104.

variables that affect academic achievement. The researcher reviewed the variables of: intelligence, age, sex, grade point average, and father's educational level, that normally affect academic achievement. Those variables that may be unique to this particular subject area and population were reviewed. These unique variables are speaker of Cherokee and degree of Indian blood.

The variable most commonly used as a predictor variable was intelligence. Several studies were reviewed that had a high correlation between intelligence and academic performance. In a study by Hinkelman, intelligence was correlated with achievement in various subject areas using a group of students from whom data were available for grade two through grade seven. Correlations were found to be quite consistent for these grades, averaging a positive .65.²⁹

A study by Barnes provided data primarily concerned with the correlation of intelligence scores to academic achievement for students in grades one through four. The correlations ranged from a positive .31 to a positive .63 and showed a tendency to increase from first to second grade. Barnes found that the magnitude of the correlation seemed stable from the second grade through the fourth grade. The increase in correlations from first to second grade suggested

²⁹Emmett A. Hinkelman, "Relationship of Intelligence to Elementary School Achievement," Educational Administration and Supervision, Vol. 41, 1955, pp. 176-179.

the possibility of an age effect.³⁰

A significant study by St. John was concerned with the relationship between intelligence test performance and achievement test results of elementary students. In this study, twelve previous studies concerned with this same relationship were compiled and summarized. The results of the summarization indicated a mean correlation of a positive .63 between intelligence test results and reading achievement results. This study also indicated a mean correlation of a positive .58 between intelligence test results and mathematics achievement.³¹

St. John reported another study which found that intelligence test scores had the highest correlation with educational achievement of any of the forty variables used in this particular study. In this study, the correlation between intelligence and educational achievement was a positive .68.³²

The variable, grade point average, is traditionally considered one of the best predictors of academic achievement. Lavin suggested that a study cannot use a grade point average

³⁰Paul J. Barnes, "Prediction of Achievement in Grades One through Four from Otis Quick Scoring Mental Ability Tests; Alpha Short Form," Educational and Psychological Measurement, Vol. 15, 1955, pp. 493-494.

³¹Charles W. St. John, Educational Achievement in Relation to Intelligence, (Cambridge: Harvard University Press, 1930), p. 51.

³²*Ibid.*, p. 53.

as a predictor of academic achievement without considering the teacher who gave the grades, the relationship between the student and the teacher, the personality traits of the student, and the socioeconomic environment of the student. Lavin concluded that the correlation of grade point average to academic achievement will nearly always be significantly high but without these considerations being taken into account, grade point average as a predictor is meaningless.³³

A study by Glenn which found that teacher marks in the sixth and eighth grades correlated more highly with achievement tests than tests of general intelligence. In another study which was based upon the use of letter grades as a criterion, the criteria were converted in various ways into numerical values such as grade points. The mean correlation between achievement in the elementary grades and the grade points was a positive .54.³⁴

In a study by O'Rugg, the coefficients of correlations among the criteria, intelligence, teacher's marks, reading achievement, and arithmetic achievement were a positive .39 for boys, a positive .50 for girls, and a mean correlation of positive .44 for both boys and girls. The correlation between teacher marks and the academic achievement of students

³³David E. Lavin, The Prediction of Academic Performance, A Theoretical Analysis and Review of Research, (New York: Russell Sage Foundation, 1965), p. 52.

³⁴St. John, Educational Achievement, pp. 41-42.

in reading and arithmetic was significant. For boys the correlation was a positive .52, the girls had a correlation of a positive .435 and the mean correlation for both the boys and girls was a positive .48.³⁵

Lavin summarized a study by Mildred Hughes that was concerned with sex differences and reading achievement in the elementary school. Hughes found that when ability was controlled, the reading achievement of girls was superior to boys through grade four. It was determined that beyond grade four, the sex differences were not significant and did not consistently favor the girls.³⁶

In a study by Penoi, seventy-five eleventh and twelfth grade Indian students from Indian boarding schools in Oklahoma were administered the California Achievement Test. It was determined from the results of this test that the girls had higher academic achievement than the boys in both the eleventh and twelfth grades.³⁷

St. John found that when 503 boys and 453 girls in grades one through six, who had been controlled for intelligence, were measured by the Haggerty Reading Test Part I, Haggerty Reading Test Part II, Ayres Reading Test, Peet-Dearborn Arithmetic Test I, and Peet-Dearborn Arithmetic

³⁵ Ibid., pp. 99-104.

³⁶ Lavin, The Prediction of Academic, p. 31.

³⁷ Charles R. Penoi, "Some Factors of Academic Achievement in High School Pupils Attending Selected Indian Boarding Schools in Oklahoma," (unpublished Doctor's Dissertation, Graduate College, University of Oklahoma, 1956), p. 52.

Test II, the results indicated the girls received higher achievement scores than did the boys on all of these tests with the exception of the Peet-Dearborn Arithmetic Test I.³⁸

The same student population demonstrated a correlation of positive .51 for girls as compared to a positive .49 for boys in the consistency of reading achievement. A correlation of positive .44 for girls as compared to positive .35 for boys was found in the consistency of arithmetic achievement.³⁹

St. John's general interpretations of the statistical findings of this study with regard to sex difference were, that when controlled for intelligence, girls received higher teacher marks than boys. In standard tests of achievement, sex differences were slightly in favor of the girls. Boys were less successful than girls in achieving a rate of progress through the grades appropriate to their intelligence.⁴⁰

Studies by Lavin concerned with the effects of age upon academic performance reached contradictory conclusions. One study found that under-age children had lower school achievement than children of normal age for the grade and equivalent ability. Another study found that under-age children were somewhat superior in achievement and a third study

³⁸St. John, Educational Achievement, p. 126.

³⁹Ibid.

⁴⁰Ibid.

showed little effect of age.⁴¹

Limited research has been conducted on the degree of Indian blood as a predictor variable for academic achievement. The most notable investigation on this subject was conducted by Garth. In this study of mixed blood Indians, he concluded that degree of white blood improved the intelligence of mixed blood Indians, the correlation between intelligence and degree of white blood was a positive .42. He found that those students who were three-fourths Indian had a mean I.Q. of 74.0, those students who were one-half Indian had a mean I.Q. of 75.3 and those students who were one-fourth Indian had a mean I.Q. of 77.5. It was pointed out in this study that these measures were high in variability.⁴²

Garth's investigation found that school education had only a slight effect on intelligence as measured by the National Intelligence Test of I.Q. Intelligence was influenced more by degree of white blood. He indicated that a relationship existed between degree of Indian blood and intelligence. It can be assumed that because of the high correlation between intelligence and academic achievement that the degree of Indian blood can also indicate the success in academic achievement.⁴³

⁴¹Lavin, The Prediction of Academic, p. 133.

⁴²Thomas R. Garth, "The Intelligence of Mixed Blood Indians," Journal of Applied Psychology, XI, (1927), p. 275.

⁴³Ibid., p. 276.

An investigation by Anderson, Collister, and Ladd was conducted to determine what factors produce differences in academic achievement. They concluded from their research that degree of Indian blood was a factor in the academic achievement of Indian students. The difference was high but not high enough to be considered significant.⁴⁴

The utilization of speaker of Cherokee as a predictor variable was reinforced by the research of Ivey who made a study on the influence of the Indian language background on reading. The findings of this study indicated a significant relationship among speaking competency, vocabulary, and reading. Results also indicated that proficiency in speaking would affect reading performance and that a deficiency in speech is a major factor in other language deficiencies. Ivey made the assumption that improvement in speech should contribute to improvement in reading.

Ivey related the importance of providing instruction designed to aid the bilingual child in an effort to prevent educational retardation or poor academic achievement. She felt that by manipulating the bilingual child's verbal behavior, it should be possible to change his level of intellectual, linguistic, and behavioral functioning. Increased verbalization and verbal approach to problem solving should facilitate

⁴⁴K. E. Anderson, G. G. Collister, and C. E. Ladd, The Educational Achievement of Indian Children, (Lawrence, Kansas: Haskell Institute Print Shop, 1953), p. 2.

intellectual development and thereby have important ramifications for the prevention of educational retardation.⁴⁵

St. John compiled and summarized forty studies that reported on factors or various traits that correlated with achievement. The ability of the student to express himself had the third highest correlation with achievement. Intelligence had the highest correlation with a positive .68, mental maturity was second with a positive .66, and oral expression was third with a positive .63. Oral expression and speaker of Cherokee affect achievement in the same way because both are concerned with the student's ability to understand and speak English.⁴⁶

Related Research

The literature in this area revealed many studies of the phenomenon of bilingualism but few studies related directly to the effect of bilingual education on academic achievement. Those longitudinal studies that pertained to academic achievement in bilingual education programs were most relevant to this study. The review of literature in this study is directed toward the effectiveness of bilingual instruction on academic achievement.

⁴⁵Lillian Patience Ivey, "Influence of Indian Language Background on Reading and Speech Development," (a doctoral dissertation, Graduate College, University of Oklahoma, 1968), pp. 59-60.

⁴⁶St. John, Educational Achievement, pp. 52-53.

A longitudinal study by Leyba attempted to determine the effectiveness of bilingual instruction over a period of six years. The language involved in this study was Spanish. This study was conducted in three elementary schools. The project operated in grades one through six, was funded for grade one in 1970-71, and was expanded vertically through federal funding, a single grade at a time in each of the three schools.⁴⁷

The treatment group consisted of 70 percent Spanish surnamed students and 30 percent Anglo students who participated in the bilingual project classrooms. The results of the study did not indicate if the two ethnic groups were separated for the purpose of determining gains made by only the Spanish surnamed students. The only study controls for the treatment group were participation in the project classrooms and parental approval.⁴⁸

The control group was selected yearly at each school using a table of random numbers. The number of children in the control group in any given year was roughly the size of a single classroom. At the beginning of each year, twenty-five students were selected for the control group, nine from one school and eight from two other schools. The control

⁴⁷Charles F. Leyba, "Longitudinal Study, Title VII Bilingual Program, Santa Fe Public Schools, Santa Fe, New Mexico," (study conducted by the National Dissemination and Assessment Center, California State University, Los Angeles, 1978), p. 1.

