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DIFFERENTIAL READING PERFORMANCE ON THE COMPREHENSIVE TESTS OF BASIC SKILLS (CTBS): AN ANALYSIS OF THE INTERACTION OF CONTENT-SUB-TESTS READING SKILLS

A Dissertation Presented

By

SHIRLEY MANSON DESHIELDS

Submitted to the Graduate School of the University of Massachusetts in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

April 1974

Major Subject: Urban Education
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Differential Reading Performance on the Comprehensive Tests of Basic Skills (CTBS): 
An Analysis of the Interaction of Content-Sub-Tests Reading Skills

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By

Shirley Manson Deshields

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Shirley M. DeShields
ABSTRACT

DIFFERENTIAL READING PERFORMANCE ON THE COMPREHENSIVE TESTS OF BASIC SKILLS (CTBS): AN ANALYSIS OF THE INTERACTION OF CONTENT-SUB-TESTS READING SKILLS

April, 1974

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The Purpose

This study grew out of the concern and need for a more adequate appraisal of the consistency of reading comprehension in the content areas as defined by tests proortedly designed to measure general reading comprehension. Specifically, the purpose of this study was to examine the extent to which the number of correct responses to a standardized reading comprehension test varies among specific reading skills and sub-test content areas, e.g., science, social studies, and other selected academic fields to determine if successful application of a specific skill in answering correctly science questions, social studies questions, etc., can be used as predictors of reading comprehension success beyond the specific content of the respective sub-test.
Population

The sample used in this study was drawn from students who participated in the Massachusetts Eighth Grade Reading Program in January, 1971. At that time, 10 per cent of all eighth grade students in the public schools were tested. Students from 57 schools and 46 school districts were represented. Of the 11,202 (28.35 per cent) students who participated in the testing program 3,652 (32.60 per cent) were attending schools serving ESEA families. Minority students enrolled in the schools at the time of testing constituted 4.71 per cent of the total population. However, 56.71 per cent of the minority students were attending eight schools located in the city of Boston.

Procedure

Performance on the Comprehensive Test of Basic Skills was analyzed statistically. Comparisons were conducted vis a vis basic skills in three content areas; language, science, and social studies. In the initial analysis, Pearson's product-moment coefficient of correlation was used to examine the relationship among six selected variables. A second analysis was conducted by obtaining test items designed to examine performance across the three content areas. Lastly, a test of significance through use of Fisher's $Z$ ratio was used to examine the assumptions of the null hypothesis with regard to the
observed proportions used in this study and to obtain one estimate of the population variance.

Results

The results of this study support the assumption that successful application of a specific skill in answering, correctly, science questions, social studies questions, etc., cannot be used as predictors of reading comprehension success beyond the specific content of the respective sub-test. Several of the important findings are reported below:

1. In certain situations, students who attended ESEA Title I schools performed at a statistically significant higher level of performance in one content area than in another content area.

2. Likewise, students who attended non-ESEA Title I schools performed at a statistically significant higher level of performance in one content area than in other content areas.

3. Students who attended ESEA Title I schools did consistently better than the students from the Boston schools.

Conclusions

In general, the results of this study indicate that, even though most of the comparisons were not statistically significant, there were differential
performances among skill areas and content areas. Of the three skills examined, (i.e., main idea, extended meaning, and author's intentions), students performed poorest in extended meaning skills. Likewise, with only one exception, students performed poorest in the social studies content areas. On the other hand, the students tended to perform best in main idea skills and, with one or two exceptions, the top performance was in the language content area.

In summary, even though the results of this study are far from conclusive, this investigator takes the view that reading instruction should be part of the curriculum in each content area. This view necessarily implies a broad definition of the term "reading." Though there are many definitions, the results of this study tend to support the position that reading is not a unitary act, that reading comprises several functions. In developing an effective reading program, it is necessary to know what attitudes and skills are involved in efficient reading, and where they are most readily developed.
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CHAPTER I
INTRODUCTION

The implied educational goals of the United States address the need to provide every American citizen the tools and mechanics with which to acquire a basic background to enhance the fulfillment of his aspirations. Efforts to reach and raise the aspirational levels of our citizenry have created problems. These problems have stagnated the entire educational network and stymied those who want to make the system work. For many years educators have been surrounded by conflict and confusion resulting from: (1) the ambivalence surrounding the commitment among educators to develop curricula that will ensure students improved leadership skills and academic excellence; (2) the mediocrity generated by attempts to produce and shape the "well adjusted" citizen; and (3) the inferiority produced by those whose teachings encourage obsequious subordination.

Before any successful attempt can be made to resolve the various problems in the public school systems, educators must first learn to distinguish between two specific and totally different aspects in the process of learning: education and schooling.
Education and Schooling

Education is a lifelong process of learning how to negotiate with the world. The important part is that it is life-long—it begins before you enter school and ends when you die. The process is both profound and prolonged (Postman and Weingartner, 1973).

An individual is shaped by the many experiences he encounters in a lifetime. The success with which he negotiates a given social milieu depends, to a large extent, on how well he manages new and different experiences. Important as these experiences might be, he carries along with him the effects and influences of the relationships previously built during his lifetime.

A person's education requires the presence, attention, and support of other people who have learned how to conduct their own affairs with some degree of satisfaction and success. These factors tend to have a tremendous impact on those aspects of one's self-development which constitute an on-going system of energy capable of movement in a variety of directions. Such a process has the potential of continuously bringing into focus new insights and views, as one develops socially and intellectually (Berman, 1968).

Of course, it is entirely possible for someone to miseducate himself, that is, not learn how to negotiate with the world very well; or at least, not learn how to negotiate with important parts of his world (Postman and Weingartner,
1973). Berman (1968) states that, "...unfortunately, in this instance, ultimately, the assumption is made that man is responsible for his own mental and physical health."

Accordingly, Postman and Weingartner (1973) conclude that education is essentially a "do-it-yourself job, whether done badly or well."

Many educational critics are fond of reminding us that education involves more than schooling, that it can occur in the absence of teachers and courses and classrooms and all the paraphernalia that we have come to associate with formal schooling (Jackson, 1972). While no one can dispute this fact, when "educational fantasy" begins to replace educational philosophy, it is often impossible to make any kind of useful distinction between "education" and "schooling"; and school, the institution itself, loses a firm sense of mission and meaning (Kristol, 1973). Given this importance, the differences between the concepts of education and schooling need to be presented more frequently and forcefully today than in the past (Jackson, 1972).

Although society's concept of equality has shifted from "equal access to schooling" to "equal schooling outcomes" (Carnoy, 1972), the most important purpose of school is to give an individual some assistance in educating himself. The explicit assumption underlying this theory is that ultimately, the quality of a school must be judged by its capacity to achieve equal schooling outcomes. Unfortunately,
like other complex institutions, schools are sidetracked by political, social and economic considerations. "...School serves many masters, yields to many constraints, has many items on its agenda, and therefore, cannot always concentrate its resources on assisting an individual in educating himself" (Postman and Weingartner, 1973).

The system of public education has been on the rise for decades. However, it has had its difficulties because people in general, and educators in particular, have not fully realized the degree and kind of schooling being made available. Historically, educational programs have not been adequate to meet the individual needs of large segments of our school populations. Consequently, for many communities there has been little or no real progress.

Within the last decade, many school systems have experienced both ethnic and economic changes among student populations. History and/or experience indicates that the national trend in public education has not kept abreast of these drastic changes. Because of institutional biases and static expectations, many educators are divided in their opinions of the strategies, methods and models by which potentials in leadership abilities and academic achievement can or should be identified and developed.

Distinct social differences are among the controlling factors that have dictated the degree, quality and kinds of schooling individuals are likely to receive. Hence, whether
by chance or circumstance, educators have particular difficulty with one basic assumption. That basic assumption is:

...the individual's educational aim is to help him realize his projected vision of a better self, the national aims of education directed toward the realization of a better society to nurture the citizen's development. Because the United States is among those fortunate nations founded on the consent of the governed, its basic national purpose has been to serve the citizens who compose it. . .(Foy, 1968).

The educational system is one of the major social institutions through which this society gives expression to its values and goals. It is generally accepted that schools are first and foremost the responsibility of state and local governments. The fact is that there has been a lack of agreement between public educational systems and the disparate groups they purport to serve, on the basic premises needed to improve the schooling process in America. Some of the essential accommodations needed are: (1) relevant and functional curricula; (2) more effective educational programming and facilities; and (3) a redistribution of finances directed toward more equitable educational outcomes among the disparate groups. The inability to resolve problems of priorities and accommodations, hence mirrors the conflict between national commitments and local dictates.

A nation faced with these complex educational and societal problems must engage in a systematic large scale search for underlying factors contributing to the lack of a greater return on its educational investment. Our shotgun approach to a scattering of apparently unrelated
weaknesses in the schooling process is a good way of perpetuating present conditions. All the money in the United States will not do the job until the job is clearly understood. And it cannot be clearly understood until the nature of the educational problem is clearly defined. Right answers cannot be obtained until the right questions are formed, and the questions must grow out of the conditions that give rise to the problems.

In summary, one of the traditional roles of educational institutions in this country has been to broaden opportunities for productive, influential, and rewarding participation in the affairs of this society by developing those skills and credentials necessary for economic survival and social satisfaction. Over the past decade, we have extended this opportunity to more and more of our people, by a steady increase in the quantity of educational experiences available and, in theory at least, a concomitant increase in the quality of the educational product. While the quantity of available educational experiences has grown, there also has been a marked increase in the quality of the skills and competencies demanded of those who would achieve much. Similarly, the individual's goals are higher. In general, students want to be productive, for they know that society sees their efforts as resulting in a valued product, influential in the sense that their participation is viewed as having some influence on outcomes; and rewarded
for their efforts both materially and psychologically (Foy, 1968).

**Significance of Reading**

Reading and living are almost synonymous in this society. Without the ability to read, the doors to accomplishment are usually tightly closed. All fields of endeavor demand reading skills. Reading skills are essential if individuals are expected to successfully learn to negotiate with their environment.

Consequently, teachers must help students experience reading as a process that provides useful solutions to every day personal experiences. Many specialists argue that educators should not only teach reading for competencies, but also—and to a greater degree for its effects on personal living (Russell, 1968).

In developed societies, such as ours, public schools have come to assume a major part of the responsibility of educating our children. Consequently, during times of stress and rapid change, schools are strongly criticized for their incompetence as reflected in pupil performance. Because of its fundamental importance, the teaching of reading bears the brunt of such criticism (Schubert and Torgerson, 1968).

For decades, almost every basic issue related to reading instruction has been debated with a great deal of
intensity and considerable rancor. However, during this period there is a difference; the body of knowledge and practices now being attacked is the first to claim validity on scientific grounds. Reading has been the most researched of all school subjects; for each study in arithmetics, there are probably three studies in reading (Chall, 1970).

In spite of the increased attention being directed by educators to the nature and extent of the reading problem in the public schools, responsibilities for the development of an effective reading program have not been clearly allocated. This is due, in part, to the fact that the very nature of reading comprehension itself has not been clearly described.

Reading is the one skill in the schooling process that transcends all content areas, whether they be mathematics, science, literature, geography, etc. Emphasis is needed on making reading serve the student and society, and on helping the student to use reading as a learning aid. The skills of reading and reading comprehension are dictated by the general purpose for reading (Parke, 1964). A systematic and sequential program specifically designed to develop such skills is necessary for successful reading. Basic to successful reading must be a broad experiential base from which one can draw upon for a wide background of understandings.
The background of understanding built up through reading and practical experience provides the standards, the criteria, the facts, against which new ideas may be evaluated and critically analyzed. Because critical reading is a circular process, it gives the reader a valid and reliable background of understanding which, in turn, he uses to evaluate critically other ideas (Artley, 1959).

Children and youth, like adults, are sometimes inclined to do little more than what is demanded of them. If the instructional demands and their felt needs can be met with a low level of assimilative reading, that will be the type of reading they may be inclined to do. If, on the other hand, there is a need to search carefully for relevant materials, to select and reject information in terms of a problem situation, to identify and compare data from several sources, the student will be more inclined to do a critical type of reading.

**Content and Skills**

Content teachers, particularly at the secondary levels in public schools, are being urged to give increasing consideration to specific reading skills needed for mastery of their respective subjects. Such demands are often met with inquiries as to the nature of the reading skills required in a specific content area. Published reading tests seem to assess competence in general reading skills
which may or may not be relevant to the particular area of concentration or may not reflect the peculiar emphases practiced in that field.

According to Farr (1969), the number of investigations related to measurement of reading ability in content areas indicates that many educators feel that there is a need for tests of specific reading skills. A review by Maney (1958) and others pointed out that most of these studies are related to attempts to measure reading comprehension as it relates to a specific subject. Other studies (Johnson, 1952; Dunlap, 1951) have also suggested the need for measuring students' vocabulary abilities, so that the needed instruction can be provided and students can learn more effectively in each subject.

There is a serious dearth of research related to the basic components of reading comprehension and their relation to various subjects. One of the major limitations of most of the relevant investigations is the fact that they have relied on the correlation coefficient for their analyses. Farr (1969) argues that, "...while such a procedure does indicate that two variables are related, it does not provide the reasons underlying such a relation..." In essence, Farr is saying that a given reading comprehension test in science may be related to later success in science not because the test is a test of specific science reading ability, but because the student who has had past experience
with science not only achieves at a high level on such a test, but has a high probability of performing well in a science class.

