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COLLEGE OF THE VIRGIN ISLANDS

BASIC CONCEPTS OF ST. CROIX KINDERGARTENERS

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CHAPTER I

THE PROBLEM AND PROCEDURES

This chapter presents a statement of the problem and the purpose of the study, the hypotheses related to that purpose, and the procedures followed in the study.

Problem and Purpose

Early childhood educators are concerned with the importance of language in the development of the child during the early years of life. The observation that some children, particularly those of low socioeconomic status, enter school with a language deficit and that the deficit becomes cumulative over the elementary years, are expressed concerns among educators of young children.

One problem observed by kindergarten teachers on St. Croix is the generally low though highly variable language levels of students entering their classrooms.¹ Several environmental and developmental factors could contribute to this problem.

It therefore became the purpose of this study to determine to what extent this variability is accounted for by chronological age within grade, sex, attending Head Start,

¹Kulwant Kaur Padda, "A Study of Relationships Between Home Environmental Factors, Language Development, and Social Competence of Kindergarten Children on St. Croix," (M. A. Thesis, College of the Virgin Islands, April 1976), p. 27.

and mode of data gathering.

Hypotheses

In order to carry out the stated purpose and to contribute to an understanding and solution of the problem, the following hypotheses were generated, to be tested at the .05 level of confidence.

1. There is no relationship between chronological age within grade and scores on the Boehm Test of Basic Concepts (BTBC).
2. There is no difference between the mean scores of males and of females on the BTBC.
3. There is no difference between the mean scores on the BTBC of children who had attended Head Start and of children who had not attended Head Start.
4. There is no difference between the mean scores on the BTBC of English speakers to whom the test is administered in English and of bilingual students to whom the test is administered in both Spanish and English.

Procedures

This section contains a description of the subjects, a discussion of the test instrument, and accounts of the collection and the treatment of data.

Subjects

The public school in which the study took place is located near the geographic center of St. Croix. The school enrollment for the 1979-80 academic year was approximately

seven hundred fifty. Kindergarten classes averaged twenty-five students each, while first through sixth grades averaged thirty students each. Also included within the school were bilingual classes on the kindergarten through fourth grade levels, these classes averaging twenty-five students each.

Instrument

The instrument used in the study was the Boehm Test of Basic Concepts (BTBC). The BTBC was published by the Psychological Corporation in 1967, with an alternate form made available in 1971. The test is designed to measure children's mastery of concepts necessary for achievement in the first years of school.

The idea behind the development of the test is that many instructional materials for young children presume that children approaching school age have developed a repertoire of language concepts, such as temporal, quantitative, and spatial relationships. In addition to assessing language concept attainment level, the BTBC is designed to give the teacher information which may be used to teach those concepts which the child has not developed before he/she enters school.

The term "basic concepts" is defined by Boehm as a "group of concepts which involves the ability to make relational decisions about persons, objects, or situations."²

²Ann E. Boehm, Charles H. Kaplan, and David Preddy, "How Important are Basic Concepts to Instruction: Validation of the Boehm Test of Basic Concepts," (Teachers College, Columbia University, 1979), p. 3.

The essence of basic concepts, as defined by Boehm, is that they "all involve relational judgments either between objects, persons, or situations or to a standard and they all apply to shifting situations."³ The fifty concepts tested by the instrument are divided into four categories: quantity, space, time, and "miscellaneous."

The items which comprise Form A of the test were developed by selecting concepts presented in a wide range of preschool and primary grade curriculum material. The curriculum references used by Boehm are listed in Appendix D. Once selected, these concepts were then represented in pictorial multiple choice items with group-administered instructions. The items were then presented to two pilot groups and ambiguous items and items found to be too easy for the majority of subjects were eliminated.

For convenience of administration, the current test is divided into two test booklets of twenty-five items each. Each item tests one particular language concept. Five scores are obtained for each student from the test: a total score ranging from zero to fifty, and a score on each of the four concept categories: quantity (n=18), space (n=23), time (n=4), and miscellaneous (n=5). Initially, only raw scores are recorded for each test subject, in the form of a check mark for each item answered correctly.

Standardization of Form A was completed in 1968-1970.

³Ibid., p. 3.

Midyear samples were obtained during the 1968-69 school year of children enrolled in kindergarten through second grade classes at schools in five cities, and beginning-of-the-year samples were obtained in the 1969-70 school year from kindergarten through second grade classes in sixteen cities. The samples were stratified by city, grade, and socioeconomic level.⁴ Norms are presented in the manual with percent passing each item by grade and socioeconomic level within each grade. Comparison of beginning-of-the-year and mid-year norms demonstrates that "concepts became better known with increasing grade level and socioeconomic level in each grade."⁵ Greater mastery of concepts at mid-year than at the beginning-of-the-year is also reflected in the norms. Percentile equivalents for raw scores by grade and socioeconomic level are also given in the manual.