⁴⁸Ibid., p. 6.

group received no specialized treatment and thus was considered to be representative of students receiving standard school offerings.⁴⁹

Leyba's study attempted to determine the effectiveness of bilingual instruction on the academic areas of reading and mathematics. In the area of reading, the most promising result of the study was that the students who had participated in the bilingual program for five years had equaled the national norm in grade six. In the majority of comparisons, the longitudinal bilingual group was superior to the control group.⁵⁰

Statistical tests using gain scores revealed that students who had participated in the bilingual program for four years had made significant gains over the control group in grades one and two. Although not always statistically significant, the students who participated in the bilingual program for five years made gains over the control group in grades three, four, five, and six.⁵¹

The achievement test results revealed greater overall gains in mathematics than in the area of reading. The students who participated in the bilingual program for five years made greater gains in all grades than did the control group. Only the mathematics gain in grade two was determined

⁴⁹ Ibid.

⁵⁰ Ibid., p. 11.

⁵¹ Ibid.

significant by the statistical tests.⁵²

Leyba's study indicated nominal success for bilingual education over a five year period as compared to the control group. In the area of mathematics, his study revealed a higher degree of success for five year bilingual education participants as compared to the control group.⁵³

A study by Powers was designed to determine the influence of bilingual instruction on academic achievement and self-esteem of Spanish speaking junior high school students in Nogales, Arizona. This was an ex post facto study with two groups, an experimental and a control group. All the students in this study were equated on age, national origin, year in school, and socioeconomic status. The experimental group consisted of forty-four students who participated from three to five years in a bilingual education program whereas the control consisted of forty-three students who received no instruction in a bilingual education program. All students in the study were measured for reading comprehension, mathematics computational skill, and self-esteem on achievement and self-concept tests.

The experimental group was comprised of students who had been enrolled from three to five years in the Title VII program. The control group included Mexican-American students

⁵²Ibid., pp. 14-29.

⁵³Ibid.

who had not been instructed in any bilingual education program.⁵⁴

Students' scores were obtained on the variables of reading comprehension, mathematics computation, first semester grade point average, and self-esteem. In the fifth grade students were administered the Stanford Achievement Test in reading comprehension and mathematics computation.

The results of the data analysis indicated that the bilingual education program students were not significantly different from nonbilingual program students on any of the six dependent measures. During this study of bilingual education, it was discovered that the bilingual program students and nonbilingual program students differed on the frequency with which they spoke English and Spanish. This difference appeared to exist prior to the participation in the bilingual education program. Therefore, a conclusion about the influence of bilingual education on academic achievement and self-esteem was not possible.⁵⁵

Powers indicated that socioeconomic status accounted for a significant amount of variance in academic achievement; thus, it was concluded that socioeconomic status was a significant factor that should be controlled in future studies of

⁵⁴Stephen Powers, "The Influence of Bilingual Instruction on Academic Achievement and Self-Esteem of Selected Mexican-American Junior High School Students," (Ann Arbor, Mi.: University Microfilms International, 78-11518, 1978), pp. 37-38.

⁵⁵Ibid., p. 52.

bilingual education. Power's study also concluded that school entry language and home language were found to be correlated with reading comprehension.⁵⁶

An ex post facto study by Trevino was made to determine the effectiveness of a bilingual program in which the students' vernacular was learning of mathematics in the primary grades. Because of a state law in Texas which required that English be the major language of instruction, the bilingual program used both English and Spanish as a means of instruction.

The population for this study was that of primary grade children in the Consolidated Independent School District in Webb County, Texas. The sample was taken from the primary grades of Nye Elementary School and consisted of 183 children beginning with the school term 1963-64 through the school term 1966-67. These children were unselected except as place of residence entitled them to attend Nye Elementary School.⁵⁷

The first and third grade classes of the 1963-64 school term were selected as the control group. Their achievement scores were taken as representative of the results obtained under the education policy of teaching exclusively in English. The control group had seventy-two children of which thirty-four

⁵⁶Ibid.

⁵⁷Bertha Alicia G. Trevino, "An Analysis of the Effectiveness of a Bilingual Program in the Teaching of Mathematics in Primary Grades," (Ann Arbor, Mi.: University Microfilms International, 68-11518, 1968), p. 59.

were English speaking and thirty-eight were Spanish speaking. The experimental group was composed of one-hundred eleven children, sixty-two of the experimental group were English speaking and forty-nine were Spanish speaking.⁵⁸

Trevino's study was concerned with three problems. First, the effect of bilingual instruction on mathematics achievement of English speaking children. Second, the effect of bilingual instruction on mathematics achievement of Spanish speaking children. Third, the relative effect of a program of bilingual instruction on the achievement of both groups.

The primary method of analysis used in the Trevino study was a one-way analysis of variance with two independent groups. The statistical analysis of the study indicated the acquisition of a second language does not lower the achievement of the English speaking child in the primary grades; rather, it facilitates his learning. The analysis also indicated that the scores of the Spanish speaking students who participated in the bilingual program were higher than the scores of Spanish speaking children taught exclusively in English.⁵⁹

A study by Olesini evaluated the effectiveness of bilingual education for sixty Spanish speaking Mexican Americans. Thirty of the children were third grade students who had participated in a bilingual education program for two years

⁵⁸Ibid., p. 60.

⁵⁹Ibid., pp. 95-96.

or more. The other thirty third grade students did not participate in any bilingual education programs. All participants in this study attended the Kinlandale Public Schools. The treatment and control group were determined to be significantly comparable on the basis of a comparison of chronological ages and scores from the Otis Quick Scoring Mental Ability Test.⁶⁰

The Metropolitan Achievement Test was administered on a pre-post basis to both the treatment and control groups. It was determined from the statistical analysis that the academic areas of spelling and arithmetic computation produced no significant difference between the treatment and control groups. In the academic areas of vocabulary, reading, language, and arithmetic concepts there was a significant difference between the achievement of the control and experimental groups.

Olesini concluded that the results of his study indicated that the bilingual children of both sexes achieved greater gains in the academic curricula when they were instructed with bilingual methods. He further concluded that bilingual instruction reduced the language handicap that bilingual children encounter at school.⁶¹

A descriptive study by Del Buono was designed to

⁶⁰Jose Olesini, "The Effect of Bilingual Instruction on the Achievement of Elementary Pupils," (Ann Arbor, Mi.: University Microfilms International, 72-10824, 1972), p. 25.

⁶¹Ibid., p. 51.

determine if there was a relationship between bilingual instruction to the academic achievement and self-concept of seventh grade Mexican-American students. The students participating in this study were taught subject matter in their native language for a part of the school day and were instructed in English as a second language for a part of the school day. The study attempted to determine if participating students would have greater academic achievement and a more positive self-concept of their ability to achieve in school than a similar group of Mexican-American students not receiving bilingual instruction.⁶²

Pre-existing groups were compared on their mean post-test scores on achievement in social studies, reading, language, and academic self-concept. Data were also gathered on socioeconomic status and mental ability of the population sample. The treatment group consisted of forty-five students and the control group consisted of forty-nine students.

The statistical analysis of the study indicated that there were differences in the group mean scores between students in the program and students in the comparison group. These differences favored the students in the bilingual program.⁶³

⁶²Xavier A. Del Buono, "The Relationship of Bilingual/Bicultural Instruction to the Achievement and Self-Concept of Seventh Grade Mexican American Students," (Ann Arbor, Mi.: University Microfilm International, 72-08677, 1971), p. 6.

⁶³Ibid., p. 117.

Summary

The review of literature revealed that there have been many changes in the direction of governmental attitude, policy, and legislation toward bilingual education for American Indians. The most recent governmental attitudes and efforts have encouraged bilingual instruction for the American Indian. The review of literature indicated that the Oklahoma prestatehood Indian bilingual education programs were effective. Current bilingual education programs for American Indians are presently being funded and evaluated to determine their short-term effectiveness.

The variables that might possibly affect the outcome of this study, if not controlled, were reviewed to determine their effectiveness on academic achievement. It was revealed that all of the variables reviewed could affect, to some degree, the academic achievement of the students in this study. Intelligence and grade point average were the most effective predictors of academic achievement. Speaker of Cherokee and degree of Indian blood were two unique variables that the reviewed literature indicated could affect the academic achievement of Indian students.

A review of related research indicated limited research available that pertained to longitudinal studies on American Indian bilingual education programs. Those research studies reviewed that were similar to the research design of this study, were found to be directed toward the Mexican-American

students and the Spanish language. Most of these studies were short term and of the ex post facto design. The review of related research generally indicated that bilingual instruction improved the academic achievement of those students who received bilingual instruction.

CHAPTER III

DESIGN OF THE STUDY

Selection of Subjects

The subjects selected for this study were divided into two treatment groups and one control group. The subjects in the first treatment group were Cherokee Indian students who had received bilingual instruction through the Cherokee Bilingual Education Program for five consecutive years. The subjects in the second treatment group were Cherokee Indian students who had received bilingual instruction through the Cherokee Bilingual Education Program for four consecutive years. The subjects in the control group consisted of comparable Cherokee Indian students who had not received bilingual instruction.

The selection of subjects who participated in the Cherokee Bilingual Education Program for five consecutive years came from project school "A" and are identified as Group I. Seventeen of the thirty-seven eighth grade students

in school "A" met the criteria for participation in Group I of this study. Only those students who had a Cherokee Indian blood quantum of one-quarter or more, entered the bilingual project as first graders in 1970-71, continuously participated in the bilingual project for five consecutive years, and had not failed a grade level through grade eight were selected to participate as the five year treatment group. The summary of raw data for Group I is located in Appendix A.