Therefore, since more basic research has been conducted on the elements composing general reading comprehension in specific subject areas, it seems to this investigator that the whole question of the construction and use of diagnostic measures of reading comprehension needs further examination. Obviously, there is a need for more definitions of the skills to be measured. If test constructors suggest that reading comprehension is different in science than it is in social studies, then it is incumbent upon them to describe exactly how they differ.

Furthermore, this investigator feels that it is inadequate for test designers to build two reading comprehension tests, one based on science materials and one based on social studies materials. Attempts to validate such tests must be related to students' responses. Correlating a test of science reading ability with grades in science is not a valid procedure for examining the unique qualities of reading comprehension in science. By studying students' responses, it may be possible to determine if the student goes through a different mental procedure in comprehending science materials than he does in comprehending
Finally, there is a lack of tests on the market which measure reading achievement in specific subject areas. This study will provide additional evidence to support the assumption that if content area teachers desire information regarding students' reading performance in that content area, it may be most useful for them to develop informal reading inventories designed to measure students' skill in learning from test materials. In summary, an informal reading inventory, developed by the classroom teacher and based on the classroom instructional materials, provides a very useful measure of each student's ability to read at increasingly difficult levels.

Most often overlooked in the use of informal reading inventories is their use as a daily, continuous part of reading instruction. By constantly being alert to each student's reading performance and applying the criteria for assessing informal reading inventorial performance, a content teacher can adjust the instructional materials to insure continued student success. After determining appropriate reading levels for students, the teacher's next concern should be related to the diagnosis of reading skills development. The validity of a teacher's diagnosis of students' reading skills can be increased if he/she selects or develops measurement devices which assess those skills associated with the students' reading skills development in social studies materials (Farr, 1969).
a given content area.

**Scope of Study**

This study attempted to improve on the extent to which generalities can be made about performance in reading comprehension in different skill areas (referent generality). In an attempt to get generalizable information, this study used the largest source available by taking a 10 per cent sample of eighth grade students from the state of Massachusetts who were administered the Comprehensive Test of Basic Skills (Reading Comprehension) in January, 1971. Such a sampling of students tested under normal test-taking circumstances, adequately defined performance in reading comprehension for all eighth grade students in the Commonwealth of Massachusetts. In other words, the universe was sufficient in size to make possible, valid generalizations.

There is, however, one caveat. While there has been some real attempt to solicit a reasonably diverse sample of schools, there is no basis to conclude that this sample of schools was truly representative of secondary schools in the Commonwealth of Massachusetts. The schools used in this study were from selected regions of Massachusetts. The selection of schools was not done in a completely random manner. Therefore, the results may not be fully generalizable to other regions of the United States or to different types of schools or communities.
Statement of the Problem

This study grew out of the concern and need for a more adequate appraisal of the consistency of reading comprehension in the content areas, as defined by tests purportedly designed to measure such comprehension. The appraisal of reading in various subject areas (e.g., social studies, mathematics, science, literature, etc.,) can provide the reading teacher with relevant diagnostic information about how well the student can demonstrate the reading skills he is taught. Such appraisal can also provide the content teacher with information about how a student can be helped to learn more efficiently in a given subject area.

Purpose of the Study

In general, this investigator proposed to examine how reading comprehension is defined and assessed in the Commonwealth of Massachusetts (public schools). This research was conducted not so much on the elements composing general reading comprehension, but on how these elements relate to specific subject areas. This investigator was, therefore, tangentially concerned with reading comprehension as it relates to: (1) specific purposes for reading and (2) various subject or content areas.

Specifically, the purpose of this study was to examine the extent to which the number of correct responses to a standardized reading comprehension test varies among
specific reading skills and sub-test content areas, e.g., science, social studies, and other selected academic fields to determine if successful application of a specific skill in answering correctly science questions, social studies questions, etc., can be used as predictors of reading comprehension success beyond the specific content of the respective sub-test.
CHAPTER II
REVIEW OF THE LITERATURE

Historical Function of Reading

Historically, when events occur that threaten the national welfare or happiness of this society, teaching instructions tend to change. In general, from 1607 to the present, the evolutionary process in teaching instruction has been marked by a series of turning points. More in keeping with the general problems of teaching instruction are the drastic changes that have come about in the design and intent of reading methods and content. Reading seems to be so intrinsically interwoven with one's life-style that it becomes a part of the living fabric of the societal milieu during crucial periods in our history. The following is a sketch of social influences that have been basically responsible for changes that have affected reading instruction.

Social influences on reading instruction

Around the beginning of the seventeenth century (1607-1776) religion was the dominant social force. During that period the American pioneers focussed their attention on religion. They also recognized the need for effective and competent leadership. For example, Thomas Jefferson
was one of the early exponents of the belief that representative government could not work without popular education. To deal with these needs and concerns, religious leaders introduced the most available material to nurture the minds of children during their formative years. It was not uncommon for many homes not to have any books at all. In general, the Bible was the only book home libraries contained. As a consequence, the materials for teaching consisted almost wholly of religious selections from the Bible (Smith, 1965).

Since the religious motive was the all-controlling force in the community, the custom was for the uneducated members of a family or community to gather in little groups in the evenings or on the Sabbath for Bible readings. Illiteracy was pervasive during this period. Therefore, at such gatherings, the uneducated members were required to listen to the oral reading of the scripture by one who had mastered the art of reading. Quite naturally, the religious motive permeated and influenced reading instruction in public schools. This method of teaching came to be known as the "oral-memorization approach" to reading.

Between 1776 and 1840 there was a shift from a concern for religious indoctrination to a concern for political freedom and the need to develop a strong, unified, young nation. Changes in the national trend toward a heavy emphasis on patriotism was associated with concomitant
changes in public education. Consequently, a new out-of-school influence was generated. Teaching methods were designed to inculcate patriotism into the citizenry. As a result, religious reading materials were supplanted by patriotic types of materials with the aim of preparing the great masses to discharge their duties of citizenship.

Between 1840 and 1880 reading as a means of obtaining information was really on the upsurge. Educators began to move away from intensive patriotic reading materials and sought broader subject reading matter. At that time, the national aim of promoting good citizenship was: (1) to provide information in all fields of learning; and (2) to develop high morals. Therefore, the design was to include a wide-range of informative selections in science, history, philosophy, economics, and politics. In other words, the subject matter of readers became broader. It was during this period that the prevailing teaching technique was the "oral-reading method."

In an attempt to provide a more effective education for the masses, educational leaders began to visit experimental schools in Europe and brought back new concepts about classroom organization (by grades) and teaching "reading by the word method." During this period, "Mr. Guffey's Readers" and Webb's book entitled, "The New Word Method," began to appear in America (Smith, 1970).

From 1880 to 1910 America had reached a period of
stability, tranquility, and security. The absence of threats of major wars helped to create an opportunity for citizens to focus on cultural development. This new trend also affected the nature of reading instruction. "Expressive oral reading for appreciation" was the method adopted. In addition, readers were used as vehicles for acquainting children with folk tales in the primary grades and introducing the classics in the upper grades.

From 1910 to 1925 a major breakthrough in reading instruction occurred. The publication of Thorndike's handwriting scale, in 1910, has been recognized as the beginning of the contemporary movement for measuring the educational products scientifically. In 1915 the first reading test entitled, "The Gray Standardized Oral Reading Paragraphs," was published. Other reading tests followed—the majority of which were silent reading tests. With the introduction of measurement it was possible, for the first time, to obtain a broad sampling of common information about the effectiveness of reading methods and materials, as well as administrative arrangements for teaching reading in the classroom. As a result, innovations in reading instruction were more evident during this period than in all of the previous periods.

Prior to this period, the "oral-reading method" had maintained an ultimate and undisputed claim over classroom methods. As a result of much of the research conducted
between 1910 and 1925, changes in reading methodologies took place. Reading instructors shifted their emphasis from the "oral-reading method" to the "silent reading method." This shift occurred primarily because research studies indicated that the "silent reading method" resulted in greater speed and a better understanding of meaning. Accordingly, two new techniques--silent reading and speed reading--became very popular and important to individuals involved in the teaching of reading. Correspondingly, the content of readers changed. Educators recognized that reading literary selections for appreciation was not consistent with procedures used for improving comprehension skills or the development of speed, so readers were designed for the comprehension of factual materials.

Between 1925 and 1935 a wide range of research in reading was conducted, resulting in approximately 654 published studies. As newer methods were examined, reading instructors began to establish objectives that would result in the identification and development of differential abilities needed for the disparate purposes for which reading was used in "well-rounded living." No one type of instruction was given precedence over another, as had been true in preceding periods. Ability grouping and tracking were introduced because (1) schools became a symbol of the route to success; and (2) increased enrollments reflected a wide range of students at varying levels of reading readiness.
At the same time, ability grouping and tracking became one of the more effective means of enhancing and institutionalizing segregation in public schools.

Educators were successfully broadening reader content skills programs and methods. In addition, major advances were made in: (1) the initiation of the readiness concept for beginning readers and (2) diagnostic techniques related to reading deficiencies. Educationally, colleges and universities began to offer a variety of reading courses as a part of the regular curricula. Professionally, the first supervisors of reading began to appear in the public schools as specialists.

National and international unrest resulted in a major war between 1935 and 1950. Hence, another out-of-school situation had tremendous influence on reading instruction. Even though there was a severe reduction in the output of research and instructional materials, there was, for the first time, an increased emphasis on reading readiness. Authors began to simultaneously provide reading readiness books for children and reading readiness instructions for teachers. Advances in methods included provisions for: (1) utilizing interrelationships of reading with other language arts, (2) addition of the use of context clues and structural analysis, and (3) extensions in comprehension and work-study skills. Further development in reading supervision emerged to the extent that a number
of school systems appointed special people for supervisory service in reading, many with the professional designation of "Reading Consultant."

From 1950 to 1965, reading instruction was influenced by: (1) expanding knowledge and (2) technological revolution. It was obvious that one of the most frequent solutions to the problems that plagued humanity was better education for the masses. Education could not proceed without reading; hence, there was a compelling objective to increase literacy. This new objective lifted the horizon of reading far above its established bounds. Russia's "Sputnik" jolted America to the extent that there was a thundering demand for more and better education. Pressures to produce higher competency in a shorter time immediately became apparent. Investigators, authors, publishers, etc., worked feverishly to find improved methods and new materials which would produce faster and better results in the teaching of reading.

As a result of these stimulating influences, authors of basal reading series enlarged their programs with multiple tests, and initiated methods reflecting the most recent research and trends. New approaches to beginning reading were published. New reading materials were prepared for youth and adults who were illiterate or functionally illiterate. And lastly, interest in reading disability was expanded, making use of contributions from other disciplines.
Implications for change

Even though changes in reading instruction have been, for the most part, generally exciting over the past half-century, research on many aspects of measurement in reading is at best sparse and inappropriate. Even in those areas which have received a great deal of attention, more questions remain unanswered than answered. Unfortunately, we still are not able to provide conclusive evidence on the nature of the skills underlying reading abilities, the validity of present devices for measuring these skills, and the most effective means for using those devices which are currently available (Smith, 1965).

Historically, much of the work in reading has overlooked some very important variables that affect reading performance. Measurement and evaluation in reading programs usually are concerned with determining how well a student reads. How well the students read is influenced, to some extent or another, by the experiential background, which they bring to the classroom and over which the classroom teacher has only partial control. Factors such as sex, socio-economic background, and personality exert some influence. The problems that these present, to those who are interested in measuring reading performance, are a matter of the degree of influence they exert on test performance. As one looks at the history of reading instruction in America, one must always remember that test performance cannot be the only means of assessing student capacity, since it represents
only a single sample of an individual's behavior, which is affected by many immediate and long-term factors.

**Reading Comprehension**

In order to measure any behavior, it is necessary to know what the basic components of that behavior are. A review of the factors that should be considered in measuring reading comprehension indicates that this measurement task is extremely complex. Factors that are critical to reading comprehension include the length, interest-appeal, subject matter, reading difficulty, and organization of the material to be read. Additional factors are the reader's purpose, mental set, environmental conditions for reading, command of basic decoding skills and the type of questions to be used (Singer, 1969; Holmes, 1969).

Kerfoot (1968) argued that the measurement of reading comprehension is a "problem of inconsistency in both a theoretical base and a descriptive terminology." He suggested that, to overcome this problem, both researchers and practitioners should seek to operationally define reading comprehension in terms of specific reading tasks. Some investigators, including Barrett (1968), have attempted to provide a partial response to Kerfoot's pleas for an operational definition of comprehension by developing a taxonomy of the cognitive and affective domains of reading comprehension. The attempts to develop taxonomies usually includes
factors such as literal comprehension, reorganization, inferential comprehension and evaluation and appreciation.

**Definitions of comprehension**

Comprehension is the correct association of meaning with word symbols, the evaluation of meanings which are suggested in context, the selection of the correct meaning, the organization of ideas as they are read, the retention of these ideas, and their use in some present or future activity (Yoakum, 1951). Guice (1969) expanded this definition by presenting the argument that a gain in comprehension is used to indicate the amount of information obtained through the processes of reading as contrasted with the amount of information previously known by the reader, as reflected in pre- and post-test scores.