One value of the BTBC is that it identifies children who are, in comparison with their age mates, low in all or some concept areas, so that a program of remediation can be developed. Another advantage of the BTBC is that it identifies concepts which are unfamiliar to a large number of pupils in a particular class. These concepts can then be emphasized in lessons to the class as a whole.⁶

The manual states that split-half reliability

⁴Ann E. Boehm, Manual: Boehm Test of Basic Concepts (New York: The Psychological Corporation, 1971), p. 21.

⁵Ibid., p. 21.

⁶Ibid., p. 4.

coefficients for the total score on Form A have ranged from .68 to .90.⁷ Alternate form reliability coefficients have ranged from .55 to .92, with a median of .76.⁸ The SE_m on Form A total score has ranged from 1.4 to 3.0.⁹

The manual of the BTBC stresses content validity of the test, the items having been drawn from "relevant curriculum materials."¹⁰

Collection of Data

The BTBC, Form A, was administered at the school in September 1979. The test was administered to all students in kindergarten classes at the school. After the test was administered, the results were transferred to a class record sheet available with the test. These records were then presented to each of the kindergarten teachers. The record sheet gives each student's name and indicates by a check mark each of the fifty items answered correctly by the pupil. The record sheet also indicates the percentage of pupils in the class who passed each of the fifty items.

The raw score for total score and for the several concept category scores (quantity, space, and time) were obtained from the various class record sheets given to each

⁷Ibid., p. 28.

⁸Ibid., p. 29.

⁹Ibid., p. 28.

¹⁰Ibid.

teacher. Information pertaining to age, sex, and the prekindergarten experience of Head Start was obtained from each child's kindergarten entrance form available from the guidance office at the school. Information pertaining to the Spanish-English testing was obtained from the teacher who had given the test.

The pupils providing the scores for the study were the seventy-one kindergarten enrollees at the school at the beginning of the 1979-80 school year. Of the seventy-one pupils tested, sixty-seven were beginning kindergarten pupils and four were repeating kindergarteners. Of the sixty-seven new pupils, sixty-one produced useable scores; forty-three were read the instructions only in English; eighteen were read the instructions in both Spanish and English.

The eighteen pupils who were administered the test in both English and Spanish received the directions first in Spanish, followed by the same set of directions under the direction of the teacher, assisted by an aide. The Spanish translation used was the Prueba Boehm de conceptos básicos.

The fourteen students who had received a formal prekindergarten experience had all attended the same Head Start center.

The students were tested in groups in their classrooms. The test was administered to all classes between 8:30 A.M. and 10:00 A.M. by the teacher in each class. Each teacher was assisted by an aide.

Treatment of Data

The hypothesis that there is no relationship between

chronological age within grade and scores on the BTBC was tested by the Pearson product-moment correlation.

The hypotheses that there are no differences with respect to sex, prekindergarten experience, or English and Spanish-English administration of the BTBC were tested by t-tests.

Chapter Summary

This chapter has set forth the problem posed by the low and highly variable language levels of St. Croix kindergarteners. The purpose of the study was to examine the roles of chronological age within grade, sex, prekindergarten experience, and mode of data gathering. The subjects were from a public school on St. Croix. The test instrument was the Boehm Test of Basic Concepts (BTBC). The collection and analysis of data were completed in the fall of 1979.

The following chapter includes a review of the literature on language acquisition and concept formation and a review of the research related to the BTBC.

CHAPTER II

RELATED LITERATURE AND RESEARCH

The Boehm Test of Basic Concepts (BTBC) was developed to test young children's levels of concept attainment. A review of the literature on language acquisition and concept formation and a review of the research related to the BTBC are included in this chapter.

Literature on Language Acquisition and Concept Formation

Normal children pass through the same stages of language development, although at differing rates. Children's first language behavior is a naming activity, beginning at about one year of age. This stage of language behavior is followed at about one and one-half years of age by one-word predications. At about two years of age, word combinations--i.e., grammar--appear. Subsequent preschool language development is largely that of increasing growth and complexity.¹¹

Reviewing early cognitive development, Malmstrom stated that "language is an example of children's mental development."¹² She stressed that infants' pre-speech

¹¹Jean Malmstrom, Understanding Language, (New York: St. Martin's Press, 1977), p. 7.