The selection of subjects who participated in the Cherokee Bilingual Education Program for four consecutive years were selected from project schools "A" and "B" and identified as Group II. Eighteen of the sixty-four eighth grade students in schools "A" and "B" met the criteria for participation in this study. Four subjects were selected from project school "A" and fourteen subjects were selected from project school "B". Only those students who had a Cherokee Indian blood quantum of one-quarter or more, entered the bilingual program as second graders in 1971-72, continuously participated in the bilingual project for four years, and had not failed a grade level through grade eight were selected to participate as the four year treatment group. The summary of raw data for Group II can be found in Appendix B.

The selection of subjects for a control group came from five rural schools. Those schools were selected for participation because they were located in Indian communities, had

similar socioeconomic environments, and had a high percentage of Indian students enrolled. Eighteen control subjects were selected from 138 eighth grade students who attended the five control schools.

To be eligible for participation in the control group, each student met the control group criteria for participation. Only students who had a Cherokee Indian blood quantum of one-quarter or more, had never been a participant in a bilingual project, and had not failed a grade level through grade eight were selected to participate in the control group. The control group is identified in this study as Group III.

After screening students for the control group criteria, a second measure was taken to insure that the control was as comparable to the treatment groups as possible. This was accomplished by taking the high and low I.Q. scores of the treatment groups and using those scores as the range limits for participation in the control group. Once an I.Q. range was established for the control group, all students who met the selection criteria and fell within the I.Q. range limit were pooled. Eighteen students were chosen for participation in the control group by a random draw from the pool. The raw data for Group III is located in Appendix C.

Method of Collecting Data

A questionnaire was given to the principal of each school participating in this study. The researcher explained the questionnaire and asked the principal for assistance in

compiling the information requested. The principal, his secretary, or his designee assisted the researcher by making the requested data available. All information sought on the questionnaire was secured from the enrollment cards, the permanent register, and from the Johnson O'Malley verification records. The data obtained through the questionnaire consisted of the student's birthdate, sex, tribe, Indian blood quantum, and pass-fail record. The questionnaire presented to the principal is located in Appendix D.

The grade point averages were taken from the third grade since it was the first year that all schools participating in this study used letter grades for reporting student progress. Both semester grades for the subjects of reading, arithmetic, social studies, and language were compiled and computed on a 4.0 basis to obtain each student's grade point average. The researcher obtained the grades from the permanent registers located in the County Superintendent's offices located in Adair, Cherokee, and Mayes Counties.

Data were collected from the files of the Cherokee Bilingual Education Program which verified students' participation in the program and the grade levels and years in which student participation took place. This information substantiated that the Indian students who participated in the treatment groups were in the bilingual program for the number of years required.

The achievement and I.Q. test data on the project and

control school participants were made available by the Cherokee Bilingual Education Program. This test information provided the achievement data on all eighth grade students who took the test in the spring of 1978. The achievement test data were used as the dependent variable in this study and the I.Q. test data were control variables used in the statistical analysis.

Data concerned with the participating students' ability to speak Cherokee and the fathers' educational level were collected by the bilingual Cherokee teacher aides when the students participated in the bilingual program. When the students did not participate in the bilingual program, the data were collected by the bilingual staff members of the Cherokee Bilingual Education Program and selected bilingual individuals from the Indian community.

When possible, the source of the data was the family members of participating students, and when not possible, the sources were close friends or knowledgeable members of the community such as the teacher aide. Because of the cultural structure of the Indian communities, most of the parents of the participating students had lived in the community all of their lives and most Indian people within the community were aware of the educational attainment of the family members and of their Cherokee speaking ability. The student's Cherokee language ability and father's educational attainment were used as control variables in the statistical analysis. The

form used in gathering data on the father's educational level and the student's Cherokee speaking ability is located in Appendix F.

The data were gathered by the researcher with the permission of, in the name of, and under the auspices of the Cherokee Bilingual Education Program. The researcher acted as an agent for the Cherokee Bilingual Education Program to insure that each participating school and student received anonymity. All data collected for this study have been used for the purpose of specifically increasing knowledge concerning bilingual instruction and improving Indian education in general. The letter granting permission to conduct this study utilizing project records is located in Appendix E.

The Measurement

There were two evaluative instruments used in this study. The SRA Achievement Series was used to evaluate the reading and mathematics skills of students who participated in the treatment and control groups. The achievement test scores in reading and mathematics were used as the dependent variable in the statistical analysis. The SRA Short Test of Educational Ability (STEA) is designed to provide a reliable estimate of general educational ability from a short, easily administered test which provided a quotient score for each student. The Short Test of Educational Ability test scores were used as a control variable in the statistical analysis.

The SRA Achievement Series, Multilevel Edition, Red Level, Form E was the achievement test that provided the measurement of academic achievement in reading, language, mathematics, social studies, science, and the use of sources. Testing time for Red Level, Form E was three and one-half hours. Consistency in test administration among schools participating in the study was enhanced by inservice training in test administration provided to classroom teachers by the Cherokee Bilingual Education Program. Test directions were delivered in English by the classroom teacher. Test scoring was handled by the SRA Computer Test Scoring Center in Chicago, Illinois.

The SRA Achievement Series was standardized in 1971 on 155,567 students nationwide. The Red Level, Form E test for eighth grade students was standardized on 10,352 students nationwide. The standardization process for this test included selecting samples from twenty-seven schools in the West South Central Region of the United States which includes Oklahoma. Samples for standardization were taken from small school districts of less than 1,100 students, from fourteen Title I school districts, and from six rural school districts where the median educational level of the head of the family was grade eight or less.¹

¹SRA Assessment Survey, Technical Report, (Achievement Series E and F, Chicago: Science Research Associates, Inc., Sept. 1974), pp. 17-23.

All of the schools included in this study were Title I schools, all were rural, all had an enrollment of 1,100 students or less, and it was anticipated that the median educational level of the head of the family was grade eight or less in one or more of the school districts participating in this study. This indicated that the population used in the standardization process on this test would be relative for the population of this study.

The Kuder-Richardson Formula 20 was used to compute the reliability coefficients of the SRA Achievement Series. The reliability for total reading of Red Level, Form E was .96. This reliability score included the sub-scores of reading comprehension which had a reliability score of .92. The reliability for the mathematics total section of the Achievement Series, Red Level, Form E was .94. This reliability score included the sub-score of mathematics concepts which had a reliability score of .86 and mathematics computation which had a reliability score of .93.²

The SRA Short Test of Educational Ability (STEA), Level 4, was administered by the classroom teachers to all eighth grade students in the project and control schools. This test was administered in conjunction with the SRA Achievement Series. The I.Q. quotient was derived from the raw score.

²SRA Technical Brief, (Achievement Series, Multilevel Edition, Form E; Chicago: Science Research Associates, Inc., 1971), p. 11.

The STEA was developed as a measure of educational aptitude, not general ability. In interpreting STEA quotient scores, it should be recognized that the students were being compared with students at their grade level. This study did not use students whose age was atypical for the grade placement.³

The items used in Level 4 were taken from current editions of the SRA Tests of Educational Ability (TEA). No standardization sample, as such, was used. Rather, the short form was administered to students in six Chicago area schools along with the TEA. I.Q. equivalents were then obtained by equating the STEA scores with the TEA scores using the equipercentile method. The implication was that the norming of the STEA to the TEA was a positive .75. The implication of these data was that the STEA was supposed to be valid for making the same kind of predictions that the long form TEA made.⁴

The Interpretive Manual for the STEA provided data that were pertinent to this study. In the second semester of grade eight, the mean raw score was 40.2 and the raw score standard deviation quotient was 15.1. The reliability and standard error of measurement were obtained from the Kuder-Richardson formula 20. In grade eight, level 4, the reliability was

³STEA Interpretive Manual, (STEA Short Test of Educational Ability, Level 3-5; Chicago: Science Research Associates, Inc., 1972), p. 5.

⁴Oscar Krisen Buros (ed.), The Mental Measurement Yearbook, (Chicago: The MacMillan Company, 1974), p. 7:382.

measured as being .94 and the standard error of measurement as being 3.61.⁵

General Procedures

This study was conducted as a quasi-experimental study. There were three groups in this study, two treatment groups which received bilingual instruction and one control group which did not receive bilingual instruction. All of the students selected for participation met the criteria for participation which were: having proper age for the grade level being used in this study, having never failed a grade, being at least one-quarter Indian or more, being a member of the Cherokee tribe, having participated in the free lunch program during the eighth grade, and having taken the SRA Achievement Series test and the Short Test of Educational Ability during the spring of their eighth grade year.

The treatment groups consisted of those students who participated in the Cherokee Bilingual Education Program for five consecutive years beginning with the first grade in 1970-71 and those students who participated in the Cherokee Bilingual Education Program for four consecutive years beginning with the second grade in 1971-72 whereas the control group consisted of those students who received no instruction in a bilingual education program.

The treatment groups were comprised of Cherokee Indian

⁵STEA Interpretive Manual, p. 9.

students who participated in the bilingual education program for four and five consecutive years in project schools "A" and "B". The control group included Cherokee Indian students who did not receive bilingual instruction from any source. Special effort was taken to exclude students who failed a grade and were overaged, who did not qualify for the free lunch program, and who did not participate in the bilingual program for the consecutive years designated for participation in this study.

The scores of participating students were obtained on the variables of the total reading and total mathematics sections of the SRA Achievement Series administered to the treatment and control groups in the spring of the eighth grade. The control variables of grade point average of the students when they were in the third grade, I.Q., age, sex, the educational level of the head of the household, the degree of Indian blood, and the Indian language speaking abilities were collected for use in the statistical analysis of this study.