Maney (1958) divided "general" reading comprehension into two basic components. The first component, literal reading, is defined as the ability to obtain a low-level type of interpretation by using only the information explicitly stated. The second component, critical reading, is defined as the ability to obtain a level of interpretation higher than that needed for literal interpretation. Some of the variables associated with critical reading are:

1. Functional vocabulary--The reader's background of experience in reference to a concept used in the selection
2. Semantic variation of vocabulary--The reader's ability to identify a similar usage of a given word from the selection

3. Association of ideas--The ability to see the relationship among ideas in a series

4. Problem solving--The ability to apply information from the selection to a problematic situation

5. Generalization--The ability to identify a general conclusion or principle from information implicitly stated

In summary, Maney's definition of "general" reading comprehension is a measure of understanding based on the results of a reading test which uses content largely from the field of literature.

Nila Smith (1964) uses common reading skills interchangeably with reading comprehension. She argues that:

It requires no special analysis to reveal that regardless of whether a student is reading in literature, science, social studies, or mathematics, he must be able to pronounce the words to get meaning from printed symbols, and to use appropriate reading rates. Breaking these general skills down somewhat we have (1) word recognition, utilizing sight words, picture clues, context clues, phonics, analysis of word structure and dictionary techniques; (2) understanding meanings involving literal comprehension, interpretation, critical reading, specific word meaning; and (3) rate-making use of different speeds according to intent for reading and nature of subject matter. These skill areas are drawn upon in all kinds of reading. . .
Smith considers study skills to be those specialized skills used in study situations beyond—and in addition to—the common reading skills employed in non-study situations. She finds it helpful to think of the reading study skills as those skills used especially in situations in which it is desired to make applications of content covered. Thus conceived, the study skills in reading may be broadly defined as those skills used when we intend to do something with content while reading it, or after finishing the reading.

On the other hand, Shores (1960) established that the following specific purposes and skills occur in reading: (1) reading for the main idea and/or (2) reading to keep a series of ideas in sequence. Shores found that reading for the main idea is a skill more commonly measured by tests of general reading achievement than is reading for a series of ideas in sequence. In this study Shores concluded that:

1. Good readers on one measure of reading ability tend to be good readers on other measures.
2. Ability to read to find the main idea relates more closely to measures of general reading abilities than does ability to read to keep in mind a series of ideas in sequence.
3. Tests of general reading ability are not necessarily good predictors of ability to read
particular materials for specific purposes.

4. Improvement in ability to read for main ideas and for ideas in sequence requires more than 20 short successive practice sessions. Presumably improvement would take place with instruction and additional time and practice.

5. A reader's purpose is a more potent determinant of reading speed and comprehension with expository materials than is the content field from which the material is drawn.

6. The purpose for reading influences the speed with which the reading is done.

7. Fast readers are the efficient readers when reading some kinds of materials for some purposes. When they read other kinds of materials for other purposes, however, no relationship is observed between reading speed and the ability to comprehend. Those who take more time to reread and answer questions, when reading to keep a series of ideas in mind in sequence, make higher comprehension scores.

The most pressing research need in measuring comprehension is to develop a clear understanding of the nature of reading comprehension. Presently, there is no conclusive evidence regarding the components of this skill.
Researchers do not know whether it is a unitary skill or a composite of sub-skills. If it is, in fact, a composite of sub-skills, can each of the sub-skills be measured independently? Future research will probably show reading comprehension to be composed of a variety of skills. More than likely, we will also find at the same time that the skills are dependent on a particular set of conditions. At the present, it seems reasonable to assume that reading comprehension as a global skill is non-existent and that measurement attempts should be narrowed down to specific conditions (Farr, 1969).

What can be measured?

From a review of recent studies in reading comprehension, it is obvious that the measurement of reading behavior is based on logical rather than empirical evidence. Research studies regarding the measurement of sub-skills of reading are very limited and where there have been studies, there is a great deal of confusion concerning existing measures of these sub-skills. In addition, for the common sub-test of reading behavior, there is a lack of clarity concerning the most appropriate method of measurement. Interestingly, there are more procedures utilized for measuring any single sub-skill of reading than there are hypothesized sub-skills of the total reading act (Farr, 1969).
Content and Reading Skills

Assessing reading in content areas--a review

The appraisal of student's reading in social studies, mathematics, science, literature, and other subject areas can provide the reading teacher with relevant diagnostic information about how well the student can apply the reading skills he is taught. Such appraisal can also provide the content teacher with information about how a student can be helped to learn more efficiently in a given subject area.

One of the earliest studies of reading in the content areas was done by Eva Bond in 1938. She investigated the relationship between general reading ability and achievement in specific fields for 300 ninth grade pupils. Using principally a series of Cooperative Tests (English, Literary Acquaintance, Latin, General Mathematics, Algebra, General Science) the Iowa Silent Reading Test, and the Trazler Silent Reading Test for reading ability, she sought the answer to the questions, "How well does a good general reader perform in English, Latin, math, and science?" and "Does he perform equally well in all other subjects, or are some subjects more directly benefited than others?" She concluded that "There is no such thing as a critical level of reading ability above which added improvement in reading is no longer a factor in achievement at the ninth grade level." Her findings indicate that any increase in reading ability will be reflected in increased scholastic achievement. She
concludes that her study supports the statement that "Every teacher should be a teacher of reading" (Bond, 1958).

In another early study of reading skills in the content areas, Artley (1944) found that while some relationship existed between tests of general comprehension and comprehension in the social studies, there was also a high degree of specificity in the factors relating to reading comprehension in the social studies. His results suggested that a command of the specialized vocabulary of social studies was found to be at least as important as knowledge of social studies facts on tests measuring knowledge of facts in social studies.

Johnson (1952) constructed a vocabulary test consisting of 150 multiple-choice items designed to test fifth graders' understanding of vocabulary in six content fields: arithmetic, geography, history, science, health and literature. The words used in the test were taken from the fifth-grade books which the students used for daily study. Because the pupils tested did poorly with the vocabularies on tests used in the respective content areas, the investigator concluded that a program of word-enrichment was needed. These results suggest that reading programs should be directly related to the vocabularies in which specific content areas are used.

Shores and Saupe (1953) studied fourth and sixth graders to examine whether the type of reading comprehension
demanded of a student in each content area differed qualitatively beyond the primary grades. Their general findings tended to support the hypothesis that reading ability differentiates beyond the primary grades into somewhat specific abilities to read different kinds of materials for different purposes. Specifically, this investigation supported hypotheses that reading of the kind employed in grades four, five, and six to solve problems in science, has a large factor in common with mental ability and general achievement as these are commonly measured, and yet is somewhat unique in a manner which cannot be accounted for by these generalized factors.

The significance of the study by Shores and Saupe can be summed up in their assumption that:

...with respect to experience background of the reader the testmaker must assume that the readers have had equivalent experience with the specialized subject matter of the reading passage in order for the test to be valid in comparing individuals or groups. A child with a wealth of experience in aviation will comprehend a passage about airplanes better and more rapidly than one who has not had this experience. This requirement of equivalent experience is not easily met and has been violated frequently in reading test construction.

They further conclude that:

Methods for meeting this requirement would be to select the subject of the reading passage in such a manner that it might be assumed that the testees have had little if any specific background for it or to use a great number of passages with the expectation that the effects of experience background would cancel out. At the same time the test passage should be typical of the kind of content and purpose for which measurement is desired.
A study by Maney (1958) provides further support for the hypothesis that reading comprehension is a specific ability related to specific purposes for reading and various subjects. Maney administered an author-constructed test of science reading comprehension, the Gates Reading Survey--Level of Comprehension, and the Pintner General Ability Tests to 513 fifth-grade students. The results indicated that literal reading comprehension correlated with each critical science reading test item from \( r = -0.15 \) to \( r = 0.47 \). This finding supports the investigator's conclusion that critical reading of science materials cannot be predicted from general reading tests or from a test of literal reading comprehension.

Halfter and Douglass (1960) developed a test designed to measure general competence in reading skills peculiar to the field of commerce. Their test correlated highly with successful performance in a business school. Comparative validations of the test were provided by correlating high school grades and the Ohio State University Psychological Test. The Ohio State Test correlated with later grades \( (r = 0.64) \) as did the Commerce Reading Comprehensive Test. The two tests and high school grades provided a multiple correlation of \( (r = 0.77) \) with first semester grades in business school. A failure to indicate the amount of variance contributed by high school grades limits the conclusion that the Commerce Reading Comprehension Test is a useful
predictor of later grades in business courses.

Accordingly, Nila B. Smith (1965) stated that:

...specialized vocabulary is a significant factor in reading science material. The new words are long, difficult to pronounce, and technical in concept. For teachers working with poor readers, it is suggested that they take a hint from procedures used in teaching reader stories, that is, to clear the way for study of new science content by providing vocabulary work before the students read both in regard to pronunciation and meanings.

Since Artley's early investigations, many studies have concluded that comprehension of reading material is different in each subject area. If such findings are accurate, they suggest that the diagnosis of a student's reading performance in a content area must be concerned with more than his general reading comprehension. Farr (1969) asserted that:

Students may be performing poorly in academic subjects not because they lack reading comprehension abilities in general, but because they lack the specific ability to apply this skill to various subject areas. The diagnosis of reading ability, therefore, needs to go beyond an evaluation of general reading power and should examine the reader's ability to apply his reading skills...

Fay (1958) described several experiments in which classroom teachers attempted to apply reading to their specific content field. In one experiment a fourth grade teacher used her entire class of 45 children in an attempt to see how much gain could be made in arithmetic reasoning in one semester, as a result of special emphasis on reading skills and vocabulary. She employed the Stanford Achievement Test, Form J, to determine the ability of the students to handle paragraph
comprehension and arithmetic reasoning. The results showed a range in reading ability from 1.7 to 8.6. The teacher stressed skill and comprehension with her pupils and gave specific training in the following skills: skimming to find the answer to a specific question, skimming to get a total impression, reading to grasp the main idea, reading to follow sequence of events, reading to note and recall details, following directions, critical reading, and remembering what one has read. A special drill was given in vocabulary along with computational skills.

Using another form of the Stanford Achievement Test, the teacher assessed the improvement the students made at the end of one semester of the experiment, that is, four months after the initial test. Results indicated a substantial gain in both paragraph meaning and arithmetic reasoning. On the second test, 22 pupils, or 49 per cent of the class, were performing at fifth grade level and above in paragraph reading. Twenty-four pupils, or 53 per cent of the class, were performing at fifth grade level or better in paragraph reading. The median gain for the class in arithmetic reading was nine months, twice the time spent in the experiment.

Krantz (1957) reenforces the essential role of the content area teacher in the development of reading and study skills. In a comparative longitudinal study he examined the relationship of reading abilities and basic skills of the elementary school with success in the interpretation of
context materials in the high school. Through school records and specific testing, he obtained massive data on 471 pupils: 215 as seventh graders in 1947 and again as eleventh graders in 1952; 256 as seventh graders in 1949 and again as ninth graders in 1952. He used a wide variety of instruments and analyzed his variables through zero-order correlation and multiple regression. Among his many conclusions, he noted that development of reading ability specific to a content area is highly important to pupil achievement in the elementary and secondary school; and that, in general, it is highly important to analyze the content fields and find related study skills, as yet unmeasured. By implication, he indicates that the content area teacher is best equipped to deal with these reading and study skills.

Melis (1964) surveyed 177 intermediate grade teachers to discover their use of "approved" reading approaches in the field of science and social studies. He listed 16 areas, and 177 or 84.1 per cent of the teachers responded. He noted the following: (1) application of "good reading practices" is more frequent at successively higher grade levels; (2) these practices are more common among social studies teachers than science teachers; (3) the extent of a teacher's experience is not a significant factor in determining methods; (4) advanced training and preparation are not significantly related to difference in method; and (5) teachers appeared to follow the recommendations of experts in using available
materials.

The knowledge explosion is such that for each grade level and subject area, information is increasing at a tremendous rate. The impact of this new knowledge is felt by classroom teachers as it is incorporated into curricula. All too often, content teachers have "so much to cover" that they feel forced to teach more specifically than they know they should. Herber's (1970) observations led him to conclude that:

...emphasizing concept development rather than accumulation of information is recommended for handling the growing curricula; but for many this requires considerable adjustment in teaching procedures. The thought of adding the teaching of reading to their responsibilities causes teachers to throw up their hands in absolute despair.

Many content teachers feel that an emphasis on reading instruction would jeopardize students' understanding of the subject, because the time available for learning content would be diminished. This concern tends to be prevalent among elementary as well as secondary school teachers. It seems that as long as teachers feel pressed by the demands to "cover" a subject, they will continue to view related reading instruction as an intrusion and resist devoting curriculum time to reading skills instruction.

In summary then, it is obvious that the erroneous supposition underlying these problems is the assumption that teaching the content of a subject and teaching the skills that are related to the subject are somehow separate
entities. Several educators have presented a clear understanding of the problem. According to Austin and Morrison (1963), "Teachers reportedly do not have sufficient time to 'teach everything' and, unaware that a dichotomy need not exist, feel it more important to cover the content than to teach the reading skills in the content areas." Research evidence shows that reading and study skills related to a course need not be taught in isolation, as an appendage to the curriculum (Herber, 1964; Bond and Tinker, 1957). Research by Braam and Reehm (1964) indicates that skills can be taught simultaneously with the course content; content and process need not be separated. Subject-area teachers have been urged to do this for many years; however, surveys rarely reveal this kind of instruction being practiced. As far as teaching reading in content areas goes, the gap between what is known and what is practiced is most unfortunate.