¹²Ibid., p. 5.

behavior characterizes their powers to symbolize.¹³ Infants' language behavior proceeds from symbolizing to categorizing to subcategorizing of objects in the environment. Children learn that objects have names, that objects with shared features have the same general name, and that unique objects have unique names.¹⁴ All of this categorization, when attained by the child, demonstrates higher abstraction. Descriptions of the child's early language, as presented in the literature, have in common that children's language is simpler than adults' language and that early language is genuinely creative.¹⁵

Blank suggested that "words can exist without concepts"--that is, a child may use terms which he does not understand (e.g., a young child's using "bad" words). She also asserted that "concepts can exist without words"--that is, language is not necessary to solve problems (e.g., a monkey's opening a cage).¹⁶ Generally speaking, however, it is held that use of the word implies knowledge of the concept, and, conversely, that children have language for the concepts which they have developed. Some theorists view language as an indicator of conceptual development, language and concepts developing concurrently. To these theorists, such as Vygotsky, language behavior is a

¹³Ibid., p. 6.

¹⁴Ibid.

¹⁵Philip S. Dale, Language Development, Structure, and Function, 2nd ed. (New York: Holt, Rinehart, and Winston, 1976), p. 20.

¹⁶Marion Blank, Teaching Learning in the Preschool, (Columbus, Ohio: Charles E. Merrill Publishing Company, 1973), p. 43.

symptom of language development, and language brings about conceptual development. Other theorists, such as Piaget, view concepts as being developed independently of language.

In taking the BTBC, the child is asked to listen to and to respond to directions (testing language acquisition) and to choose from among three pictorial representations of objects and events (concept formation). These pictures of three-dimensional objects are reduced to two dimensional drawings, making them semi-abstract. Successful response to the test items requires performance of a transmodal nature, indicating a higher level of abstraction than that required for the manipulation of real three-dimensional objects.

The BTBC thus tests the child's conceptual development by sampling his language acquisition. The rationale of the BTBC assumes that language development is an indicator of conceptual development.

Review of Related Research

Reliability of the BTBC

In a study of reliability estimates, using urban and rural kindergarten children, Houch, Biskin, and Regetz examined BTBC test scores of both lower-class and middle-class socioeconomic status children. Urban reliability statistics were obtained from the BTBC test manual. Reliability coefficients were .86 for urban, .88 for rural lower-class students; .90 for urban, .52 for rural middle-class students. There were virtually no differences between

the reliabilities of the lower-class urban and rural groups, but the middle-class differences were significant.¹⁷

Validity of the BTBC

A study by Boehm, Kaplan, and Preddy addressed the issue of content validity. The study focused on examining the fifty basic concepts tested by the BTBC from the perspective of the occurrence of these terms in printed materials, reading and mathematics curricula, and in verbally presented teacher's directions. Forty-three of the fifty Boehm concepts were found to appear on the Thorndike-Lorge list of 1,000 most frequently used words; forty six of the fifty concepts appeared in the Educational Developmental Laboratories' (EDL) core vocabulary of words found in kindergarten through grade three basal reading series. All fifty concepts occurred frequently in either current reading or mathematics workbooks.

Kaplan recorded the occurrence of BTBC terms in teachers' verbal directions. Of 711 directions recorded in grades kindergarten through grade two, 400 were BTBC terms and 255 were synonyms, antonyms, or comparative forms of the concepts, for a total of .92 concept terms per direction.¹⁸

¹⁷Cherry K. Houch, Donald S. Biskin, and Jeanette Regetz, "A Comparison of Urban and Rural Reliability Estimates for the Boehm Test of Basic Concepts," Psychology in the Schools, pp. 430-432.

¹⁸Ann E. Boehm, Charles H. Kaplan, and David Preddy, "How Important Are Basic Concepts to Instruction: Validation of the Boehm Test of Basic Concepts," (Teachers College, Columbia University, 1979), p. 9.

Three studies of the predictive validity of the BTBC were reviewed. In a study by Estes, Harris, Moers, and Woodrich, a significant relationship was found between BTBC concepts and end-of-first-grade achievement as measured by the Stanford Achievement Test. The BTBC was administered in September and the Stanford Achievement Test in May to 278 first-grade pupils. The correlation between BTBC and SAT total test scores was .56. The median correlation between scores on the SAT subtests and BTBC total test was .47.¹⁹

Steinbauer and Heller reported that the achievement of upper-middle class second and third grade pupils in New Jersey who had taken the BTBC in kindergarten showed significant correlations with all except the "Science and Social Studies" subtest of the Stanford Achievement Test. Grade two correlations ranged from .48 to .65; grade three correlations ranged from .41 to .93.²⁰ In the most recent study, Olinger determined the validity of the BTBC for predicting reading achievement by correlating the BTBC test scores of forty-two kindergarteners with the scores of the same students on the Iowa Test of Basic Skills in second grade. A coefficient of correlation of .60 was obtained. He interpreted the findings to indicate that the BTBC is of

¹⁹Gary D. Estes, Jerry Harris, Fran Moers, and David Woodrich, "Predictive Validity of the Boehm Test of Basic Concepts for Achievement in First Grade," Educational and Psychological Measurement, Winter 1976, pp. 1031-1035.