During the spring of the 1978 school year, the SRA Achievement Series and the Short Test of Educational Ability were administered. The results of these tests were obtained from the Cherokee Bilingual Education Program. The researcher gathered the grade point average, degree of Indian blood, pass-fail record, age, and sex data from the records of the participating elementary schools. Because of the language, culture, and background of the majority of the parents of

participating students, it was necessary to utilize the Cherokee Bilingual Education Program staff personnel and trained community people who were bilingual and who were accepted by the Indian community to gather information concerning the students' ability to speak the Cherokee language and the educational level of the head of the household. The researcher standardized and coordinated this data collection process.

The bilingual education program was initiated in a dependent school district, designated in this study as school "A" in September, 1969. The bilingual education program was initiated in the dependent school district, designated in this study as school "B" in September, 1971. The goal of the project was to develop a pupil who could fully function in the standard usage of both the home language and the second language which was English.

Oral language development was the primary effort of the Cherokee Bilingual Education Program. Both the Cherokee and English languages were used but the basic efforts were directed toward oral language development in English. The Cherokee language was used to reinforce the English oral language lessons. In grades one, two, and three, the program efforts were concerned primarily with oral language development. During these grades, efforts were implemented to improve oral language in both languages. In grades four and five, reading of the Cherokee syllabary was introduced.

The absence of bilingual teachers and the absence of curriculum materials printed in the Cherokee syllabary during the first two years of the program were the primary reasons for the curricula direction of the Cherokee Bilingual Education Program. The use of bilingual teacher aides was the factor that made the bilingual program bilingual. In 1971, the first Cherokee Syllabary Primers were introduced into the classroom curriculum to be used by both Indians and non-Indians.

Those eighth grade students selected for participation in this study from project school "A" were the only students that had the full benefit of bilingual instruction from grade one through grade five. Those eighth grade students selected for participation in this study from project schools "A" and "B" were the only students who received bilingual instruction beginning in grade two and continuing through grade five. After 1975, bilingual instruction was discontinued in grades four and five due to reduced federal funding. Therefore, the only students who could ever be used as subjects to determine the effectiveness of bilingual instruction from grade one through grade five consecutively were used in this study as treatment groups I and II.

This chapter explained the design of the study by describing the process of selecting subjects, the methods of collecting data, the various measurement instruments utilized, and the general procedures used in this study. Chapter IV

will describe the statistical technique selected for this study and give the rationale behind the selection of the statistical techniques used in this study. The statistical procedures and results will be discussed in relation to testing the hypotheses of this study.

CHAPTER IV

TREATMENT OF DATA

The purpose of this study was to determine if the eighth grade reading and mathematics achievement scores of Cherokee Indian students who received bilingual instruction in grades one through five were significantly different from the reading and mathematics achievement scores of comparable eighth grade Cherokee Indian students who did not receive bilingual instruction. A secondary purpose of this study was to determine whether the reading and mathematics achievement scores of five-year bilingually instructed participants were significantly different from the four-year bilingually instructed participants.

There were seventeen Cherokee Indian students who received bilingual instruction in the Cherokee Bilingual Education Program for five consecutive years. These five-year participants were an intact group who were identified in the statistical analysis as treatment Group I. There were eighteen Cherokee Indian students who received bilingual instruction in

the Cherokee Bilingual Education Program for four consecutive years. These four-year participants were an intact group who were identified in the statistical analysis as treatment Group II. There were eighteen Cherokee Indian students who did not receive bilingual instruction nor did they participate in the Cherokee Bilingual Education Program. These non-participating Cherokee Indian students were randomly selected and were identified as treatment Group III in the statistical analysis.

Because the researcher was not able to control all of the variables in the research design due to the partial use of intact groups, it was necessary to use a statistical technique that could equate all of the groups with respect to relevant variables. The analysis of covariance was selected as the primary statistical technique, since it allowed one to test for mean difference between two or more intact groups while compensating for initial differences between the groups with respect to relevant variables.¹

The researcher selected seven variables, age, sex, I.Q., father's educational level (FEDUC), grade point average (GPA), Cherokee speaker (CHER), and degree of Indian blood (DEGIND), which were considered relative and were an influence on the three treatment groups with respect to reading and mathematics

¹W. James Popham, Educational Statistics Use and Interpretation, (New York: Harper and Row Publishers, 1967), p. 230.

achievement scores. These variables were used in the statistical analysis as control variables.

An examination was made to determine if the correlation between the control variables (covariates) and the dependent variables was high or low. The higher the correlation between the covariates and the dependent variable, the more effective the analysis of covariance.² A low correlation would indicate that the covariate was not relevant and therefore would not be a pertinent factor in the overall analysis. The summary of the Pearson Product-Moment Correlation Coefficient among and between the covariates and dependent variables is presented in Table III.

The covariates, I.Q., father's educational level, and grade point average, had a significant correlation to the dependent variable, reading achievement score. These covariates are definite predictor variables that were relevant to the dependent variables. The covariate, speaker of Cherokee, had a high correlation to the reading variable but was not high enough to be significant.

An analysis of variance was computed on each of the seven covariates to determine the magnitude of initial difference between the groups. The results of the analysis of variance on the seven covariates of the one control and two treatment groups confirmed that the groups did not differ

²Fred N. Kerlinger, Foundations of Behavioral Research, (New York: Holt, Rinehart and Winston, Inc., 1964), p. 349.

TABLE III

PRODUCT-MOMENT CORRELATION COEFFICIENTS AMONG AND BETWEEN THE
COVARIATES AND DEPENDENT VARIABLES FOR GROUPS I, II, AND III

	Age	Sex	I.Q.	FEDUC	GPA	CHER	DEGIND	READ ACH	MATH ACH
Age	X	-.098	-.193	.149	-.078	-.109	.084	-.086	-.005
Sex		X	-.150	-.059	.025	-.006	.158	-.075	-.061
I.Q.			X	.305*	.592*	.279*	-.117	.793*	.644*
FEDUC				X	.316*	.152	-.129	.290*	.050
GPA					X	.480*	-.302*	.643*	.498*
CHER						X	-.639*	.214	.228
DEGIND							X	.110	-.074
READ ACH								X	.579*
MATH ACH									X

*.271 is significant beyond the .05 confidence level

significantly on the unadjusted means which indicates that the variance found among the means can be accounted for by the variance within the groups.³ The data derived from the analysis of variance for each covariate can be found in Appendix G.

The research design of this study called for the use of seven covariates in the analysis of covariance. The conventional analysis of covariance model, which had the capacity to use a maximum of five covariates in the statistical analysis, was determined to be inappropriate for this particular analysis. The multiple linear regression analysis model, which did not have a maximum on the number of covariates used in the statistical analysis, was selected to be used in place of the conventional model.

The multiple regression analysis utilized two models, a restricted and a full model, in the statistical analysis. The restricted model for this study utilized the seven covariates in its analysis. The restricted model answered the question, "Is the influence of the treatments nonconstant and different across the three groups in the presence of the control variables?"⁴

The full model for this study has added two dummy variables to the covariates making a total of nine control

³Francis J. Kelly and others, Research Design in the Behavioral Sciences, Multiple Regression Approach, (Carbondale, Illinois: Southern Illinois University Press, 1969), p. 223.

⁴Ibid., p. 225.

variables. A dummy variable is a vector in which members of a given category are assigned an arbitrary number, while the other subjects not belonging to the given category are assigned another arbitrary number.⁵ The purpose of the addition of the dummy variables was to allow each dummy variable to assume the position of a treatment group, thus allowing the multiple regression analysis to answer the question, "Does the additional knowledge of the treatment group and of the individual significantly improve the prediction of the criterion variable over and above that which the control variable predicts?"⁶

In this research design, dummy variable one (D_1) assumed the position of treatment Group I. The purpose of utilizing the D_1 analysis was to determine the differential effect of treatment Group I and Group III. Dummy variable two (D_2) assumed the position of treatment Group II and Group III.

The multiple regression analysis utilizing the restricted model for reading achievement was calculated. Using seven and forty-five degrees of freedom, a calculated f value greater than 2.23 was required for significance at the .05 confidence level. To be significant at the .01 confidence level, the computed f value had to be greater than 3.06. The computed f value equating for seven covariates was 14.35. The analysis indicated the covariates utilized in the restricted model were relevant and should be used in the analysis.

⁵Kerlinger, Foundations of Behavioral, p. 105.

⁶Kelly, Research Design, p. 226.

The summary for the analysis of covariance restricted model is presented in Table IV.

TABLE IV
ANALYSIS OF REGRESSION FOR THREE GROUPS IN READING ACHIEVEMENT
FOR GRADE EIGHT UTILIZING THE RESTRICTED MODEL

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	7	7822.1	1117.4	14.35*
Within	45	3503.1	77.85	
Total	52			

*Significant at the .05 confidence level

The multiple regression analysis utilizing the full model for reading achievement was calculated. Using nine and forty-five degrees of freedom, a computed f value greater than 2.11 was required for significance at the .05 confidence level. To be significant at the .01 confidence level, the computed f value had to be greater than 2.86. The computed f value equating for nine covariates was 12.69. The result of the full model analysis indicated the seven covariates plus the dummy variables predicted reading achievement. The summary for the multiple regression analysis full model is presented in Table V.

Utilizing the data from the restricted and full model of the multiple regression analysis, a test of regression

coefficients provided the test for hypotheses one and two.

TABLE V
ANALYSIS OF REGRESSION FOR THREE GROUPS IN READING ACHIEVEMENT
FOR GRADE EIGHT UTILIZING THE FULL MODEL

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	9	8228.5	914.3	12.69*
Within	45	3096.7	72.02	
Total	52			

*Significant at the .05 confidence level

It was stated in hypothesis one that there is no significant difference, operationally defined as the .05 confidence level, in the reading achievement means of Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education Program for five years and comparable Cherokee Indian students who did not receive bilingual instruction when initial differences between the groups have been controlled with respect to their age, sex, I.Q., grade point average, speaker of Cherokee, degree of Indian blood, and father's educational level.