Definition--reading through content

For most educators, the concepts associated with the teaching of reading in content areas is still quite unclear. There is a definite difference between teaching reading in a reading class and in a content class. If and when this distinction is generally understood, confusion should fade, and content teachers should be more inclined to engage in "reading instructions." Operationally, one of the most satisfactory ways to define teaching reading through content is to compare
the responsibilities of the reading teacher with those of the content teacher. Each has a different curriculum to teach and a concomitant set of skills to develop.

The reading teacher's curriculum usually consists of a set of reading skills. The reading teacher strives to develop students' interests in the use of these skills to expand their concepts, appreciations, and understandings of life around them, but his primary responsibility is to teach the skills. The successful reading teacher analyzes the needs of students in his classes, and this analysis determines the sequence for a given student, as well as the level of sophistication at which the skill or skills should be taught.

Usually these teachers select reading material through which they can teach the skill and through which students can practice the skill after they have received the initial instruction. In most instances, the content of the material is not of primary concern. Generally, it is assumed that the material is interesting and informative. The content can be related to any curricular areas in the school or it can be general material that has no bearing on a specific content area. It is important to understand that teachers do not teach the "content" of the material, but develop understanding of the processes being applied to these materials.

On the contrary, content teachers have a set of ideas, concepts or facts as their curriculum. These ideas, concepts and facts have order and definite relationships existing among
them. Content teachers are trained to establish a sequence for these ideas based on logic, study, and experience. In addition, they are expected to assess the needs of their students, and make judgements about where in the sequence of a curriculum the students require instruction. Consequently, they are trained to plan a teaching program accordingly.

Herber (1970) argues that content teachers are generally weak in specific reading concepts; need more exposure to specific ideas; and must have the perception to see relationships among various principles. Herber (1970) asserts:

...content teachers find materials (or select parts from their textbooks, if that is all they have available) which contain the information and ideas they want their students to encounter, understand and use. They are not primarily concerned with the skills students must use in reading materials. When they teach the students how to acquire the information and ideas from an assigned selection, teachers have to be aware of the skills inherent in the selection. But those skills are not the reason for using that material... .

It is assumed that content teachers teach students only the skills their curriculum calls for them to understand. Many educators feel that they should not teach a reading skill for its own sake, as does the reading teacher. It is further felt that content teachers do not concern themselves with the sequential development of reading skills, but with the sequential development of ideas. Skills are developed functionally, not directly. The skills to be taught are determined by the content of the material assigned for a given lesson, never in reverse (Herber, 1970).
Herber (1970) concludes by summarizing his ideas about the difference between reading teachers and content teachers.

...the reading teachers say: I have to teach these skills. What materials can I use to give instruction and provide practice on these skills? I don't care what the subject matter is just as long as the students have to use these skills in order to understand what they read.

And so the reading teacher finds the material, teaches the skills, and has the students engage in re-enforcing practice. He hopes, of course, that the students will transfer these skills to their subjects and that instruction they receive in reading class will help with assigned readings in each of their courses.

Meanwhile, the content teachers say: I have these ideas to get across to my students and this text—or these texts—develop the idea quite well. I'll assign this material for homework so students, through their readings, will develop some understanding of these ideas. Now, in order for them to develop and use these ideas, there is a specific skill that the students have to use. It isn't the "main idea," because the mere apprehension of the central thought is not the key to understanding this concept; nor is it "inference," because the author is rather straightforward in his statements; nor is it "recognition of assumption," because the author has identified his premises and has not relied on assumptions. No, in this particular selection the students have to read to "evaluate argument," and so that's the skill I will discuss with them for a moment before they begin reading the selection. Some of them will need more assistance than others so I'll have to provide a bit more guidance for them, but all of the students will have to employ this skill...

In summary, Herber's position is that the differences between the reading teacher and the content teacher are with respect to teaching methodology and emphasis. He further asserts that the cliché:
Every teacher is a teacher of reading has been interpreted by content teachers in light of the reading teacher's role and responsibility for teaching reading. . . . Content teachers have rejected that role and rightly so. He also takes the position that, unfortunately, there has been a concerted effort to force on all content teachers the directed reading instruction properly engaged in by the reading teacher (Herber, 1970).

He concludes his arguments by expressing the feeling that there is no place for reading instruction, as reading teachers generally employ it, in content areas. Accordingly, in his opinion, there is a need for a whole new strategy in teaching reading through content areas. Such a strategy should use what is known about the direct teaching of reading and adapt that knowledge to fit the structures of and responsibilities for all curricula materials. Basic and supplementary texts can be used as vehicles for reading instructions in each content area with teachers showing students how to become successful readers of the required materials.
CHAPTER III
METHOD AND PROCEDURES

Massachusetts Eighth Grade Testing Program--1971

The State Department of Education pursues a testing program: (1) to obtain objective information on the status of education in the Commonwealth... (2) to anticipate increasingly detailed reporting requirements concerning Federal programs and (3) to more objectively determine the educational needs of children throughout the Commonwealth. (R & D, Department of Education)

During the last decade, the Department of Education in the Commonwealth of Massachusetts developed a Reading Curriculum Guide. The major emphasis of the reading program was to encourage each public school student to reach his full potential in the area of communication. Commissioner Neil V. Sullivan stated at that time:

...since one of the cornerstones of communication is undeniably the ability to read, to understand, and to react to printed materials, we find ourselves reexamining the traditional methods and goals of reading instruction.

The Reading Curriculum Guide was designed to assist local administrators, supervisors, and teachers to identify and to assess students' skills and attitudes.

Locale

In this study the investigator used the data bank obtained during the Massachusetts Eighth Grade Testing Program in January, 1971. The testing program was carried
out under the sponsorship of the Massachusetts State Board of Education. During that period there were 324 school systems in the Commonwealth with 1488 schools and approximately 85,382 students.

Sample

The information used in this study was data compiled from a summary of students who participated in the Massachusetts Eighth Grade Reading Program in January, 1971. At that time, 10 per cent of all the eighth grade students in the public schools were tested.

In an attempt to assure greater representation of various elements of the school population, the Massachusetts Department of Education divided all eighth graders into sub-populations called strata. Each stratum was represented in the sample by a predetermined number of cases relative to occurrence in the population. Theoretically, stratification creates homogeneous groupings with respect to certain characteristics, enabling more complete representation from each stratum. When applying stratification to statewide testing programs, two critical variables considered were system size and geographic location.

The sample of students used in this study was drawn from 57 schools representing 46 school districts. Table 1 indicates that when the testing program was undertaken there were 39,512 students attending the schools represented in
### TABLE I

STUDENT CHARACTERISTICS REFLECTED IN SAMPLE

<table>
<thead>
<tr>
<th></th>
<th>No. Districts/Schools in Study</th>
<th>Total No. in Sample</th>
<th>Mean</th>
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<td>Student Population for School Districts</td>
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<tr>
<td>Minority Student Population for School District</td>
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<td>6,335.74</td>
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<tr>
<td>Student Population for Schools</td>
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<tr>
<td>Minority Student Population for Schools</td>
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<td>32.66</td>
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<tr>
<td>Number of Students Tested</td>
<td>57</td>
<td>11,202</td>
<td>196.50</td>
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</table>
this study. Table 1 also reflects that 11,202 (28.35 per cent) of the sample student population participated in the testing program. It should be noted that 3,652 (32.60 per cent) of the students tested were attending schools serving ESEA families.

Table 2 reflects a distribution of white and non-white students in the 57 schools used in this study. This Table indicates that 1,862 (4.71 per cent) minority students were enrolled in the schools at the time testing was conducted. Of the 1,862 minority students in the sample, 1,056 (56.71 per cent) were attending eight schools located in the city of Boston.

Test instruments

The Reading Curriculum Advisory Committee developed guidelines for behavioral objectives and vocabulary development as well as a taxonomy of reading comprehension for all public schools in the Commonwealth. The factors that comprised the taxonomy for reading comprehension were:

1. Literal - The ability to locate specific information
2. Interpretation - The ability to make reasonable inferences on materials read
3. Critical - The ability to interpret traits in characters, mood and tone of selection, and the ability to read and evaluate figurative expressions
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<th>No. of Non-White Students</th>
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<td>No. of Non-White Students</td>
<td>Total</td>
<td>Per Cent Non-White</td>
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<td>987</td>
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<td>531</td>
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<td>700</td>
<td>.0</td>
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<td>52</td>
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<td>1,161</td>
<td>3.3</td>
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<tr>
<td>53</td>
<td>272</td>
<td>22</td>
<td>294</td>
<td>7.5</td>
</tr>
<tr>
<td>54</td>
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</tr>
<tr>
<td>55</td>
<td>672</td>
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<td>672</td>
<td>.0</td>
</tr>
<tr>
<td>56</td>
<td>1,161</td>
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<td>1,189</td>
<td>2.4</td>
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<td>1,1063</td>
<td>70</td>
<td>1,133</td>
<td>6.2</td>
</tr>
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<td>Total</td>
<td>37,650</td>
<td>1,862</td>
<td>39,512</td>
<td>4.71</td>
</tr>
</tbody>
</table>

4. Imagery - The ability to react to materials by forming mental images of sight, sound, touch, taste, and smell

5. Organization - The ability to recognize relationships, use time order, rank, and the use of comparison, etc

6. Association - The ability to relate what is being read to real or vicarious experiences in reading

7. Evaluation - The ability to read critically
Instruments selected to test eighth grade students in public schools were the Comprehensive Tests of Basic Skills (CTBS) and the Short Form Test of Academic Aptitude (SFTAA), published by CTB/McGraw-Hill. CTBS provided information on levels of mastery for both learning content and process areas. When used in relation with SFTAA, CTBS provided information on actual or "obtained" achievement compared with potential or "anticipated" achievement for individuals, classes, schools and systems. The "anticipated" achievement scores are interpreted as the expected level of achievement on CTBS based upon performance of the student on the California Test of Mental Maturity-Short Form using a multiple regression formula. In reference to the reading curriculum, the key questions to be answered by the testing program were:

1. What are the levels of mastery of basic reading skills in Massachusetts eighth grades?

2. Are there differences between reading skills and other content skills?

3. What educational needs can be inferred for Massachusetts students based on basic reading skills testing?

4. Are there regional variations in reading abilities and achievement?
The reading test of the Comprehensive Tests of Basic Skills is designed for grades 2.5-4, 4-6, 6-8, and 8-10. It is a group survey test yielding conventional scores for vocabulary, comprehension, and total reading. As such, its value lies in evaluating total groups with respect to general level of reading skill and in selecting cases of reading disability which are in need of more intensive diagnosis (Buros, 1972).

The CTBS is designed to measure the extent to which students have acquired skills that are required for effective use of language and numbers in everyday living, and for further academic study. The items measuring these skills are classified by intellectual processes and content in the areas of Reading, Language, Arithmetic, and Study Skills, so that results are readily usable in further educational planning, instruction, and guidance of students. As part of a series that is scaled continuously from Grade 2.5 through Grade 10, the CTBS provides a basis for individual and group growth comparison over an extended period of time (Buros, 1972).

The reading area contains a 40-item Vocabulary test and a 45-item Comprehension test. The Vocabulary test presents in context, words in common use and the correct responses are words that mean the same or about the same as
the word in the stem. The Comprehension test was based upon stories, articles, poems, letters, and ads, all on topics of general interest to students. The two Reading tests are independently timed and normed, and may be used separately (Buros, 1972).

CTBS limits its assessment to a systematic measurement of the following basic skills requisites: (1) studying and learning in subject-matter courses and (2) the effective use of language. Reading is divided into the following categories of vocabulary and reading comprehension:

1. Recognition - Literal meaning
2. Translation
   a. Simple rewording
   b. Paraphrasing
3. Interpretation
   a. Main idea
   b. Relationships
   c. Conclusions
   d. Inferences
4. Analysis
   a. Extended meaning
   b. Author's intention
The Short Form Test of Academic Aptitude provides an index of general academic aptitude for use throughout the school years. This set of aptitude measures may be used to predict academic success as measured by achievement tests or other appropriate indicators. Prediction of academic success may be accomplished without reference to Intelligence Quotients (I.Q.'s). The SFTAA has been designed so that it can normally be administered in one class period. It is divided into five levels which span Grades 1.5-12 (Buros, 1972).

The SFTAA comprises four sub-tests—Vocabulary, Analogies, Sequences, and Memory. The scores can be combined to yield separate measures of language and non-language aptitudes as well as one general measure of academic aptitude. Some measurement authorities feel that I.Q.'s are subject to misinterpretation and misuse, especially with cultural subgroups which are significantly different from the norming population. A unique feature of the SFTAA is that results may be reported in terms of a Reference Scale Score (RSS) in lieu of, or in addition to, I.Q. scores. The RSS is particularly useful in conducting mental growth studies for an individual, and in charting the relative development of language and non-language abilities (Buros, 1972).
Definition of Terms

Language

Those items that examine the extent to which students have the ability to: (1) select the word, phrase, or sentence which provides the greatest clarity and/or economy of expression; (2) to comprehend sentence meaning and perceive appropriate relationships; (3) convert concepts presented in graphic form (e.g., prose, poetry, etc.) and understand their interrelationship; and (4) recognize and interpret an author's implication (e.g., tone, mood, and form) and select appropriate paraphrased expressions.