²⁰Erika Steinbauer and Marc S. Heller, "The Boehm Test of Basic Concepts as a Predictor of Academic Achievement in Grades 2 and 3," Psychology in the Schools, July 1978, pp. 357-360.

moderate value in predicting success in reading achievement in the second grade as measured by the Iowa Test of Basic Skills.²¹

Concurrent validity of the BTBC was studied by Levin, Henderson, Levin, and Hoffer. A modified version of the BTBC with rural and urban white disadvantaged children at the prekindergarten level produced correlations of .62 with the Peabody Picture Vocabulary Test, .41 with the Preschool Social Competency Scale. With three- and four-year-old black children, the BTBC correlated .49 with the Peabody Picture Vocabulary Test, .66 with the Preschool Inventory.²²

Another study of concurrent validity of the BTBC was conducted by Hutcherson, who correlated the Peabody Picture Vocabulary Test with the BTBC, obtaining a correlation coefficient of .84. The population consisted of twenty-three developmentally delayed five-through seven-year-olds. The results indicated that the PPVT and BTBC are measuring essentially the same abilities.²³

Effects of Concept Training

Several investigations have been carried out to study

²¹Clarice K. Olinger, "The Validity of the 'Boehm Test of Basic Concepts' in Predicting Achievement," (M.A. Thesis, Kean College of New Jersey, May 1979), pp. 1-4.

²²Ann E. Boehm, "Summary of Work with the Boehm Test of Basic Concepts," (Teachers College, Columbia University, n.d.), p. 2.

²³Richard Hutcherson, "Correlating the Boehm and the PPVT," Academic Therapy, January 1978, pp. 285-287.

the effects of efforts to develop concepts upon later achievement. Children who participated in structured programs for the teaching of basic concepts gained between pre-and-post testing on the BTBC and also gained at a faster rate in both reading and arithmetic achievement than a control or "placebo" group. The instrument used was the Stanford Achievement Test.²⁴ At the Central Arkansas Education Center, first grade children of low socioeconomic status received an enriched experience based upon the BTBC results; these children achieved higher BTBC and reading levels than those children taught by traditional procedures.²⁵ Kaufman studied the importance of basic concepts to following test directions.²⁶ Kaplan developed a "Directions Game" to measure pupils' abilities to follow teacher's verbal directions. The "Directions Game" results were then correlated with the BTBC scores for 215 children in grades kindergarten to five. A coefficient of .71 was obtained for the two tasks.²⁷

Sex Differences

Guttentag and Ross found no significant sex differences in two experiments to determine whether movement facilitates learning of verbal concepts. In the

²⁴Ann E. Boehm, "Summary of Work with the Boehm Test of Basic Concepts," (Teachers College, Columbia University, n.d.), p. 2.

²⁵Ibid., p. 2.

²⁶Ibid., p. 5.

²⁷Ibid.

first experiment, lower-class black preschool children were divided into movement, traditional, and control groups. The movement treatment group scored higher on the BTBC than either the traditional or control group, with scores of 38.6, 30.0, and 24.1, respectively. In the second experiment, the same method was applied to a heterogeneous group of children. Again, at the kindergarten level the movement treatment group scored highest, with a total mean score of 60.57, as compared to 47.14 for the traditional group, and 40.0 for the control group.²⁸

Children with Special Needs

Blind, hard-of-hearing, syntactically deviant, and educable mentally retarded groups of children have been studied by means of the BTBC; findings related to all four groups support the use of the BTBC as a useful measure of concept development for children with special needs.²⁹

Use of the BTBC in Other Cultures

In 1970 a Spanish translation of the directions for Form A was published by the Psychological Corporation. Preparation of the translation was accomplished with the help of personnel of the Los Angeles School District and of Ramon

²⁸Marcia Guttentag and Sylvia Ross, "Movement Responses in Simple Concept Learning," American Journal of Orthopsychiatry (July 1972): 657-665.

²⁹Ann E. Boehm, "Summary of Work with the Boehm Test of Basic Concepts," (Teachers College, Columbia University, n.d.), pp. 3-4.