Hypothesis one was tested, utilizing a one-tailed test, with the null hypothesis being rejected only when there was a significant difference at or above the .05 confidence level; a computed f value greater than 3.21 was required to reject

the null hypothesis at the .05 confidence level. The analysis used two and forty-three degrees of freedom in calculating the f ratio. There was a significant difference in the differential effects of treatment Group I and Group III which was indicated by the calculated f value of 4.63. Based on the calculated f value, hypothesis one was rejected (see Table VI).

TABLE VI

SUMMARY OF ANALYSIS OF COVARIANCE TEST OF REGRESSION
COEFFICIENTS ON READING ACHIEVEMENT

Variable	Regression Coefficient	f Value	Variable	Regression Coefficient	f Value
Age	2.126	.459	Cher	-5.707	2.244
Sex	1.841	.517	Degind	- .602	.012
I.Q.	.704	34.696	D ₁	7.133	4.634*
Feduc	.357	.499	D ₂	6.263	3.976*
GPA	6.436	11.101			

*Significant at the .05 confidence level

The reading achievement means were adjusted utilizing data taken from the multiple regression analysis. The formula used in this analysis is presented in Appendix H. The summary of adjusted reading means is presented in Table VII. The test of regression coefficients was used to determine the significant difference in the differential effect of treatment Group I and Group III. The original reading achievement mean scores of Group III was 37.94 as compared to the Group I score

TABLE VII

DEPENDENT AND CONTROL VARIABLE MEANS FOR THREE GROUPS OF BILINGUALLY AND
NONBILINGUALLY INSTRUCTED STUDENTS IN READING ACHIEVEMENT SCORES

Group	N	Dependent		Age	Sex ^a	I.Q.	Control FEDUC	GPA	CHER ^b	DEGIN ^c
		Adjusted	Non-Adjusted							
Group I	17	39.86	37.41	13.75	1.29	90	6.59	2.42	1.17	.82
Group II	18	38.78	37.06	13.92	1.44	87.6	6.94	2.82	1.38	.65
Group III	18	33.37	37.94	13.87	1.56	92.5	8.61	3.15	1.22	.81
Total Mean	17.7	37.33	37.47	13.85	1.43	90	7.4	2.8	1.26	.76

^aSex; Male = 1.0, Female = 2.0.

^bSpeaker of Cherokee; Yes = 1.00, No = 2.00.

^cDegree of Indian blood; 1/4 = .25, 1/2 = .50, 3/4 = .75, 4/4 = 1.00.

of 37.41. After adjusting for initial differences between Group I and Group III with respect to relevant variables, the adjusted reading achievement mean score of Group I was 39.86 as compared to 33.37 for Group III.

It was stated in hypothesis two that there is no significant difference, operationally defined as the .05 confidence level, in the reading achievement means of Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education Program for four years and comparable Cherokee Indian students who did not receive bilingual instruction when initial differences between the groups have been controlled with respect to age, sex, I.Q., grade point average, speaker of Cherokee, degree of Indian blood, and father's educational level.

Hypothesis two was tested utilizing a one-tailed test, with the null hypothesis being rejected only when there was a significant difference at or above the .05 confidence level. A computed f value greater than 3.21 was required to reject the null hypothesis at the .05 confidence level. The analysis used two and forty-three degrees of freedom in calculating the f ratio. There was a significant difference in the differential effect of treatment Group II and Group III. Based on the calculated f value, hypothesis two was rejected (see Table VI).

The reading achievement means were adjusted utilizing data taken from the multiple regression analysis. As presented in Table VII, the non-adjusted reading achievement mean score

avored Group III with a score of 37.94 as compared to Group II which had a score of 37.06. After adjusting for initial differences between Group II and Group III with respect to relevant variables, the adjusted reading achievement mean score of Group II was 38.78 as compared to 33.37 for Group III.

It was stated in hypothesis three that there is no significant difference, operationally defined at the .05 confidence level, in the adjusted reading achievement mean of Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education Program for four years and Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education Program for five years when the initial differences between the groups have been controlled with respect to age, sex, I.Q., grade point average, speaker of Cherokee, degree of Indian blood, and father's educational level.

Hypothesis three was tested utilizing the priori comparison method which utilized a t ratio formula (see Appendix I) to calculate for difference between the adjusted means of Group I and Group II with the null hypothesis being accepted when the t distribution table value was not significant at the .05 confidence level.

The comparison of adjusted reading achievement mean scores of Group I (39.86) to Group II (38.78) was not significant at the .05 confidence level. A calculated t value greater than 1.69 was required to reject the null hypothesis at the

.05 confidence level, the tabled t distribution value had to be greater than 2.43. The computed t ratio between Group I and Group II was .35 which allowed the third hypothesis to be accepted. The summary of tests of significance for reading achievement between the adjusted reading achievement mean scores of Groups I, II, and III is presented in Table VIII.

TABLE VIII

SUMMARY OF TESTS OF SIGNIFICANCE FOR READING ACHIEVEMENT
BETWEEN THE ADJUSTED READING ACHIEVEMENT MEAN
SCORES OF GROUPS I, II, AND III

	Group I N=17	Group II N=18	Group III N=18
Group I adjusted \bar{X} = 39.86	-	.35 ^a	4.63 ^b
Group II adjusted \bar{X} = 38.78	-	-	3.97 ^b
Group III adjusted \bar{X} = 33.37	-	-	-

^aUtilizing the priori comparison method, the result was not significant at the .05 confidence level which requires 1.69 t value.

^bUtilizing the multiple regression analysis, the results were significant at the .05 confidence level which requires a 3.21 f value.

The covariates, I.Q., and grade point average, have a significant correlation to the dependent variable mathematics achievement score as indicated in Table III. These covariates

were definite predictor variables that were relevant to the dependent variable. The covariate, speaker of Cherokee, indicated a high correlation to the mathematics variable but was not high enough to be significant. The reading achievement score, although not a covariate in this study, was significantly correlated to mathematics achievement.

The multiple regression analysis was utilized with hypotheses four and five. This statistical analysis technique utilized two models, a restricted and a full model. The restricted model utilized seven covariates in its analysis. The restricted model related the effectiveness of the seven covariates as predictor variables. The full model added two dummy variables to the original covariates making a total of nine. The purpose of utilizing the dummy variables was to determine the differential effect between the experimental and control groups.

The multiple regression analysis utilized the restricted model when calculating mathematics achievement. Using seven and forty-five degrees of freedom, a calculated f value greater than 2.23 was required for significance at the .05 confidence level. To be significant at the .01 confidence level, the computed f value had to be greater than 3.06. The calculated f value equating for seven covariates was 6.34. The analysis indicated the covariates utilized in the restricted model were relevant and should be used in the analysis. The summary for this analysis is presented in Table IX.

TABLE IX
ANALYSIS OF REGRESSION FOR THREE GROUPS IN
MATHEMATICS ACHIEVEMENT FOR GRADE EIGHT
UTILIZING THE RESTRICTED MODEL

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	7	5183.70	740.53	6.34*
Within	45	5254.48	116.77	
Total	52			

*Significant at the .05 confidence level

The multiple regression analysis utilizing the full model for mathematics achievement was calculated using nine and forty-three degrees of freedom, a calculated \underline{f} value greater than 2.11 was required for significance at the .05 confidence level. To be significant at the .01 confidence level, the calculated \underline{f} value had to be greater than 2.86. The computed \underline{f} value equating for the original seven covariates plus the two dummy variables was 6.94. The results of the full model analysis indicated the seven covariates plus the two dummy variables predict mathematics achievement. The summary for this analysis is presented in Table X.

Utilizing the data from the restricted and full models of multiple regression analysis, a test of regression coefficients provided the test for hypotheses four and five. The test of the regression coefficients was the end result of the multiple regression analysis.

TABLE X
ANALYSIS OF REGRESSION FOR THREE GROUPS IN
MATHEMATICS ACHIEVEMENT FOR GRADE EIGHT
UTILIZING THE FULL MODEL

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	9	6183.42	687	6.94*
Within	43	4254.76	98.94	
Total	52			

*Significant at the .05 confidence level

It is stated in hypothesis four that there is no significant difference, operationally defined as the .05 confidence level, in the mathematics achievement means of Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education Program for five years and comparable Cherokee Indian students who did not receive bilingual instruction when initial differences between the groups have been controlled with respect to age, sex, I.Q., grade point average, speaker of Cherokee, degree of Indian blood, and father's educational level.

Hypothesis four was tested utilizing a one-tailed test, with the null hypothesis being rejected only when there was a significant difference at or above the .05 confidence level, a computed f value greater than 3.21 was required to reject the null hypothesis at the .05 confidence level. The analysis

used two and forty-three degrees of freedom in calculating the f ratio. There was a significant difference in the differential effect of treatment Group I and Group III which was indicated by the calculated f value of 5.63. Based on the calculated f value, hypothesis four was rejected (see Table XI).

TABLE XI

SUMMARY OF ANALYSIS OF COVARIANCE TEST OF REGRESSION
COEFFICIENTS OF MATHEMATICS ACHIEVEMENT

Variable	Regression Coefficient	f Value	Variable	Regression Coefficient	f Value
Age	5.389	2.147	Cher	- 1.196	.071
Sex	1.961	.426	Degind	4.046	.407
I.Q.	.643	21.103	D ₁	9.219	5.634*
Feduc	- .674	1.294	D ₂	11.233	9.311*
GPA	5.033	4.942			

*Significant at the .05 confidence level

The mathematics achievement means were adjusted utilizing data taken from the multiple regression analysis. The summary of adjusted mathematics means is presented in Table XII. The test of regression coefficients was used to determine if there was significant difference in the differential effect of treatment Group I and Group III. The original mathematics achievement mean scores of Group III was 27.00 as compared to the Group I score of 31.23. After adjusting for

TABLE XII

DEPENDENT AND CONTROL VARIABLE MEANS FOR THREE GROUPS OF BILINGUALLY AND
NONBILINGUALLY INSTRUCTED STUDENTS IN MATHEMATICS ACHIEVEMENT SCORES

Group	N	Dependent		Age	Sex ^a	I.Q.	Control FEDUC	GPA	CHER ^b	DEGINDC ^c
		Adjusted	Non-Adjusted							
Group I	17	33.68	31.23	13.75	1.29	90	6.59	2.42	1.17	.82
Group II	18	35.91	33.72	13.92	1.44	87.6	6.94	2.82	1.38	.65
Group III	18	30.65	27.00	13.87	1.56	92.5	8.61	3.15	1.22	.81
Total Mean	17.7	33.41	30.31	13.85	1.43	90	7.4	2.8	1.26	.76

^aSex; Male = 1.0, Female = 2.0.