Science

Those items that assess the student's ability to: (1) establish categories and classify objects or activities into categories; (2) quantify data by observing size, reading scales, etc.; (3) summarize or interpret data by recognizing trends; and (4) recall and/or apply scientific information.

Social Studies

Those items that measure the student's ability to analyze or interpret data concerning social studies problems, to select the best sources for acquiring new data, or to recall and/or apply facts, terms, theories, or concepts.
School performance

Although performance in school can be variously defined, it is used here to refer primarily to performance on standardized tests of school achievement.

Elementary and Secondary Education Act of 1965--Title I

This refers to the Federally funded aid-to-education program developed to support special programs for low-income families. It is a supplementary program, designed to upgrade the educational opportunities of children from poor families.

Ethnicity

This term refers to commonly recognized population differences that may be characterized as cultural or racial, but not as social or economic.

Statement of the Hypotheses

As previously mentioned, the primary purpose of this study was operationalized by examining performance on the Comprehensive Tests of Basic Skills vis a vis specific subject areas. In general, this study examined the extent to which the number of correct responses to a standardized reading comprehension test varied among specific sub-test content areas--e.g., science, social studies, and other selected content areas.
In pursuance of the primary aim of this study, the major hypotheses were stated in the null form. That is, there would be no statistically significant differences between comparative groups. The specific hypotheses were:

1. There would be no statistically significant difference in the per cent of correct responses for the three content areas between students who attended ESEA schools and students who attended non-ESEA schools.

2. There would be no statistically significant difference in the per cent of correct responses among the three content areas for students who attended ESEA schools.

3. There would be no statistically significant difference in the per cent of correct responses among the three content areas for students who attended non-ESEA schools.

4. There would be no statistically significant difference in the per cent of correct responses for the three content areas between students who attended selected Boston schools and students who attended selected ESEA schools.

5. There would be no statistically significant difference in the per cent of correct responses among the three content areas for students who attended selected schools in Boston.
6. There would be no statistically significant difference in the per cent of correct responses for the three skill areas between students who attended selected schools with special science programs and students who attended selected schools without special science programs.

7. There would be no statistically significant difference in the three content areas between students who attended selected schools in Boston and students who attended selected schools with special programs in science.

**Statistical Analysis**

In the initial analysis, Pearson's product-moment coefficient of correlation was used to examine the relationship among six selected variables. Basic coefficients were obtained by comparing each factor with every other factor. In different situations the coefficient of correlation varied from a value of +1.00, which means perfect positive correlation, through zero, which means complete independence or no correlation whatever, on down to -1.00, which means perfect negative correlation (Guilford, 1965). The six variables used in the correlational matrix were:

1. Student population per school
2. Student population per school district/system
3. Minority students per school district/system
4. Non-verbal I.Q.
5. Verbal I.Q.
6. Total I.Q.

A second analysis was conducted by obtaining weighted means of the percent of correct responses for all test items, because the number of students tested varied among the schools used in this study. Means were weighted according to the number of students per school responding to specific test items from which the means were derived. Weighted means were obtained for skill areas that contained test items designed to examine performance across three content areas. The skill areas were:

1. Main Idea
   a. Science content
   b. Language
   c. Social Studies

2. Relationships
   a. Science content
   b. Language
   c. Social Studies

3. Extended Meaning
   a. Science content
   b. Language
   c. Social Studies
The following formula was used to obtain means of percentages where N's differed (Guilford, 1965).

\[ w_p = \frac{\sum N_i P_i}{N} \]

where \( N_i \) = number in each sample

\( P_i \) = percentage for each sample

\( \sum N_i P_i \) = sum of products of each percentage times its corresponding N

\( N_i \) = sum of the sample N's

Standard deviations were obtained for all of the obtained weighted means. Lastly, a test of significance through use of Fisher's \( \tilde{z} \) ratio was used to examine the assumptions of the null hypothesis with regard to the observed proportions used in this study and to obtain one estimate of the population variance (Guilford, 1965).
CHAPTER IV
ANALYSIS OF DATA

In this chapter the investigator examines the data related to performance on the Comprehensive Test of Basic Skills Reading Comprehension Test. Performance, the dependent variable, is herein defined as the per cent of correct responses for three skill areas occurring throughout the reading sub-test content areas--i.e., science, language, and social studies. Selected variables will be discussed as the investigator examines the extent to which performance varies among the students who participated in the Massachusetts Eighth Grade Reading Program, conducted in January, 1971.

It should be noted that the analysis of data was conducted to attain additional information about the consistency of reading performance in three content areas, by tests purportedly designed to measure reading skills. Hopefully, the analysis will provide the investigator with additional information about: (1) how well students demonstrate reading skills they are taught; (2) the degree of specificity in factors relating to reading comprehension in the three content areas, respectively; and (3) the relationships among selected variables, so that students can be helped
to learn more efficiently in a given subject area.

This chapter is divided into six parts. The first part includes an analysis of the data derived from the total population, which includes comparisons between ESEA Title I schools and non-ESEA Title I schools. The second part includes an analysis of data derived from the sub-sample of ESEA Title I schools. The analysis of data in the third part was derived from the sub-sample of non-ESEA Title I schools. The fourth part contains an analysis of data from the sub-sample of students from the Boston schools. The analysis of data in the fifth part was derived from the sub-sample of schools with special programs in science. The sixth part contains a comparison of performance among the Boston schools, ESEA Title I schools, and schools with special science programs.

Part I--Total Sample of Schools

Correlation among school characteristics

The Pearson Product-Moment coefficient of correlation was used to examine the relationship among six variables for the total sample of schools. The results of the comparisons are presented in Table 3.

The comparisons in Table 3 reflect some interesting relationships. There was an inverse relationship between the student population in a school district and I.Q. The coefficient \( r = -0.38 \) between the number of students per
<table>
<thead>
<tr>
<th></th>
<th>Student Population Per School</th>
<th>Student Population Per District/System</th>
<th>Minority Students Per District/System</th>
<th>Non-verbal I.Q.</th>
<th>Verbal I.Q.</th>
<th>Total I.Q.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Population Per School</td>
<td>1</td>
<td>NS</td>
<td>NS</td>
<td>.15</td>
<td>.07</td>
<td>.11</td>
</tr>
<tr>
<td>Student Population Per District/System</td>
<td>1</td>
<td>.96</td>
<td>-.38</td>
<td>-.19</td>
<td>-.28</td>
<td></td>
</tr>
<tr>
<td>Minority Students Per District/System</td>
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<td>-.32</td>
<td>-.13</td>
<td>-.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Verbal I.Q.</td>
<td></td>
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<td></td>
<td>.85</td>
<td>.95</td>
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<tr>
<td>Verbal I.Q.</td>
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<td></td>
<td></td>
<td></td>
<td>.97</td>
<td></td>
</tr>
<tr>
<td>Total I.Q.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 112; P > .05 = .25; P > .01 = .32
school district and Normal I.Q. was statistically significant at less than the .01 level of confidence. Likewise, the relationship between the student population per school district and Total I.Q. \((r = -.28)\) was statistically significant at the .05 confidence level. These data suggest that the larger the student population per school district, the lower the I.Q. performance.

The findings in Table 3 also indicate that there was a similar inverse relationship between the minority population per school district and I.Q. The relationship between the number of minorities per school district and Normal I.Q. \((r = -.32)\) was statistically significant at the .01 level of confidence. The relationship between minority population per school district and Total I.Q., though not statistically significant, approached the .05 level of confidence. These two findings strongly suggest that the larger the minority population per school district, the lower the I.Q. performance in reading.

**Hypothesis I**

The first hypothesis states that there will be no statistically significant difference in the per cent of correct responses for the three content areas between students who attended ESEA schools and students who attended non-ESEA schools. Fisher's \(\tilde{z}\) ratio was used to examine the difference among weighted mean proportions (12 variables)
between ESEA Title I schools and non-ESEA Title I schools. The results of these comparisons are presented in Table 4.

The results in Table 4 indicate that there were no statistically significant differences either for the three skill areas, or for the respective content areas, between students who attended ESEA Title I schools and students who attended non-ESEA Title I schools. These results indicate that students from non-ESEA Title I schools performed no better (i.e., per cent of correct responses on test items) than students from ESEA Title I schools. The largest means for correct responses occurred in language skills for both ESEA Title I school students and non-ESEA Title I school students. The lowest means for correct responses occurred in extended meaning skills for the social studies content area. Even though the performance between ESEA Title I school students and non-ESEA Title I school students did not differ, the range among mean per cent of correct responses for ESEA schools was greater than the range among the mean per cent of correct responses for non-ESEA schools. The findings in Table 4 support the first hypothesis.

Part II--Sub-Sample of ESEA Title I Schools

Hypothesis II

The second hypothesis states that differences for the mean per cent of correct responses in the three content areas for students who attended ESEA Title I schools will
# Table 4
A Comparison of the Per Cent of Correct Responses in Three Content Areas Among Students in ESEA Schools and Non-ESEA Schools

<table>
<thead>
<tr>
<th>Skills Tested</th>
<th>ESEA Title I Schools</th>
<th>Non-ESEA Title I Schools</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weighted Mean</td>
<td>SD</td>
<td>Weighted Mean</td>
</tr>
<tr>
<td>Main Idea</td>
<td>60.41</td>
<td>7.30</td>
<td>60.00</td>
</tr>
<tr>
<td>Science</td>
<td>50.06</td>
<td>14.43</td>
<td>48.81</td>
</tr>
<tr>
<td>Language</td>
<td>62.35</td>
<td>7.61</td>
<td>63.67</td>
</tr>
<tr>
<td>Social Studies</td>
<td>50.96</td>
<td>12.73</td>
<td>52.49</td>
</tr>
<tr>
<td>Relationship</td>
<td>58.07</td>
<td>8.00</td>
<td>57.80</td>
</tr>
<tr>
<td>Science</td>
<td>57.64</td>
<td>9.82</td>
<td>58.51</td>
</tr>
<tr>
<td>Language</td>
<td>66.30</td>
<td>6.37</td>
<td>64.39</td>
</tr>
<tr>
<td>Social Studies</td>
<td>42.50</td>
<td>11.18</td>
<td>43.20</td>
</tr>
<tr>
<td>Extended Meaning</td>
<td>46.57</td>
<td>6.13</td>
<td>47.33</td>
</tr>
<tr>
<td>Science</td>
<td>50.00</td>
<td>2.24</td>
<td>51.71</td>
</tr>
<tr>
<td>Language</td>
<td>50.52</td>
<td>5.12</td>
<td>50.86</td>
</tr>
<tr>
<td>Social Studies</td>
<td>31.32</td>
<td>10.72</td>
<td>32.34</td>
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</table>

N = 22
N = 35
not be statistically significant. Table 5 reflects a comparison of mean percentage of correct responses for three skill areas occurring throughout science and language content areas. None of the mean differences were statistically significant. However, the mean percentage of correct responses tended to be higher in the language content area than in the science content area. The largest mean for correct responses occurred in relationship skills for both the science and language content areas. The range among mean per cent of correct responses in the language content area was much higher than the range for mean per cent of correct responses in the science content area.

**TABLE 5**

A COMPARISON OF PER CENT OF CORRECT RESPONSES FOR SKILLS IN SCIENCE AND LANGUAGE CONTENT AREAS AMONG STUDENTS IN ESEA TITLE I SCHOOLS

<table>
<thead>
<tr>
<th>Skills Tested</th>
<th>Science Weighted Mean</th>
<th>SD</th>
<th>Language Weighted Mean</th>
<th>SD</th>
<th>M'd</th>
<th>z</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Idea</td>
<td>50.06</td>
<td>14.43</td>
<td>62.35</td>
<td>7.61</td>
<td>-.12</td>
<td>.80</td>
<td>NS</td>
</tr>
<tr>
<td>Relationship</td>
<td>57.64</td>
<td>9.82</td>
<td>66.30</td>
<td>6.37</td>
<td>-.08</td>
<td>.53</td>
<td>NS</td>
</tr>
<tr>
<td>Extended Meaning</td>
<td>50.00</td>
<td>2.24</td>
<td>50.52</td>
<td>5.12</td>
<td>-.01</td>
<td>.06</td>
<td>NS</td>
</tr>
</tbody>
</table>

N = 22
The results of a comparison of mean percentage of correct responses for three skill areas occurring throughout science and social studies content areas are presented in Table 6. While none of the mean differences were statistically significant, the general overall performance in the science content area was greater than the performance in the social studies content area. The mean per cent of correct responses in relationship skills and extended meaning skills was much higher in the science content area than in the social studies content area. For example, the $z$ ratio of 1.90 for the mean difference between science content and social studies content for extended meaning skills was less than the .10 level of confidence and just shy of being significant at the .05 confidence level. The largest mean per cent of correct responses showed up in relationship skills for both science and social studies content areas. The range among the mean per cent of correct responses was much greater in the social studies content area than in the science content area.
Table 6 contains the data for mean differences between social studies and language content areas. It is quite obvious that the ESEA Title I school students performed much better in the language content area than in the social studies content area. The results for relationship skills indicated that the students performed at a statistically significant higher level in language content than in science content. This difference was significant at less than the .05 level of confidence. Similar results were obtained for extended meaning skills. The students performed at a higher level in language content than in science content. Again, the difference between mean performance was statistically significant at the .05 level of confidence. The largest mean per cent of correct responses occurred in main idea skills.
for both content areas. On the other hand, the lowest mean per cent of correct responses occurred in extended meaning skills for both content areas. The range among the mean per cent of correct responses was much greater in the social studies content area than in the language content area.