L. Santiago, the University of Puerto Rico.³⁰ Public and private school norms on the BTBC in Puerto Rico were established in 1978-79.³¹ Researchers at the University of Nebraska completed a study with Mexican-American children in 1979-80. A study was planned to collect BTBC data from three locations in Italy in 1980-81 (Milan, Florence, and Naples).³²

Vane compared achievement and intelligence test results of kindergarten age children from white-collar and blue-collar classes in England and Ireland with the performance of children from the same classes in the United States. The test used was the BTBC. The mean BTBC score for English white-collar students was 31.5; for Irish white-collar students the mean BTBC score was 23.9; for United States white-collar students the mean BTBC score was 35.8. English blue-collar students had a mean BTBC score of 27.1; Irish blue-collar students had a mean BTBC score of 24.6; and United States blue-collar students had mean BTBC scores of 25.5 to 31.8. These results demonstrate that there are significant differences among test scores in different socioeconomic classes of England, Ireland, and the United States.³³

³⁰Ann E. Boehm, Prueba Boehm de conceptos básicos, (New York: The Psychological Corporation, 1970), p. 1.

³¹Ann E. Boehm, "Summary of Work with the Boehm Test of Basic Concepts," (Teachers College, Columbia University, n.d.), p. 4.

³²Ibid., p. 4.

³³Julia R. Vane, "Intelligence and Achievement Test Scores of Kindergarten-age Children in England, Ireland, and the United States," Journal of Clinical Psychology (April 1973): 191-193.

Reviews of the BTBC

In addition to empirical studies, a number of reviews of the BTBC have been published. Dahl described the BTBC as being "well laid out and easy to administer, to take, and to score."³⁴ However, Dahl suggested that if the purpose of the test is to provide a criterion-referenced interpretation, the results were not necessary, nor were reliability and validity estimates appropriate.³⁵ Collison too reviewed the BTBC and noted favorably the paced administration, the clear and unambiguous items, the Class Record Form available with the test, and the discussion of concept development given in the manual. However, Collison also stressed the need for more examples of teaching activities which could be used in conjunction with the BTBC results. He also questioned the use of the BTBC as a group test above the kindergarten level. Despite these reservations, Collison suggested that "preschool programs should find the BTBC useful."³⁶ Proger rated the BTBC manual and test as being of high quality and stated that the test has appeal because the teacher can administer, interpret, and utilize the test directly. However, he judged that there are limitations in the areas of

³⁴Theodore A. Dahl, "Test Review," Measurement and Evaluation in Guidance, April 1973, p. 65.

³⁵Ibid., p. 65.

³⁶Brook B. Collison, "The Boehm Test of Basic Concepts," The School Counselor, March 1971, p. 1.

standardization, validation, and test-retest reliability.³⁷ Noll also found the directions for administering the BTBC clear and complete. In summarizing the psychometric data on the BTBC, he suggested that the test is lacking in content validity. However, Noll suggested that the BTBC may have usefulness as a diagnostic teaching device.³⁸

Additional references and reviews of the BTBC are cited in Appendices B and C.

Chapter Summary

This chapter has set forth evidence that language acquisition and concept formation are closely related. The BTBC uses language acquisition as an indicator of the child's concept attainment level. Research studies have demonstrated satisfactory reliability and validity for the BTBC. Predictive validity correlations for the BTBC ranged from .41 to .93. Concurrent validity correlations ranged from .41 to .84. The BTBC has been used as a testing instrument with children having special needs and with children who are culturally different from the norm sample, and all of this research also supports the use of the BTBC as a testing instrument. Many of the basic concepts contained in the BTBC have been judged to be of the kind used with children in classroom situations.

³⁷Barto B. Proger, "Test Review: Boehm Test of Basic Concepts," The Journal of Special Education, (Spring-Summer 1970): 251.

³⁸Victor H. Noll, "Boehm Test of Basic Concepts," Journal of Educational Measurement (Summer 1970): 140.

The following chapter presents the findings of the study by chronological age within grade, sex, the prekindergarten experience of Head Start, and mode of data gathering.

CHAPTER III

FINDINGS

This chapter presents the findings of the study by raw scores and percentile rank, chronological age, sex, the pre-kindergarten experience of Head Start, and Spanish-English or English administration of the BTBC.

Distributions of Raw Scores

Table one presents the distributions of raw scores, with percentile ranks corresponding to mean "total" score for various socioeconomic status (SES) levels.