^bSpeaker of Cherokee; Yes = 1.00, No = 2.00.

^cDegree of Indian blood; 1/4 = .25, 1/2 = .50, 3/4 = .75, and 4/4 = 1.00.

initial differences between Group I and Group III with respect to relevant variables, the adjusted mathematics mean score of Group I was 33.68 as compared to 30.65 for Group III.

It was stated in hypothesis five that there is no significant difference, operationally defined as the .05 confidence level, in the mathematics achievement means of Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education Program for four years and comparable Cherokee Indian students who did not receive bilingual instruction when initial differences between the groups have been controlled with respect to age, sex, I.Q., grade point average, speaker of Cherokee, degree of Indian blood, and father's educational level.

Hypothesis five was tested utilizing a one-tailed test, with the null hypothesis being rejected only when there was a significant difference at or above the .05 confidence level. A calculated f value greater than 3.21 was required to reject the null hypothesis at the .05 confidence level. The analysis used two and forty-three degrees of freedom in calculating the f ratio. There was a significant difference in the differential effect of treatment Group II and Group III which was indicated by the calculated f value of 9.31. Based upon the calculated f value, hypothesis five was rejected (see Table XI).

The mathematics achievement mean scores were adjusted utilizing data taken from the multiple regression analysis.

As presented in Table XII, the non-adjusted mathematics achievement mean scores favored Group II with a score of 33.72 as compared to Group III which had a score of 27.00. After adjusting for initial differences between Group II and Group III with respect to relevant variables, the adjusted mathematics achievement mean score of Group II was 35.91 as compared to 30.65 for Group III.

It was stated in hypothesis six that there is no significant difference, operationally defined at the .05 confidence level, in the adjusted mathematics achievement mean of Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education Program for four years and Cherokee Indian students who received bilingual instruction through the Cherokee Bilingual Education Program for five years when the initial differences between the groups have been controlled with respect to age, sex, I.Q., grade point average, speaker of Cherokee, degree of Indian blood, and father's educational level.

Hypothesis six was tested utilizing the priori comparison method which utilized a t ratio formula to calculate for difference between the adjusted means of Group I and Group II, with the null hypothesis being accepted when the t distribution table value was not significant at the .05 confidence level.

The comparison of adjusted mathematics achievement mean scores of Group I (33.68) to Group II (35.91) was not

significant at the .05 confidence level. A computed t value greater than 2.03 was required to reject the null hypothesis at the .05 confidence level. To reject at the .01 confidence level, the tabled t distribution value had to be greater than 2.45. The calculated t ratio between Group I and Group II was .871. Based on the calculated t value, hypothesis six was accepted. A summary of tests of significance for mathematics achievement between the adjusted mathematics achievement mean scores of Groups I, II, and III is presented in Table XIII.

TABLE XIII

SUMMARY OF TESTS OF SIGNIFICANCE FOR MATHEMATICS ACHIEVEMENT
BETWEEN THE ADJUSTED MATHEMATICS ACHIEVEMENT
MEAN SCORES OF GROUPS I, II, AND III

	Group I N=17	Group II N=18	Group III N=18
Group I adjusted \bar{X} = 33.68	-	.871 ^a	5.63 ^b
Group II adjusted \bar{X} = 35.91	-	-	9.31 ^b
Group III adjusted \bar{X} = 30.65	-	-	-

^aUtilizing the priori comparison method, the result was not significant at the .05 confidence level which requires a 1.69 t value.

^bUtilizing the multiple regression analysis, the results are significant at the .05 confidence level which requires a 3.21 f value.

Summary

Three groups of eighth grade Cherokee Indian students were used in this study to determine if reading and mathematics achievement scores were significantly different for students who received bilingual instruction as compared to students who did not receive bilingual instruction. A secondary purpose of this study was to determine if there was a significant difference in the achievement scores of five-year bilingual education participants as compared to four-year bilingual education participants.

The researcher identified seven variables which would influence the reading and mathematics achievement of Indian students. These seven variables; age, sex, I.Q., grade point average, father's educational level, degree of Indian blood, and speaker of Cherokee, were controlled in this study by utilizing the multiple regression analysis of covariance as the statistical technique. This statistical technique equated the different groups with regard to these specific variables.

To answer the question of hypothesis one, a comparison was made between Group I, the five-year bilingual education participants, and Group III, the non-bilingual education participants, in the area of reading achievement. The multiple regression analysis provided the statistical data that led to the rejection of hypothesis one at the .05 confidence level. The adjusted reading means revealed that the five-year bilingually instructed students scored higher than the students who

did not receive bilingual instruction.

To answer the question of hypothesis two, a comparison was made between Group II, the four-year bilingual education participants, and Group III, the nonbilingual education participants, in the area of reading achievement. The multiple regression analysis of covariance provided the statistical data that led to the rejection of hypothesis two at the .05 confidence level. The adjusted reading mean scores revealed that the four-year bilingually instructed students scored higher than the students who did not receive bilingual instruction.

To answer the question of hypothesis three, a comparison was made between the adjusted reading mean scores of Group I, the five-year bilingual education participants, and Group II, the four-year bilingual education participants. The priori comparison method provided the test of significance that resulted in the acceptance of hypothesis three. The difference between the two groups was not significant at the .05 confidence level. The adjusted reading mean for Group I was higher than the adjusted reading mean for Group II.

To answer the question of hypothesis four, a comparison was made between Group I, the five-year bilingual education participants, and Group III, the nonbilingual education participants, in the area of mathematics achievement. The multiple regression analysis provided the statistical data that led to the rejection of hypothesis four. The adjusted

mathematics mean scores revealed that the five-year bilingually instructed students scored higher than the students who did not receive bilingual instruction.

To answer the question of hypothesis five, a comparison was made between Group II, the four-year bilingual education participants, and Group III, the nonbilingual education participants, in the area of mathematics achievement. The multiple regression analysis provided the statistical data that led to the rejection of hypothesis five. The adjusted mathematics mean scores revealed that the four-year bilingually instructed students scored higher than the students who did not receive bilingual instruction.

To answer the question of hypothesis six, a comparison was made between the adjusted mathematics mean scores of Group I, the five-year bilingual education participants, and Group II, the four-year bilingual education participants. The priori comparison method provided the test of significance that resulted in the acceptance of hypothesis six. The adjusted mathematics mean score for Group II was higher than the adjusted mathematics mean scores for Group I.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Bilingual education for the American Indian is not a new educational concept. During the years before Oklahoma statehood, several Indian tribes had established educational systems which utilized bilingual instruction in the classroom with the Indian child.

The Cherokee tribe was unique in the area of bilingual instruction among the Indian tribes because they had their own written language. Many historians and educators felt that the Cherokee syllabary facilitated bilingual instruction in the classrooms of the schools within the Cherokee Nation. The Cherokee Nation prestatehood educational system has been recognized as being successful in making Indian students literate in both the Cherokee and English languages.

When Oklahoma became a state, the schools operated by the Cherokee Nation were turned over to the new state government

and bilingual instruction was discontinued. After the transition was accomplished, a reduction in the literacy level of the Cherokee people was noticeable in the years that followed. Another noticeable reaction that followed the transition was the increase in the number of Indian students who dropped out of school.

The attitudes and policies of the federal government concerning bilingual education and the use of the Indian languages in the federal boarding schools changed several times during the period between 1860 and 1968. In 1968, the federal government enacted legislation which provided funds for bilingual education in the public schools on a limited basis. Since 1968, the attitude of the federal government has been positive toward bilingual education for the Indian child.

The Cherokee tribe in Northeastern Oklahoma was identified as one of the American Indian tribes with the greatest need for bilingual education. The Cherokees were identified as having a need because of their high dropout rate from the public schools, their language deprivation, and their high unemployment and poor economic conditions.

The Cherokee Bilingual Education Program was funded and began operation in 1969 in four rural dependent schools in Adair, Cherokee, and Delaware Counties. After two years of operation, only two of the original schools remained in the program. Because the project schools did not have bilingual teachers, bilingual Cherokee Indian teacher aides were employed

to work with the classroom teacher in a team effort to provide bilingual education for the Indian child.

The lack of appropriate bilingual curriculum materials limited the early effectiveness of the Cherokee Bilingual Education Program. In 1971, the first classroom curriculum materials developed by the program were introduced into grade one and from 1972 through 1975 curriculum materials utilizing the Cherokee language through the Cherokee syllabary and Roman script were placed into operation in grades two through five.

Those students who had the opportunity to benefit from the full utilization of the bilingual materials and bilingual instruction were first graders in 1971, and received bilingual instruction through grade five. Those students who participated in the Cherokee Bilingual Education Program in 1971 as first graders were eighth graders in 1978, and were selected for participation in this study as a treatment group.

Those students who entered the bilingual program as second graders in 1972, received four consecutive years of bilingual instruction that was comparable to the bilingual instruction received by the five-year participants in grades two through five. Those students who entered and participated in the Cherokee Bilingual Education Program in 1972 as second graders were eighth graders in 1978 and were selected for participation in this study as a treatment group.

Indian students from nonproject schools who were eighth

graders in 1978 were screened for the following participation criteria: they must have a Cherokee blood quantum of one-quarter or more; they must have never been a participant in a bilingual project; and they must have never failed a grade level through grade eight. After screening students for the control group participation criteria, the students who met the criteria were pooled if they were within the I.Q. range limits of the treatment groups. The control group was selected for participation in this study by a random draw from the students who were pooled.