TABLE 7
A COMPARISON OF PER CENT OF CORRECT RESPONSES FOR SKILLS IN SOCIAL STUDIES AND LANGUAGE CONTENT AREAS AMONG STUDENTS IN ESEA TITLE I SCHOOLS

<table>
<thead>
<tr>
<th>Skills Tested</th>
<th>Social Studies Weighted Mean</th>
<th>SD</th>
<th>Language Weighted Mean</th>
<th>SD</th>
<th>M_d</th>
<th>z</th>
<th>Level of Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Idea</td>
<td>50.96</td>
<td>12.23</td>
<td>62.35</td>
<td>7.61</td>
<td>-.11</td>
<td>1.10</td>
<td>NS</td>
</tr>
<tr>
<td>Relationship</td>
<td>42.50</td>
<td>11.18</td>
<td>66.30</td>
<td>6.37</td>
<td>-.23</td>
<td>2.30</td>
<td>.05</td>
</tr>
<tr>
<td>Extended Meaning</td>
<td>31.32</td>
<td>31.32</td>
<td>50.52</td>
<td>5.12</td>
<td>-.20</td>
<td>2.00</td>
<td>.05</td>
</tr>
</tbody>
</table>

N = 44

The analysis of the mean per cent of correct responses for students who attended ESEA Title I schools showed evidence of differential performance for certain skills and across the social studies and language content areas. Even though most of the mean differences were not statistically significant, the ones that were suggest that the second hypothesis be rejected. Therefore, the alternate hypothesis is then accepted: that in certain situations, students who attended
ESEA Title I schools will perform at a statistically significant higher level of performance in one content area than in another content area.

Part III--Sub-Sample of non-ESEA Title I Schools

Hypothesis III

The third hypothesis asserts that there will be no statistically significant difference for the mean per cent of correct responses in the three content areas among students who attended non-ESEA Title I schools. Table 8 contains data reflecting mean differences in the per cent of correct responses for three skill areas occurring throughout science and language content areas. None of the mean differences were statistically significant. However, it should be noted that for main idea skills and relationship skills, students who attended non-ESEA Title I schools tended to perform better in the language content area than in the science content area. The largest means for per cent of correct responses occurred in relationship skills for both science and language content areas. The range among mean per cent of correct responses in the language content area was larger than the range of mean per cent of correct responses in the science content area.
Table 9 reflects an analysis of the mean performance in three skills occurring throughout social studies and science content areas. For extended meaning skills, the students performed better in the science content area than in the social studies content area. This difference was statistically significant at the .05 level of confidence. Though not statistically significant, similar results were obtained for relationship skills. The range among mean per cent of correct responses in the social studies content area was greater than the range of mean per cent of correct responses in the science content area.
TABLE 9
A COMPARISON OF PER CENT OF CORRECT RESPONSES FOR SKILLS IN SOCIAL STUDIES AND SCIENCE CONTENT AREAS AMONG STUDENTS IN NON-ESEA TITLE I SCHOOLS

<table>
<thead>
<tr>
<th>Skills Tested</th>
<th>Social Studies Weighted Mean</th>
<th>SD</th>
<th>Science Weighted Mean</th>
<th>SD</th>
<th>$M_d$</th>
<th>$z$</th>
<th>Level of Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Idea</td>
<td>52.49</td>
<td>13.51</td>
<td>48.81</td>
<td>7.45</td>
<td>.03</td>
<td>.30</td>
<td>NS</td>
</tr>
<tr>
<td>Relationship</td>
<td>43.20</td>
<td>11.25</td>
<td>58.51</td>
<td>12.72</td>
<td>-.16</td>
<td>1.60</td>
<td>NS</td>
</tr>
<tr>
<td>Extended Meaning</td>
<td>32.34</td>
<td>9.07</td>
<td>51.71</td>
<td>14.56</td>
<td>-.20</td>
<td>2.00</td>
<td>.05</td>
</tr>
</tbody>
</table>

$N = 35$

The results in Table 10 indicate that the students who attended non-ESEA Title I schools perform better in the language content area than in the social studies content area. For two of the skill areas, the difference between mean per cent of responses was statistically significant. The results for both relationship skills and extended meaning skills were significant at the .05 level of confidence. The largest mean per cent of correct responses occurred in main idea skills for both content areas. The range among mean per cent of correct responses was greater in the social studies content area than in the language content area.

The results obtained for the sub-sample of non-ESEA Title I schools indicate that, for selected content areas, students performed better in some content areas than in others. Consequently, the third hypothesis is rejected.
TABLE 10
A COMPARISON OF PER CENT OF CORRECT RESPONSES FOR SKILLS IN SOCIAL STUDIES AND LANGUAGE CONTENT AREAS AMONG STUDENTS IN NON-ESEA TITLE I SCHOOLS

<table>
<thead>
<tr>
<th>Skills Tested</th>
<th>Social Studies Weighted</th>
<th>Language Weighted</th>
<th>Md</th>
<th>z</th>
<th>Level of Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Main Idea</td>
<td>52.49</td>
<td>13.51</td>
<td>63.67</td>
<td>11.18</td>
<td>-.12</td>
</tr>
<tr>
<td>Relationship</td>
<td>43.20</td>
<td>11.25</td>
<td>64.39</td>
<td>8.74</td>
<td>-.21</td>
</tr>
<tr>
<td>Extended Meaning</td>
<td>32.34</td>
<td>9.07</td>
<td>50.86</td>
<td>8.21</td>
<td>-.19</td>
</tr>
</tbody>
</table>

N = 35

An alternative hypothesis would be more appropriate: that students will attain higher levels of performance in one content area more so than in another content area.

Part IV--Sub-sample of Boston Schools

Hypothesis IV

The fourth hypothesis states that there will be no statistically significant difference in the per cent of correct responses for the three content areas, between students who attended selected Boston schools and students who attended selected ESEA schools. Table 11 contains the results for comparisons between the Boston schools and ESEA Title I schools. None of the differences for mean performances between students who attended the Boston schools and
meaning skills in both the science and social studies content areas.

TABLE 12

A COMPARISON OF PER CENT OF CORRECT RESPONSES FOR SKILLS IN SCIENCE AND SOCIAL STUDIES CONTENT AREAS AMONG STUDENTS IN THE BOSTON SCHOOLS

<table>
<thead>
<tr>
<th>Skills Tested</th>
<th>Science Weighted Mean</th>
<th>SD</th>
<th>Social Studies Weighted Mean</th>
<th>SD</th>
<th>M</th>
<th>z</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Idea</td>
<td>45.20</td>
<td>11.01</td>
<td>35.66</td>
<td>3.87</td>
<td>.09</td>
<td>.50</td>
<td>NS</td>
</tr>
<tr>
<td>Relationship</td>
<td>39.78</td>
<td>11.95</td>
<td>27.41</td>
<td>5.29</td>
<td>.13</td>
<td>.72</td>
<td>NS</td>
</tr>
<tr>
<td>Extended Meaning</td>
<td>33.78</td>
<td>4.12</td>
<td>26.20</td>
<td>7.87</td>
<td>.08</td>
<td>.44</td>
<td>NS</td>
</tr>
</tbody>
</table>

N = 7

Table 13 contains data for mean performances in language skills and science skills. The differences among the mean percentages of correct responses between language content and social studies content were not statistically significant. The Boston students performed consistently better in the language content area than in the social studies content area. The poorest performance, for both content areas, occurred in extended meaning skills rather than in the other skill areas. The range among mean per cent of correct responses was greater in the language content area than in the social studies content area.
A COMPARISON OF THE PERCENT OF CORRECT RESPONSES FOR THE THREE CONTENT AREAS BETWEEN STUDENTS WHO ATTENDED SELECTED SCHOOLS WITH SPECIAL SCIENCE PROGRAMS AND STUDENTS WHO ATTENDED SELECTED SCHOOLS WITHOUT SPECIAL SCIENCE PROGRAMS

<table>
<thead>
<tr>
<th>Skills Tested</th>
<th>Schools With Special Programs in Science</th>
<th>Schools Without Special Programs in Science</th>
<th>Weighted Mean</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Idea</td>
<td>57.70</td>
<td>57.77</td>
<td>12.74</td>
<td>NS</td>
</tr>
<tr>
<td>Science</td>
<td>60.55</td>
<td>61.17</td>
<td>14.85</td>
<td>NS</td>
</tr>
<tr>
<td>Language</td>
<td>63.18</td>
<td>60.83</td>
<td>11.36</td>
<td>NS</td>
</tr>
<tr>
<td>Social Studies</td>
<td>49.73</td>
<td>51.31</td>
<td>2.00</td>
<td>.02</td>
</tr>
<tr>
<td>Relationship</td>
<td>53.38</td>
<td>56.42</td>
<td>5.17</td>
<td>.03</td>
</tr>
<tr>
<td>Science</td>
<td>56.85</td>
<td>60.90</td>
<td>10.17</td>
<td>.04</td>
</tr>
<tr>
<td>Language</td>
<td>63.03</td>
<td>64.75</td>
<td>6.66</td>
<td>.02</td>
</tr>
<tr>
<td>Social Studies</td>
<td>40.26</td>
<td>43.61</td>
<td>3.23</td>
<td>.03</td>
</tr>
<tr>
<td>Extended Meaning</td>
<td>42.32</td>
<td>49.15</td>
<td>7.75</td>
<td>.07</td>
</tr>
<tr>
<td>Science</td>
<td>47.56</td>
<td>53.36</td>
<td>7.70</td>
<td>.06</td>
</tr>
<tr>
<td>Language</td>
<td>50.45</td>
<td>61.23</td>
<td>10.85</td>
<td>.11</td>
</tr>
<tr>
<td>Social Studies</td>
<td>28.95</td>
<td>32.87</td>
<td>4.92</td>
<td>.09</td>
</tr>
</tbody>
</table>

N = 14

TABLE 15
TABLE 13
A COMPARISON OF PER CENT OF CORRECT RESPONSES FOR SKILLS IN LANGUAGE AND SOCIAL STUDIES CONTENT AREAS AMONG STUDENTS IN THE BOSTON SCHOOLS

<table>
<thead>
<tr>
<th>Skills Tested</th>
<th>Language Mean</th>
<th>Language SD</th>
<th>Social Studies Mean</th>
<th>Social Studies SD</th>
<th>M_d</th>
<th>z</th>
<th>Level of Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Idea</td>
<td>47.91</td>
<td>12.21</td>
<td>35.66</td>
<td>3.87</td>
<td>.12</td>
<td>.67</td>
<td>NS</td>
</tr>
<tr>
<td>Relationship</td>
<td>51.79</td>
<td>5.69</td>
<td>27.41</td>
<td>5.29</td>
<td>.25</td>
<td>1.39</td>
<td>NS</td>
</tr>
<tr>
<td>Extended Meaning</td>
<td>38.10</td>
<td>8.69</td>
<td>26.20</td>
<td>7.87</td>
<td>.12</td>
<td>.67</td>
<td>NS</td>
</tr>
</tbody>
</table>

N = 7

The results of a comparison of mean percentage of correct responses for three skills occurring throughout science and language content areas for Boston students are presented in Table 14. There were no statistically significant differences among the mean per cent of correct responses between science and language content areas. In the science content area, Boston students performed best in main idea skills. In the language content area, the best performance occurred in relationship skills. For both content areas, the students did poorest in extended meaning skills than in the other skill areas.

In general, the Boston students performed best in main idea skills and poorest in extended meaning skills. In the content areas, the students performed better in language and poorer in social studies. Since there were no
TABLE 14

A COMPARISON OF PER CENT OF CORRECT RESPONSES FOR SKILLS IN SCIENCE AND LANGUAGE CONTENT AREAS AMONG STUDENTS IN THE BOSTON SCHOOLS

<table>
<thead>
<tr>
<th>Skills Tested</th>
<th>Science Weighted Mean</th>
<th>SD</th>
<th>Language Weighted Mean</th>
<th>SD</th>
<th>M_d</th>
<th>z</th>
<th>Level of Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Idea</td>
<td>45.20</td>
<td>11.01</td>
<td>47.91</td>
<td>12.21</td>
<td>.03</td>
<td>.17</td>
<td>NS</td>
</tr>
<tr>
<td>Relationship</td>
<td>39.78</td>
<td>11.95</td>
<td>51.79</td>
<td>5.69</td>
<td>-.12</td>
<td>.67</td>
<td>NS</td>
</tr>
<tr>
<td>Extended Meaning</td>
<td>33.78</td>
<td>7.14</td>
<td>38.10</td>
<td>8.69</td>
<td>-.04</td>
<td>.22</td>
<td>NS</td>
</tr>
</tbody>
</table>

N = 7

statistically significant differences among mean performances in the content areas, the fifth hypothesis is accepted.