TABLE 1
DISTRIBUTION OF RAW SCORES

<u>Concept Category</u>	<u>N of items</u>	<u>Range</u>	<u>SD</u>	<u>Mean</u>	<u>%ile</u>
Quantity	18	1-15	3.03	6.46	
Space	23	1-18	4.04	8.51	
Time	4	1- 4	.81	1.74	
Total	45	1-36	7.75	14.16	10 (Low SES) 3 (Middle SES) 1 (High SES)

"Quantity" concept scores, with a maximum of eighteen, ranged from one to fifteen, with a mean of 6.46. For the twenty-three concepts tested in the "Space" category, the

scores ranged from one to eighteen, with a mean of 8.51. "Time" scores, with a maximum of four, ranged from one to four, with a mean of 1.74. For the forty-five "Total" concepts tested, the mean was 14.16. On Form A beginning-of-the-year kindergarten norms in the manual this mean score corresponds to the tenth percentile for low socioeconomic status pupils, to the third percentile for middle SES pupils, and to the first percentile for high SES pupils. Notably, one pupil achieved a total score of thirty-six; on Form A beginning-of-the-year kindergarten norms this score corresponds to the ninetieth percentile for low SES pupils, to the sixty-fifth percentile for middle SES pupils, and to the forty-fifth percentile for high SES pupils. Thus, while the mean level is quite low, there are some pupils entering kindergarten classes in the public schools in the Virgin Islands who do achieve above-average scores, according to the national norms for the BTBC.

Correlations Between Age and BTBC Scores

The first analysis of the data was to test the null hypothesis that there is no relationship between chronological age and scores on the Boehm Test of Basic Concepts.

Table two presents the resulting correlations between age and BTBC scores for the sixty-one subjects. Pearson product-moment correlations were calculated between raw scores and age in months. These correlations were interpreted at the .05 level of significance.

TABLE 2

CORRELATIONS BETWEEN AGE AND BTBC SCORES

<u>Variables</u>	<u>r</u>	<u>p</u>
Age and Quantity Score	.20	ns
Age and Space Score	.14	ns
Age and Time Score	.21	ns
Age and Total Score	.21	ns

The children tested in the study ranged in age from fifty-two to sixty-nine months. Generally, as children mature, their concept attainment level increases; this general trend of increasing scores by age-level is reflected in the norms presented in the BTBC manual. However, in this study none of the concept categories of "Quantity," "Space," or "Time" were found to be significantly correlated with age, nor was the correlation of .21 between age and "Total" score significantly different from zero at the .05 level of confidence. Thus, the null hypothesis of no relationship between chronological age and BTBC scores was retained.

Comparisons of BTBC Scores by Sex

The second analysis of the data was to test the null hypothesis that there is no difference between the mean scores of females and males on the BTBC. Table three presents comparisons of BTBC scores by sex. Observed mean differences between the scores of females and males on both the concept categories and their total scores were tested

by means of their critical ratios.

TABLE 3
COMPARISON OF BTBC SCORES BY SEX

<u>Concept Category</u>	<u>N</u>		<u>Range</u>	<u>SD</u>	<u>Mean</u>	<u>D</u>	<u>t</u>	<u>p</u>
Quantity	33	Female	2-14	3.02	6.76	.73	.90	ns
	28	Male	1-15	3.13	6.03			
Space	33	Female	2-16	3.72	8.64	.39	.36	ns
	28	Male	1-18	4.57	8.25			
Time	33	Female	1- 4	.59	1.73	.02	.12	ns
	28	Male	1- 4	.83	1.75			
Total	33	Female	2-32	6.95	14.70	1.17	58	ns
	28	Male	1-36	8.55	13.53			

"Quantity" scores for females ranged from two to fourteen with a mean of 6.76, while male "Quantity" scores ranged from one to fifteen with a mean of 6.03. "Space" scores for females ranged from two to sixteen with a mean of 8.64, while male "Space" scores ranged from one to eighteen with a mean of 8.25. "Time" scores for females ranged from one to four with a mean of 1.73, while male "Time" scores ranged from one to four with a mean of 1.75. Total scores for females ranged from two to thirty-two with a mean of 14.70, while male total scores ranged from one to thirty-six with a mean of 13.53. Thus, females had a slightly higher observed mean "Total" as well as higher means in the concept categories of "Quantity" and "Space." Males had a higher mean BTBC score in the concept category of "Time" than did females. The standard deviations for males were higher in

all concept categories and in "Total" scores than were the corresponding standard deviations for females. The range of scores in the concept categories of "Quantity" and "Space" and for total scores for males was higher than for females. Thus scores of males were seen to be slightly more variable than female scores. However, the t -tests calculated for the concept categories of "Quantity," "Space," and "Time," and for the "Total" scores of females and males, demonstrated no significant differences. This sample of children, then, did not differ in this regard from the standardization population, the BTBC manual not presenting different norms for females and males. Thus, the null hypothesis of no sex difference was retained.