The purpose of this study was to determine if the eighth grade reading and mathematics achievement scores of Cherokee Indian students who received bilingual instruction in grades one through five were significantly different from the reading and mathematics achievement scores of comparable eighth grade Cherokee Indian students who did not receive bilingual instruction. A secondary purpose of this study was to determine whether the reading and mathematics achievement of five-year bilingual education participants was significantly different from four-year bilingual education participants.

The SRA Achievement Series was administered to eighth grade students in the project schools and selected control schools. The achievement test results were used in this study as the dependent variable. The Short Test of Educational Ability was administered in conjunction with the achievement test and was utilized in this study as a control variable.

The control variables; age, sex, degree of Indian blood, Indian tribe, and pass-fail record, were obtained from permanent records in the principal's office. The control variable, grade point average, was derived from letter grades taken from the permanent registers provided by the county superintendents. The control variables, speaker of Cherokee and father's educational level, were obtained from the parents or family members through an interview.

The researcher utilized specific criteria to select participants for the two treatment groups and one control group. Treatment Group I was an intact group that had seventeen students who participated in the bilingual program for five consecutive years beginning with grade one. Treatment Group II was an intact group that had eighteen students who participated in the bilingual program for four consecutive years, beginning in the second grade. The control Group III was a randomly selected group that had eighteen students who did not receive bilingual instruction.

The multiple regression analysis of covariance was utilized as the primary statistical technique in this study because it could take intact groups and equate them on the control variables identified by the researcher. After equating the three groups with regard to the control variables, an f value was calculated using the analysis of covariance test of regression coefficients to determine if the reading and mathematics achievement scores between the treatment and control

groups were significantly different. To determine if the reading and mathematics achievement scores were significantly different between the two treatment groups, a priori comparison method utilizing a t ratio formula was used.

Findings

An analysis of the data for the SRA Achievement Series revealed the following:

1. When the reading achievement scores of Indian children who received bilingual instruction for five consecutive years were compared to the reading achievement scores of comparable Indian children who did not receive bilingual instruction, the Indian children who received bilingual instruction scored significantly higher on the reading achievement subtest than the Indian children who did not receive bilingual instruction.

2. When the reading achievement scores of Indian children who received bilingual instruction for four consecutive years were compared to the reading achievement scores of comparable Indian children who did not receive bilingual instruction, the Indian children who received bilingual instruction scored significantly higher on the reading achievement subtest than the Indian children who did not receive bilingual instruction.

3. When the reading achievement scores of Indian children who received bilingual instruction for five consecutive years were compared to the reading achievement scores of

comparable Indian children who received bilingual instruction for four consecutive years, there were no significant differences in their performance on the reading achievement subtest.

4. When the mathematics achievement scores of Indian children who received bilingual instruction for five consecutive years were compared to the mathematics achievement scores of comparable Indian children who did not receive bilingual instruction, the Indian children who received bilingual instruction scored significantly higher on the mathematics achievement subtest than the Indian children who did not receive bilingual instruction.

5. When the mathematics achievement scores of Indian children who received bilingual instruction for four consecutive years were compared to the mathematics achievement scores of comparable Indian children who did not receive bilingual instruction, the Indian children who received bilingual instruction scored significantly higher on the mathematics achievement subtest than the Indian children who did not receive bilingual instruction.

6. When the mathematics achievement scores of Indian children who received bilingual instruction for five consecutive years were compared to the mathematics achievement scores of comparable Indian children who received bilingual instruction for four consecutive years, there were no significant differences in their performance on the mathematics achievement subtest.

Conclusions

When reviewing the conclusions, one should understand that the data were collected for only those selected students who participated four and five consecutive years in the Cherokee Bilingual Education Program. The data collected on the student population in this study support the following conclusions:

1. Linguistically deprived Cherokee Indian children need to receive bilingual instruction in order to improve their reading achievement.

2. Linguistically deprived Cherokee Indian children need to receive bilingual instruction in order to improve their mathematics achievement.

3. Four consecutive years of bilingual instruction is as effective with linguistically deprived Cherokee Indian children as five consecutive years of bilingual instruction.

4. When considering reading and mathematics achievement, bilingual instruction is effective with linguistically deprived Cherokee Indian children offered for either four or five consecutive years.

5. Trained Cherokee bilingual teacher aides are effective in the bilingual education process with Cherokee Indian children.

Recommendations

1. Additional study should be given to the relationship between bilingual education when presented in the first

through the fifth grades and reading achievement utilizing the student population of this study during their senior year in high school.

2. Additional study should be given to the relationship between bilingual instruction and academic achievement using other measuring instruments.

3. A longitudinal study should be undertaken to correlate reading and mathematics achievement to bilingual education utilizing matched treatment and control groups who are pre-post tested in each year of program participation.

4. An effort should be made to encourage the employment of bilingual teachers by the rural dependent schools where language deprivation has been identified among the Indian student population.

5. A study should be undertaken to determine the effectiveness of bilingual instruction when it is offered for one year, two consecutive years, and three consecutive years to linguistically deprived Cherokee Indian children.

6. An effort should be made to change the Oklahoma statute that requires instruction to be in English only to one that allows instruction in a child's first language when it will facilitate the learning process.

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APPENDIX A

RAW DATA OF GROUP I

CODING FOR RAW DATA OF GROUP I

School:

A	Project School A
B	Project School B

Age:

Age in months

Sex:

1	Male
2	Female

DEGIND: (degree of Indian blood)

1/4	.25
1/2	.50
3/4	.75
4/4	1.00

FEDUC: (father's educational level)

0	No formal education
2	Completed second grade
3	Completed third grade
4	Completed fourth grade
5	Completed fifth grade
7	Completed seventh grade
8	Completed eighth grade
10	Completed tenth grade

GPA: (grade point average)

A	4.0
B	3.0
C	2.0
D	1.0
F	0.0

CHER: (speaker of Cherokee)

1.00	Speaker of Cherokee
2.00	Non-speaker of Cherokee

TABLE XIV

RAW DATA FOR CONTROL AND DEPENDENT VARIABLES FOR TREATMENT GROUP I

Pupil No.	School	Age	Sex	I.Q.	Control				Dependent	
					DEGIN	FEDUC	GPA	CHER	Reading	Mathematics
1	A	162	1	100	.50	8	3.17	2.00	55	20
2	A	163	1	66	1.00	4	1.60	1.00	22	14
3	A	170	1	79	1.00	0	1.60	1.00	17	22
4	A	162	1	106	1.00	8	3.17	1.00	60	44
5	A	162	2	84	.50	3	2.40	1.00	37	22
6	A	165	1	79	1.00	5	1.00	1.00	22	19
7	A	162	1	97	1.00	8	2.56	1.00	52	30
8	A	164	1	94	1.00	8	3.08	1.00	29	40
9	A	167	2	87	1.00	8	2.00	1.00	21	47
10	A	171	1	89	1.00	6	2.40	1.00	32	45
11	A	164	1	82	1.00	8	2.17	1.00	32	34
12	A	168	2	74	1.00	8	1.17	1.00	21	15
13	A	164	1	96	1.00	8	3.75	1.00	55	28
14	A	163	1	123	.25	8	4.00	2.00	74	67
15	A	163	1	84	.25	7	1.08	1.00	25	13
16	A	164	2	106	.50	10	3.47	2.00	60	48
17	A	161	2	84	1.00	5	2.58	1.00	22	23

APPENDIX B

RAW DATA FOR GROUP II

CODING FOR RAW DATA OF GROUP II

School:

A	Project School A
B	Project School B

Age:

Age in months

Sex:

1	Male
2	Female

DEGIND: (degree of Indian blood)

1/4	.25
1/2	.50
3/4	.75
4/4	1.00

FEDUC: (father's educational level)

4	Completed fourth grade
5	Completed fifth grade
6	Completed sixth grade
7	Completed seventh grade
8	Completed eighth grade
9	Completed ninth grade
12	Completed twelfth grade

GPA: (grade point average)

A	4.0
B	3.0
C	2.0
D	1.0
F	0.0

CHER: (speaker of Cherokee)

1.00	Speaker of Cherokee
2.00	Non-speaker of Cherokee

TABLE XV

RAW DATA FOR CONTROL AND DEPENDENT VARIABLES FOR TREATMENT GROUP II

Pupil No.	School	Age	Sex	I.Q.	Control		GPA	CHER	Dependent	
					DEGIN	D F			Reading	Mathematics
1	A	172	1	74	1.00	8	2.00	1.00	29	18
2	B	171	2	82	1.00	8	3.33	1.00	32	26
3	B	171	1	91	.50	6	4.00	2.00	37	47
4	B	171	1	76	.50	6	3.44	1.00	37	58
5	B	163	1	89	.50	8	3.33	2.00	35	37
6	B	164	1	100	1.00	4	3.33	1.00	46	47
7	B	165	2	79	.50	4	2.66	2.00	35	19
8	A	164	1	90	.50	8	1.92	1.00	27	30
9	A	162	1	133	.50	8	3.92	2.00	66	60
10	B	164	2	86	.25	8	2.55	2.00	29	44
11	B	170	1	95	.25	12	3.66	1.00	60	21
12	B	166	2	79	1.00	9	2.77	1.00	44	20
13	A	168	2	80	1.00	6	1.33	1.00	17	19
14	A	169	2	82	.25	7	3.55	2.00	27	43
15	B	162	2	82	.25	8	3.66	2.00	45	31
16	B	161	1	97	1.00	5	2.00	1.00	46	48
17	B	164	2	84	1.00	5	2.11	1.00	31	13
18	A	161	1	78	.75	5	1.17	1.00	24	26

APPENDIX C

RAW DATA FOR GROUP III

CODING FOR RAW DATA FOR GROUP III

School:

1	Control School No. 1
2	Control School No. 2
3	Control School No. 3
4	Control School No. 4
5	Control School No. 5

Age:

Age in months

Sex:

1	Male
2	Female

DEGIND: (degree of Indian blood)

1/4	.25
1/2	.50
3/4	.75
4/4	1.00

FEDUC: (father's educational level)

0	No formal education
4	Completed fourth grade
7	Completed seventh grade
8	Completed eighth grade
10	Completed tenth grade
12	Completed twelfth grade

GPA: (grade point average)

A	4.0
B	3.0
C	2.0
D	1.0
F	0.0

CHER: (speaker of Cherokee)

1.00	Speaker of Cherokee
2.00	Non-speaker of Cherokee

TABLE XVI

RAW DATA FOR CONTROL AND DEPENDENT VARIABLES FOR CONTROL GROUP III

Pupil No.	School	Age	Sex	I.Q.	Control		GPA	CHER	Dependent	
					DEGINF	FEDUC			Reading	Mathematics
1	1	171	2	97	1.00	12	4.00	1.00	53	40
2	1	167	1	108	.75	12	4.00	2.00	44	31
3	1	171	1	74	.25	8	3.64	2.00	27	16
4	1	165	1	93	.50	12	2.10	1.00	30	17
5	1	171	2	80	1.00	10	2.00	1.00	28	23
6	2	163	1	102	.25	10	3.70	2.00	23	16
7	3	172	1	79	1.00	8	3.17	1.00	32	23
8	2	166	1	91	.75	8	2.70	1.00	23	26
9	1	162	2	92	1.00	8	3.60	2.00	41	25
10	1	170	1	91	1.00	8	2.22	1.00	44	21
11	1	169	1	98	.50	12	3.64	1.00	48	24
12	3	160	2	119	1.00	8	4.00	1.00	76	54
13	1	170	2	104	1.00	4	2.88	1.00	51	38
14	1	171	2	76	1.00	12	1.77	1.00	22	13
15	4	162	2	105	1.00	8	3.75	1.00	53	52
16	4	170	2	102	1.00	8	3.92	1.00	36	38
17	3	151	2	76	.50	0	3.17	1.00	25	13
18	2	163	2	79	1.00	7	2.40	1.00	27	16

APPENDIX D

DATA GATHERING QUESTIONNAIRE FOR
ANALYZING SCHOOL RECORDS

CHEROKEE BILINGUAL EDUCATION PROGRAM

Student's Name _____

Date of Birth _____ Sex _____

Degree of Indian _____ Tribe _____ (JOM Data)

Lives with? (tell relationship) _____

Where is the father employed? _____

Where is the mother employed? _____

Father's occupation? _____

Mother's occupation? _____

Has this student ever failed a grade? _____

If the answer to the above question is yes, what grade? _____

Does the student speak the Cherokee language? _____

Does the student understand the spoken Cherokee language? _____

Is the student transported to school? _____

Does the student live in an Indian home built recently (with-
in the last eight years)? _____

APPENDIX E

LETTER GRANTING PERMISSION TO
USE BILINGUAL PROGRAM DATA

C
B
E
P

CWY KASZ JSYIAJ JSOhAaj Jh90aLhJT

CHEROKEE BILINGUAL EDUCATION PROGRAM

P.O. BOX 769
HIGHWAY 62 SOUTH
TAHLEQUAH, OKLAHOMA 74464

OFFICE PHONE
496-6177

January 10, 1978

Mr. Herbert Bacon
411 East 13th Street
Claremore, OK 74017

Dear Chief:

In response to your request to use Cherokee Bilingual Education Program's test data and other information in our files that pertains to students who have participated in the Bilingual Program for several years, you have permission to utilize the information in the Cherokee Bilingual Education Program's files for your dissertation provided that schools and students are treated with anonymity.

Since you will be conducting our annual evaluation this year, you may collect your dissertation data in conjunction with the information needed for our evaluation. I do ask that you protect each participating school and student's identity at all times.

We will also commit our project staff to assist you in the collection of data if and when you might need it.

Sincerely,

Agnes Cowen
Agnes Cowen
Project Director

AC:pd

APPENDIX F

DATA GATHERING QUESTIONNAIRE FOR CHEROKEE SPEAKING
ABILITY AND FATHER'S EDUCATIONAL LEVEL

CHEROKEE BILINGUAL EDUCATION PROGRAM

Student's Name _____

1. Does the student speak Cherokee? _____
2. Does the student understand Cherokee but cannot speak the language? _____
3. Is the Cherokee language ever spoken in the home? _____

4. With whom does the student live? (father, mother, grandparents, other relatives) _____
5. Is either parent white? _____ If the answer is yes, which parent is white, the mother or the father? _____

6. Approximately how far does the student live from school? (answer in miles) _____
7. Approximately how far does the student live from the nearest town? (answer in miles) _____
8. Does the father work? _____ If yes, where does he work? _____

9. Does the mother work? _____ If yes, where does she work? _____
10. What was the last grade completed by the father or the head of the household?
Completed grade 1 2 3 4 5 6 7 8 9 10 11 12
1 2 3 4 years of college
11. How many children are in the family? _____

APPENDIX G

SUMMARY OF TABLES FOR ANALYSIS OF VARIANCE FOR CONTROL AND
DEPENDENT VARIABLES BETWEEN THREE GROUPS BEFORE
THEY WERE CONTROLLED FOR DIFFERENCES

TABLE XVII

ANALYSIS OF VARIANCE FOR TWO TREATMENT GROUPS
AND ONE CONTROL GROUP IN AGE

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	2	.264	.132	.793
Within	50	8.327	.166	
Total	52	8.592		

TABLE XVIII

ANALYSIS OF VARIANCE FOR TWO TREATMENT GROUPS
AND ONE CONTROL GROUP IN SEX

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	2	.600	.300	1.209
Within	50	12.418	.248	
Total	52	13.019		

TABLE XIX

ANALYSIS OF VARIANCE FOR TWO TREATMENT GROUPS
AND ONE CONTROL GROUP IN I.Q.

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	2	220.08	110.043	.608
Within	50	9036.71	180.734	
Total	52	9256.80		

TABLE XX

ANALYSIS OF VARIANCE FOR TWO TREATMENT GROUPS
AND ONE CONTROL GROUP IN FEDUC

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	2	41.339	20.669	3.138
Within	50	329.339	6.587	
Total	52	370.679		

TABLE XXI

ANALYSIS OF VARIANCE FOR TWO TREATMENT GROUPS
AND ONE CONTROL GROUP IN FEDUC

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	2	4.592	2.295	3.062
Within	50	37.484	.749	
Total	52	42.076		

TABLE XXII

ANALYSIS OF VARIANCE FOR TWO TREATMENT GROUPS
AND ONE CONTROL GROUP IN CHER

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	2	.442	.221	1.122
Within	50	9.859	.197	
Total	52	10.301		

TABLE XXIII

ANALYSIS OF VARIANCE FOR TWO TREATMENT GROUPS
AND ONE CONTROL GROUP IN DEGINO

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	2	.324	.162	1.885
Within	50	4.308	.086	
Total	52	4.633		

TABLE XXIV

ANALYSIS OF VARIANCE FOR TWO TREATMENT GROUPS
AND ONE CONTROL GROUP IN READING

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	2	7.203	3.601	.159
Within	50	11318.000	226.360	
Total	52	11325.203		

TABLE XXV

ANALYSIS OF VARIANCE FOR TWO TREATMENT GROUPS
AND ONE CONTROL GROUP IN MATHEMATICS

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Between	2	415.52	207.76	1.036
Within	50	10022.67	200.45	
Total	52	10438.19		

APPENDIX H

FORMULA FOR ADJUSTING MEANS

FORMULA FOR ADJUSTING MEANS

The adjustment of the reading and mathematics means of the three groups was accomplished by utilizing the following formula model:

$$\bar{Y}_j(\text{adj}) = \bar{Y}_j - b(\bar{X}_j - \bar{X})$$

Where $\bar{Y}_j(\text{adj})$ = the adjusted mean of treatment

\bar{Y}_j = the mean of treatment j before adjustment

b = the common regression coefficient

\bar{X}_j = the mean of the covariate for treatment group j

\bar{X} = the grand mean of the covariate

Source: Fred N. Kerlinger and Elazer J. Pedhazur, Multiple Regression in Behavioral Research, (New York: Holt, Rinehart and Winston, Inc., 1973), p. 272.

APPENDIX I

THE PRIORI COMPARISON METHOD UTILIZING A T-RATIO FORMULA

THE PRIORI COMPARISON METHOD UTILIZING A T-RATIO FORMULA

Since there were significant differences among treatments of the groups, it was necessary to determine specifically which of the groups differed significantly from each other. The priori comparison method was employed, using t ratios to calculate the differences between the adjusted means of Groups I and II. The formula is as follows:

$$t = \frac{\bar{Y}_1(\text{adj}) - \bar{Y}_2(\text{adj})}{\sqrt{\text{MSR} \left(\frac{1}{n_1} + \frac{1}{n_2} \right) \left[1 + \frac{\text{ss}_{\text{reg}(c)}}{K\text{ss}_{\text{res}(c)}} \right]}}$$

Where $\bar{Y}_1(\text{adj})$ and $\bar{Y}_2(\text{adj})$ = adjusted means for treatment Groups I and II, respectively.

MSR = residual mean square of the analysis of covariance.

n_1, n_2 = number of subjects in Groups I and II, respectively.

$\text{ss}_{\text{reg}(c)}$ = regression sum of squares of the covariate when it is regressed on treatments.

$\text{ss}_{\text{res}(c)}$ = residual sum of squares of the covariate when it is regressed on the treatments.

K = the degrees of freedom for treatments.

Source: Fred N. Kerlinger and Elazer J. Pedhazur, Multiple Regression in Behavioral Research, (New York: Holt, Rinehart and Winston, Inc., 1973), p. 274.