Part V--Sub-Sample of Schools with Special Science Programs

Hypothesis VI

The sixth hypothesis states that there will be no statistically significant difference in the per cent of correct responses in three skill areas, between students who attended selected schools with special science programs and students who attended selected schools (randomly selected) without special science programs. The data in Table 15 indicate that the mean performances between students who attended schools with special science programs and students who attended schools without special science programs were
not statistically significant. Even though the differences were not significant, there were some interesting observations. For both groups of students, the highest mean percentage of correct responses occurred in main idea skills, while the lowest means occurred in extended meaning skills. Likewise, both groups performed worse in the social studies content area associated with extended meaning skills. The results in Table 15 suggest that the sixth hypothesis will be accepted.

**Hypothesis VII**

The seventh hypothesis asserts that there will be no statistically significant difference in the three content areas, between students who attended selected schools in Boston and students who attended selected schools with special programs in science.

Table 16 contains data for students who attended selected schools with special programs in science, and students who attended the Boston schools. None of the mean percentage of correct responses between schools with special programs in science, and the Boston schools, was statistically significant. Students attending schools with special programs in science performed consistently better than the students from the schools in Boston. Both groups performed better in main idea skills than the other skill areas. Performance for both groups was poorest in extended meaning
### TABLE 16

A COMPARISON OF THE PER CENT OF CORRECT RESPONSES FOR THE THREE CONTENT AREAS BETWEEN THE BOSTON SCHOOLS AND SELECTED SCHOOLS WITH SPECIAL PROGRAMS IN SCIENCE

<table>
<thead>
<tr>
<th>Skills Tested</th>
<th>Boston Schools</th>
<th>Schools With Special Programs in Science</th>
<th>$M_d$</th>
<th>$z$</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weighted Mean</td>
<td>Weighted Mean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main Idea</td>
<td>49.92</td>
<td>57.77</td>
<td>-0.08</td>
<td>.35</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>6.64</td>
<td>12.74</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td>45.20</td>
<td>61.17</td>
<td>-0.16</td>
<td>.70</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>11.01</td>
<td>11.62</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>47.91</td>
<td>60.83</td>
<td>-0.13</td>
<td>.56</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>12.21</td>
<td>14.85</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Studies</td>
<td>35.66</td>
<td>51.31</td>
<td>-0.16</td>
<td>.70</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>3.37</td>
<td>11.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship</td>
<td>39.66</td>
<td>56.42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8.69</td>
<td>5.17</td>
<td>-0.21</td>
<td>.91</td>
<td>NS</td>
</tr>
<tr>
<td>Science</td>
<td>39.78</td>
<td>60.90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.95</td>
<td>10.77</td>
<td>-0.13</td>
<td>.57</td>
<td>NS</td>
</tr>
<tr>
<td>Language</td>
<td>51.79</td>
<td>64.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.89</td>
<td>9.66</td>
<td>-0.17</td>
<td>.74</td>
<td>NS</td>
</tr>
<tr>
<td>Social Studies</td>
<td>27.41</td>
<td>43.61</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.29</td>
<td>6.23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended Meaning</td>
<td>32.69</td>
<td>49.15</td>
<td>-0.16</td>
<td>.70</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>7.14</td>
<td>8.78</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td>33.78</td>
<td>53.36</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.12</td>
<td>9.65</td>
<td>-0.20</td>
<td>.87</td>
<td>NS</td>
</tr>
<tr>
<td>Language</td>
<td>38.10</td>
<td>61.23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.69</td>
<td>8.08</td>
<td>-0.23</td>
<td>1.00</td>
<td>NS</td>
</tr>
<tr>
<td>Social Studies</td>
<td>26.20</td>
<td>32.87</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.87</td>
<td>5.29</td>
<td>-0.07</td>
<td>.30</td>
<td>NS</td>
</tr>
</tbody>
</table>

$N = 7$             $N = 14$
skills. Interestingly, the students from schools with special science programs did as well or better in language content areas as they did in the science content areas. In terms of the content areas, the best performance for both groups occurred in the language content area associated with relationship skills. On the contrary, the poorest performance, for both groups, occurred in the social studies content area associated with extended meaning skills. Because of the results contained in Table 16, the seventh hypothesis is accepted.

**National Norms**

For a summary, Table 17 is presented to show the mean percentage of correct responses for students from selected groups of schools and related national norms for the three skill areas. Main idea, relationship, and extended meaning are the skills occurring throughout the three content areas. A review of the data indicates that students from schools with special programs in science tended to perform at a level that was much closer to the national norms, than did students from schools in Boston, or those attending ESEA Title I schools. On the basis of overall performance, students from ESEA Title I schools were next in distance from the national norms. The Boston school students tended to be more distant from the national norms than the other students from selected schools represented.
### Table 17

A comparison of the per cent of correct responses across three content areas for students from selected groups of schools.

<table>
<thead>
<tr>
<th>Skills Tested</th>
<th>Boston Schools</th>
<th>ESEA Schools</th>
<th>Schools Special Science Programs</th>
<th>National Norm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Idea</td>
<td>49.92</td>
<td>60.41</td>
<td>57.80</td>
<td>60.7</td>
</tr>
<tr>
<td>Science</td>
<td>45.20</td>
<td>50.05</td>
<td>61.17</td>
<td>62.5</td>
</tr>
<tr>
<td>Language</td>
<td>47.91</td>
<td>62.35</td>
<td>60.83</td>
<td>66.5</td>
</tr>
<tr>
<td>Social Studies</td>
<td>35.66</td>
<td>50.96</td>
<td>51.31</td>
<td>53.0</td>
</tr>
<tr>
<td>Relationship</td>
<td>39.66</td>
<td>58.07</td>
<td>56.42</td>
<td>58.2</td>
</tr>
<tr>
<td>Science</td>
<td>39.78</td>
<td>57.64</td>
<td>60.90</td>
<td>63.0</td>
</tr>
<tr>
<td>Language</td>
<td>51.79</td>
<td>66.40</td>
<td>64.75</td>
<td>66.5</td>
</tr>
<tr>
<td>Social Studies</td>
<td>27.41</td>
<td>42.50</td>
<td>43.61</td>
<td>46.0</td>
</tr>
<tr>
<td>Extended Meaning</td>
<td>32.69</td>
<td>46.57</td>
<td>49.20</td>
<td>47.2</td>
</tr>
<tr>
<td>Science</td>
<td>33.78</td>
<td>50.00</td>
<td>53.36</td>
<td>57.0</td>
</tr>
<tr>
<td>Language</td>
<td>38.10</td>
<td>50.52</td>
<td>61.23</td>
<td>55.7</td>
</tr>
<tr>
<td>Social Studies</td>
<td>26.20</td>
<td>31.32</td>
<td>32.87</td>
<td>29.0</td>
</tr>
</tbody>
</table>

The performance of all three groups was higher for main idea skills than the other skill areas. Only the students from ESEA Title I schools approximated the national norms for this skill area. The lowest performance for the three groups of students occurred in extended meaning skills. The best performance for all three groups occurred in the science content areas associated with relationship skills. The poorest performance for all three groups occurred in the social studies content area associated with extended meaning.
CHAPTER V
CONCLUSIONS

Equal Educational Opportunity

A major problem in discussing equality of educational opportunity is settling on a definition of the term. To oversimplify greatly, equality of opportunity in the traditional sense implies that the same type of educational facilities should be made available on equal terms to all socio-economic classes. It is the chance to benefit that matters; what individuals and groups do with that opportunity is ultimately their business, not society's. There are no clear-cut strategies to ensure that outcomes will be equal among all identifiable social groups, but a loosely held belief indicates that if money or social class were not a formal barrier to entry into various types and stages of education, low-income people would get about as much out of the educational system as those in affluent communities, and any gap remaining would not be a severe or legitimate source of complaint (Carney, 1972).

The 1965 Elementary and Secondary Education Act (ESEA) was one of the major Federal programs designed to address itself to the educational problems of the poor. Title I was the heart of this Act. The central thrust of Title I was to reduce poverty through educational opportunity. The underlying
notion is familiar: poor children given the opportunity to do well in school will improve their lot as adults. By allocating extra funds to state and local agencies, the intent of Title I was to expand and improve elementary and secondary school programs for educationally deprived children in low-income areas. In this Act an educationally deprived child was defined as "A child who needs special educational assistance to perform at the grade level for his age." The term also included children with special educational needs resulting from poverty, neglect, delinquency, handicaps, or cultural, economic, ethnic, or linguistic isolation from the general community.

The data in this study strongly suggest that there were, in all probability, pervasive and persistent inequalities in the distribution of Federal financial resources for the schools used in this study. There were 22 ESEA Title I schools. The sub-sample of ESEA Title I schools did not include any of the Boston schools, even though the Boston schools contained 56.71 per cent of the minorities who participated in this testing program.

This is particularly disturbing when one thinks of the recent rhetoric used as a basis for certain public educational policies. The "social deprivation hypothesis" is the belief that children of ethnic minorities and the economically poor who achieve "below average" in school, do
so mainly because they begin school lacking certain crucial experiences. Such experiences are prerequisites for school learning and attitudes conducive to achievement in the classroom. The chief aim of preschool and compensatory programs, therefore, was to make up for specific environmental deficiencies as quickly and intensively as possible. Compensatory programs were designed to provide the appropriate experiences, cultural enrichment, and training in basic skills of the kind presumably possessed by middle-class majority children of the same age (DeShields, 1972).

The ideological use of the cultural deprivation theory was based on the hypothesis that the differences in educational achievement of poor as compared with middle-class children—and, more specifically, differences between Black and white children—were mediated by differences in home background. It is generally known that, for cities such as Boston, poverty and general environmental disabilities are endemic to Black communities. However, from these data, one could easily make the mistake of assuming that the Black students who attended the Boston schools were atypical—i.e., most were not from impoverished families. Such an assumption could lead one to the conclusion that the Boston schools did not meet the criteria of eligibility for ESEA Title I funds.

A safer and more realistic assumption is that
resource allocations, both Federal and State, are distributed unequally in favor of the already affluent schools. In the Commonwealth, resource differentials occur largely between districts, with fairly equal allocations within districts. Title I funds flow disproportionately, primarily because the allocation formula is based on a political system. There is ample evidence to support the hypothesis that instructional expenditures are distributed unequally, and that school systems spend less on minority and poor children than on other children in large American cities. The American myth is not that all children receive equal resources from all sources, but that they are treated "fairly" by the formula grant system used by governmental agencies. We must always remember that there are political in-groups and political out-groups. There are many examples in public school financing to indicate that politics is an effective vehicle for favoritism.

Special Educational Programs--A Dream Deferred

ESEA Title I programs

For many educators, Title I represented a major effort to address the impossible demand enshrined in the mythology of the American dream itself: that schools constitute the ultimate promise of equality and opportunity; that they enable American society to remain somehow immune from the economic inequities and social afflictions that
plague the rest of mankind; that they, in short, guarantee an open society.

Education, it has often been said, is the American religion. Thus, if the school system fails, so does the promise of equality, so does our security against the inequities of society. However, much of the comprehensive data available indicates that nothing in school makes as much difference as the economic background of the student, and the social and economic background of his peers. In general, there is little evidence to support the assumption that increasing educational expenditures in a particular district produces greater achievement, and a fair amount of evidence that it does not (Schrag, 1970).

Interestingly, Gentry, et al (1972) argue that:

Although any new source of funds appeared to be important, Federal aid proved no panacea for urban schools. Urban districts favored Title I of the Elementary and Secondary School Education Act because it allocated funds according to a poverty formula. All too many schools, however, purchased more of the same meaningless instructional materials and quantities of educational hardware. Other programs, which comprise three fifths of Federal assistance to education, favor districts which already have high expenditure patterns.

These authors conclude that Federal and State programs have not served the compensatory function, as was so widely assumed.

In this study, the geographic distribution of ESEA Title I schools represented all metropolitan areas of the Commonwealth. ESEA schools were located in the following
cities: (1) Worcester (N = 1); (2) West Springfield (N = 2); and (3) Cambridge (N = 3). Most of the ESEA schools were located in places such as Pittsfield, Plymouth, Revere, Fall River, etc. It should be noted that the Black population in Massachusetts represents a bipolar distribution. That is, the majority of Blacks in Massachusetts live either in Boston or Springfield. None of the ESEA schools used in this study were located in these cities. Even Holyoke was not included, despite the recent heavy influx of Puerto Ricans.

There were 632 minority students enrolled in the 22 ESEA Title I schools. This number represented 33.94 per cent of the total minority students who participated in this study and 4.20 per cent of the total number of students enrolled in ESEA Title I schools. The percentage of 4.20 approximates the per cent of minority students (4.71 per cent) in the total sample who participated in the testing program. By comparison, even though 56.71 per cent of the minority students tested attended seven schools in Boston, they represented 23.25 per cent of the total student enrollment of the Boston schools used in this study.

The findings in Table 11 indicated that even though there were no statistically significant differences, students who attended ESEA Title I schools did consistently better than students who attended the Boston schools. In addition, Table 3 indicates that there was an inverse
relationship between the: (1) number of students per school district and I.Q.; and (2) number of minority students per district and I.Q. A casual review of the results between ESEA schools and Boston schools would support, without qualification, the fact that academic performance of the Boston students in reading is still more depressing than other students throughout the Commonwealth. However, when one considers the fact that Boston is the largest school district with the greatest percentage of minority students, these results are predictable. One can seriously question why the State Department of Education has not deemed it essential to provide most, or all, of the Boston schools with special assistance and resources comparable to that received by ESEA Title I schools.