Comparison of BTBC Total Scores by Prekindergarten Experience

The third analysis of the data was to test the null hypothesis that there is no difference between the mean scores on the BTBC of children who had attended Head Start and of children who had not attended Head Start. Table four presents the comparison of BTBC total scores by prekindergarten experience. The fourteen pupils who had had a prekindergarten experience had all attended the same Head Start center. A t -test was calculated for the observed difference between their scores and the mean score of the forty-seven pupils who had not attended Head Start.

The fourteen pupils who had attended Head Start had a slightly higher observed mean than did the forty-seven students who had not had that prekindergarten experience.

TABLE 4
COMPARISON OF BTBC TOTAL SCORES BY
PREKINDERGARTEN EXPERIENCE

<u>Pre-K</u>	<u>N</u>	<u>Range</u>	<u>SD</u>	<u>Mean</u>	<u>D</u>	<u>t</u>	<u>p</u>
HS	14	5-36	8.47	15.43	1.64	.69	ns
Non-HS	47	1-32	7.48	13.79			

HS: Head Start Experience

Non-HS: No Head Start Experience

However, to determine the reliability of the difference between their means, a t-test was calculated and no significant difference was found. Thus, the null hypothesis of no difference between children who had attended Head Start and those who had not attended Head Start was retained.

Comparison of BTBC Total Score by Spanish-English and English Administration

The fourth analysis of the data was to test the null hypothesis that there is no difference between the mean score on the BTBC of bilingual students to whom the test was administered in both Spanish and English and the mean score of English speakers to whom the test was administered in English. Table five reports the comparison of total scores by Spanish-English and English administration. A t-test was calculated for the observed differences between the mean scores.

The mean total score for the Spanish-English group was higher than the mean total score obtained under the

TABLE 5

COMPARISON OF BTBC SCORES BY SPANISH-ENGLISH
AND ENGLISH ADMINISTRATION

<u>Admin.</u>	<u>N</u>	<u>Range</u>	<u>SD</u>	<u>Mean</u>	<u>D</u>	<u>t</u>	<u>p</u>
Spanish- English	18	2-36	9.33	15.50	1.90	.86	ns
English	43	1-25	6.90	13.60			

English testing. However, the critical ratio of .86 demonstrated the observed mean difference to be non-significant. Thus, the null hypothesis of no difference between bilingual and monolingual administration of the BTBC was retained.

Chapter Summary

This chapter has set forth the findings of the study by raw scores and percentile rank, chronological age, sex, Head Start experience, and Spanish-English and English administration. No significant correlations were found between chronological age and BTBC scores. No significant mean differences were found on BTBC scores on the bases of sex, Head Start experience, or Spanish-English or English administration.

The following chapter presents a summary of previous chapters, conclusions, and suggestions for research and educational practice.

CHAPTER IV

SUMMARY

This chapter presents summaries of previous chapters, conclusions, and suggestions for research and for educational practice.

Chapter I posed the problem of the generally low and highly variable language levels of St. Croix kindergarteners. The purpose of the study was to examine the roles of chronological age, sex, pre-kindergarten experience, and language of test administration as determiners of that variability. The linguistic/conceptual development of a group of St. Croix public school kindergarteners was assessed by means of the Boehm Test of Basic Concepts in September 1979.

Chapter II set forth the rationale and justification for using language acquisition as an indicator of the child's level of concept attainment in the Boehm Test of Basic Concepts. Research studies on the BTBC reported satisfactory reliability and validity for the test. Reliability coefficients ranged from .52 to .90, validity from .41 to .84. Other research reported on the BTBC, as well as reviews of the test, support its usefulness with young children.

Chapter III presented the findings of the study by raw scores and percentile ranks, chronological age, sex, the pre-kindergarten experience of Head Start, and language of test administration. No significant correlations were found

between chronological age and BTBC scores. No significant differences were found between mean BTBC scores on the bases of sex, Head Start experience, and Spanish-English or English administration of the test.

Conclusions

The finding of no significant correlations between age and any of the concept category scores or between age and total score points to the need for individualization of the curriculum to accommodate the varied learning levels in any classroom. Individualization is further indicated by the variability in the scores and by the fact that many younger children received higher scores than their older age classmates. This finding does not warrant differential admission to kindergarten on the basis of age.

Since no significant differences were found between any of the concept category scores or the total score for boys and girls, the implication for the Virgin Islands public school kindergarten curriculum with respect to basic concepts is that no differential curriculum needs to be developed to satisfy the needs of male and female kindergarteners.

Since Head Start was not found to be a significant factor in determining the BTBC scores of the subjects, both children with and without formal preschool experience entering the Virgin Islands public schools may benefit equally from a curriculum of instruction in basic concepts.

Since no significant differences in total scores were found to exist between monolingual students who were tested

in English and bilingual students who were tested in both Spanish and English, the results suggest that both monolingual and bilingual kindergarteners in the Virgin Islands public schools may benefit from a curriculum of instruction in the area of basic concepts.

The rather small number of cases in this sample and the restricted range of their chronological ages could have concealed the true difference in the population--a Type II error, in which an untrue null hypothesis is retained. But their variability aside, the factors of age, sex, prekindergarten experience, and bilingualism were not found to account for the generally low test scores of these subjects.

Suggestions for Research and Educational Practice

Even though the results were not analyzed for examiner effect, one suggestion is that future testing be done by one person in order to eliminate examiner variability as a source of error variance in the testing. Another suggestion, in the interest of efficiency, is to administer the test just once in Spanish to predominantly Spanish-speaking students and once in English to predominantly English-speaking students. This suggestion would standardize the testing procedure.

A suggestion related to the somewhat limited scope of the present study is that replication is needed in a wide sample of Virgin Islands public schools in order that a more representative sample of the Territory's public school students be examined.

A study is needed in which there would be a pre-and

post testing to determine potential gains in children's concept attainment during the kindergarten school year. Such a study ought also to determine the impact of such gains in language upon subsequent academic learning in grade one and beyond.

Further study is needed to determine to what extent these concepts are "teachable," to what extent this sample of forty-five concepts tested by the BTBC represents a wide array of concepts which are essential to academic learning.

It is recommended that the BTBC scores obtained for entering kindergarten students in the Virgin Islands public schools be employed for the main purpose of individualizing programs to fit the needs of each student with respect to the acquisition of basic concepts.

APPENDICES

- A. RAW DATA
- B. REFERENCES RELATED TO THE BTBC
- C. REVIEWS
- D. CURRICULUM REFERENCES

APPENDIX A

RAW DATA, 1979 BOEHM TEST OF BASIC CONCEPTS

<u>S</u>	<u>Age</u>	<u>Sex</u>	<u>HS</u>	<u>Q</u>	<u>S</u>	<u>Total</u>	<u>T</u>	<u>S</u>	<u>HS</u>	<u>Q</u>	<u>S</u>	<u>T</u>	<u>Total</u>
1	63	F		5	11	17	1	11		5	32	1	10
2	64	F	X	2	5	7	0	14		7	33	1	17
3	63	M		6	14	23	2	7		1	34	0	3
4	59	F		4	7	11	0	8	X	3	35	1	2
5	56	M		5	11	14	0	9		7	36	1	19
6	59	F		9	8	23	2	4		4	37	0	13
7	59	M	X	4	8	12	0	0		0	38	0	1
8	55	M		0	3	3	0	6	X	6	39	1	14
9	56	M		3	4	7	0	3		3	40	0	9
10	63	M		4	5	10	1	6	X	3	41	0	12
11	60	M		7	13	22	2	5		5	42	2	18
12	68	F	X	6	14	25	3	6		6	43	1	16
13	62	F		7	8	16	0	7		9	44	0	21
14	61	F	X	11	11	24	1	11		9	45	1	19
15	60	M	X	2	3	5	0	65		11	46	1	28
16	56	F		8	9	20	2	67	X	14	47	3	36
17	64	M		8	9	18	1	65		3	48	0	3
18	59	F		8	8	18	2	60		3	49	0	7
19	59	F		8	8	14	1	65		6	50	1	11
20	56	F		4	8	25	0	63		6	51	0	13
21	64	F		11	13	14	0	56	X	6	52	1	18
22	69	F		7	5	14	0	62		7	53	1	17
23	64	M		6	14	24	2	64		7	54	1	15
24	61	F		2	1	4	0	55		2	55	0	3
25	61	F		5	5	11	1	60	X	4	56	0	2
26	62	M		7	9	17	1	57		4	57	0	8
27	61	M		2	1	3	0	58	X	13	58	2	32
28	64	M		3	8	13	1	52	X	3	59	1	9
29	62	F		3	1	4	0	62		9	60	1	22
30	62	M		4	2	6	0	63	X	8	61	1	21
31	63	M	X	4	3	7	0					1	

APPENDIX B

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