The State Department of Education should consider expanding its selection process so that a broader cross-section of students requiring or receiving special educational programs in reading, science, etc., would be included in the testing program. To include only selected schools with a high concentration of minority students, and/or peer students who do not receive special educational programs, tends to depress the overall performance of the population who participated in the testing program. Analyses of the performance among students in the Commonwealth should always take this into consideration. In other words, variables such as special funds, teachers, equipment, etc., must be presented as critical factors in academic achievement. If this isn't
done, then the popular assumptions about urban students are primarily alibis for educational neglect.

In support of this assumption, Gentry et al contend that programs such as ESEA Title I are critically important, because the inferior quality of many urban schools would be less crucial for the future of American society, if it were not for the critical emphasis placed upon public education maintaining an open class system. To Gentry and his colleagues, mobility between classes has helped this country to reluctantly move closer to its commitment to equality as a basic condition of democracy compatible with a functional class structure.

Because schools do, in fact, both aid upward mobility for a few and perpetuate class lines for a majority, systems must be opened so that their most repressive and destructive characteristics are mitigated, if not eliminated. Despite abuses of many Federal programs, compensatory education is critical because it helps many children to stay in school. "These individuals who change class standing from that of their parents typically take their first steps up or down because of what happens to them in school" (Gentry, 1972).
Special Programs in Science

Today, children are developing cognitive skills related to fundamental scientific principles more rapidly and in a more sophisticated manner than ever before. Much of this progress is due to improvements in the methods and materials of the science programs presently available. Most educators agree that the best results in a science curriculum can be secured when the objectives and materials used are adapted to the developmental needs, interests, and abilities of the children. The usefulness of scientific principles depends upon the educational strategies that facilitate the adaptation of knowledge to new experiences and challenges (DeShields, 1968).

In general, special science programs are efforts to place greater emphasis on the philosophy and processes of science, as well as more meaningful laboratory work. Over the past decades critics of school science have grown more strident with recurring complaints that school science programs are repetitive, inadequately articulated, and insufficiently developmental in character. Specifically, criticisms are leveled that science course content is too broad, and includes undue emphasis on technology and applied science. It also involves too few fundamental ideas and principles (Rutledge, 1973).

The problem with many special programs in science,
however, is that they fail to provide a challenge for science educators. In addition to perpetuating traditional attitudes and culture, special programs in science need to produce curricula that are oriented toward a period in the future, influenced by relevant discoveries, and structured, somewhat, by the realities of prevailing social problems. Educators must adopt special programs in science that are designed to meet change, and influence the direction of change.

Our country is a technological society. The need for many different kinds of scientists is judged to be great, and it is readily accepted by educators that all citizens need "scientific literacy," so some degree, to live effectively in a science-oriented world. Many of the skills basic to scientific inquiry are identical to those used by effective readers. Students are successful readers when they can readily transform a repertoire of skills to meet the demands of various content areas and levels of sophistication. The first part of that repertoire is an awareness of levels of comprehension and how to function at each, according to one's competence. The same holds true for science curricula (Rutledge, 1973).

In this study, a comparison was made between selected schools with special programs in science, and selected schools without special programs in science. Based on earlier research (DeShields, 1968), the assumption was that
students who had been exposed to special science programs or additional science experiences, would be more apt to develop a better or broader science vocabulary and, consequently, better or more specialized problem-solving skills applicable to science. Given these assumptions, there should be differences in performance on the reading tests in science content areas, between students who attended schools with, and without, special science programs.

The results in Table 15 tend to support, in a very general way, this investigator's assumptions. Even though there were no statistically significant differences, students who had special science programs performed slightly better in science for each of the skill areas than those students without special science programs. More importantly, special programs function in such a manner that there is little programmatic consistency from one school district to another and/or one school to another. From the available data, this investigator had no way to determine the structure and design of the respective science programs. In summary, within the whole range of special science programs, there may be some highly sophisticated organized program and special activities that have not been arranged around any formal science skill development.
The results in this study indicate that, even though most of the comparisons were not statistically significant, there were differential performances among skill areas and content areas. Of the three skills examined, students performed poorest in extended meaning skills. Likewise, with only one exception, students performed poorest in the social studies content areas. On the other hand, the students tended to perform best in main idea skills and, with one or two exceptions, the top performance was in the language content area. Even within the social studies content areas, the poorest performance occurred within extended meaning skills. One of the clearest implications of these patterns is that proficiency in the use of one skill in a given content area, does not necessarily suggest comparable proficiency for the same skill in another content area.

The Reading Curriculum Advisory Committee established a taxonomy for reading. That is, they placed critical reading at the highest level in a hierarchy of reading comprehension skills. Likewise, the hierarchy for CTBS included an inextricably involved continuum of seven psycho-sociolinguistic skills in reading comprehension which included:

1. Main Idea

The ability to identify main purpose or idea of a sentence, paragraph, or passage
2. Relationship

The ability to perceive relationships (cause-effect, time, size, part-whole, structure of prose or poetry, sequence)

3. Extended Meaning

The ability to extend meaning of indefinite or incomplete statements and ideas, and recognize omitted information

This hierarchy endorses the view of critical reading as a subset of comprehension skills in the total framework of reading skills and abilities. It also establishes an ascending level of difficulty—i.e., main idea is the lowest level of difficulty and extended meaning the highest level of difficulty. The results of this study tend to follow this hierarchy. The students who participated in the testing program performed best in main idea skills and poorest in extended meaning skills. One might also anticipate that performance in the content areas would be related to the level of difficulty of the skill to which the content is associated. However, the results of this study show that, for the language content area, students generally performed better at a more difficult skill hierarchy (relationship) than they did at the least difficult skill hierarchy (main idea). With the exception of language content, the hierarchy of reading comprehension was basically consistent for:
(1) skill areas; (2) content areas; (3) total scores; and (4) the national norms. These results support the contention that reading comprehension is not a generalized unitary skill.

Even though the results of this study are far from conclusive, this investigator takes the view that reading instruction should be part of the curriculum in each content area. This view necessarily implies a broad definition of the term "reading". Though there are many definitions, the results of this study tend to support the position that reading is not a unitary act, that reading comprises several functions. In developing an effective reading program, it is necessary to know what attitudes and skills are involved in efficient reading, and when they are most readily developed.

The performance of students who attended the Boston schools indicated that of equal importance to the student's success in critical reading is the necessity for greater depth and breadth of environmental experiences. It is from wide and varied experiences that language meanings derive. It is from the student's fund of language meanings that he comprehends. Paucity of experiences results in shallowness in conceptualizing and generalizing. This condition in turn limits and impedes both accuracy and flexibility in reading comprehension. The possession of a repertory of
language meanings derived from real and vicarious experiences provides the student a constellation of ideas from which he may combine and reorganize related conceptions in ever-evolving configurations. Through increasingly skillful fusions of language meanings, the reader develops closer and closer approximations of the author's intent (Newton, 1972).

To meet the demands of society today and to develop mature efficient readers in the secondary school, we need a comprehensive, flexible reading program which recognizes that development in reading skill is continuous. To accomplish this task, we need the full cooperation and active participation of every teacher in the secondary school. Unfortunately, many educators in the past frequently have not viewed the teaching of reading as one of their responsibilities.

This investigator, in concluding, agrees with Sargent (1970) that the content area teacher is the best-qualified person in the school for teaching reading in his subject area. He is the one who:

1. is most capable of teaching the new vocabulary in his subject area;
2. is most knowledgeable in setting purposes for reading;
3. is most able to developing and motivating student interest;
4. is most adept at identifying important concepts to be developed and understood;
5. is most conversant with multi-resources, their use and value in developing background experiences; and,
6. is familiar enough with the text to know how best to read and study it.

This study provides additional information to support the hypothesis that "so-called" reading skills are easily identifiable in one or more content areas. The results lend further support to the position that the whole question of the construction of achievement measures of reading comprehension needs further examination. This study should add to the body of knowledge currently being developed to indicate that tests on the market should measure reading comprehension in specific content areas and move away the myth of general reading ability across all content areas. It should also assist educators in recognizing that if content area teachers need information regarding students' reading performance in that content area, it may be more feasible for them to develop informal reading inventories. Such inventories should be designed to measure students' ability in learning from text materials, the skills, vocabulary and concepts unique to that content area.

Some new directions for developmental reading and the basal reader approach must be provided. The shifting
needs in skill development, through the grades and within the various content areas, dictate a new kind of reading instruction beginning from the primary grades. The results of this study suggest that skills related to reading comprehension and school success are not provided for within the context of traditional curriculum offerings.

This study should also add to the mounting evidence that reading comprehension tests as they are currently constructed are, in fact, content area achievement tests.

**Limitations of the Study**

Because of the confidential nature of the data in the files of the Department of Education in the Commonwealth and the monetary cost required to attain individual data for each student who participated in the testing program, this investigator was restricted in the kinds of individual data used to get certain results. Most of the data used in this study reflected general characteristics about selected secondary schools and very little about individuals within each secondary school.

The general characteristics and structure of the special programs in science were not obtained or readily available. Consequently, some analyses were not conducted that could possibly have added to the general information needed to make more substantive generalizations. Accordingly, little was done to analyze the extent to which CTBS
was the most appropriate instrument to use during the testing program.

**Recommendations for Further Research**

Future studies should encourage researchers to produce information about more efficient methods of teaching children to read in different skill areas. Additional information is needed on reading comprehension and skills in content areas. In addition, teacher training institutions in cooperation with classroom teachers must seriously attack the issue of who has the basic and ultimate responsibility for teaching reading in our public schools. Research supports the fact that reading is the only cognitive skill that transcends all content areas. It is not, in and of itself, a content area. In light of this, pre-service and in-service training programs must begin to reflect, as one of their top priorities, literacy in all content areas.

Since many studies conclude that the tests of general reading skills usually fail to measure the more important aspects related to sub-content area reading skills, future research must begin to focus on success models. Success models should include, in particular, those individuals who, inspite of depressed socio-economic environments, perform as well as their more affluent counterparts. The research must begin to focus on: (1) the prevailing teaching styles of "successful teachers;" (2) the variety and nature of
learning styles among students; and (3) the acquisition of reading skills (e.g., cognitive and affective domains). Lastly, new tools for evaluation and accountability for teacher training and student performance must be major priorities during this decade.
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APPENDIX

CLASSIFICATION TABLES

Guide for Using Tables

Tables 2, 4, 6, and 8, on Pages 14, 16, 18, and 20, respectively, present the “Classification of Objectives and Categorization of Items” common to all levels and forms of CTBS for the following skills areas:

Table 2—READING
TESTS 1 and 2, FORMS Q and R

Table 4—LANGUAGE
TESTS 3, 4, and 5, FORMS Q and R

Table 6—ARITHMETIC
TESTS 6, 7, and 8, FORMS Q and R

Table 8—STUDY SKILLS
TESTS 9 and 10, FORMS Q and R

At the left are listed the KEY TERMS for the categories of the taxonomy preceded by the letter representing the broad classification and the number of the category, e.g., A-1, B-4, C-8, D-10. The letter and number classifications and the key terms are used throughout the tables. The key terms are also useful in interpreting CTBS accessories such as the machine-produced Individual Test Record (see Page 50) and the hand-scored SCORERE Answer Sheets for Levels 2, 3, and 4 (see Page 60).

Tables 3, 5, 7, and 9, facing Tables 2, 4, 6, and 8, classify by process all items in the two forms of the four levels for the corresponding skills area. To find the classification of an item, locate first the table for the skills area, then the appropriate column for the level and form of the test in which that item appears. The columns for Form R have been screened to facilitate use of the tables.

Tables 10-25 present the two-dimensional “Process/Content Classifications” for the four levels and the two forms of CTBS. Whereas the preceding tables are set up by skills areas, the process/content charts are presented by level because all categories are not found at all levels and different content is used at the various levels. The four skills areas of a level are found together on facing pages in the following order:

<table>
<thead>
<tr>
<th>Level</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>22-23</td>
</tr>
<tr>
<td>2</td>
<td>24-25</td>
</tr>
<tr>
<td>3</td>
<td>26-27</td>
</tr>
<tr>
<td>4</td>
<td>28-29</td>
</tr>
</tbody>
</table>

The classification of any item in the two forms of CTBS by content and process can be determined by locating the number of the item in the cell at the intersection of the process and content axes. Numbers for the items in Form Q appear at the top of the cell and for Form R at the bottom in the screened area. To find the process/content classification of an item, first turn to the table of the appropriate level and skills area, then locate the number in the cell. Follow across to the process and up to the content. For example, in Table 10 in row A-3: Item 18 of Test 2 in Level 1, Form Q, involves recognizing directly stated details, Literal Meaning (process), in a story (content). In the same table in row C-6: Item 23 in Level 1 of Form R involves identifying the Main Idea (process) of a letter (content).
### Table 2
CLASSIFICATION OF OBJECTIVES AND CATEGORIZATION OF ITEMS
READING – TESTS 1 AND 2, FORMS Q AND R

<table>
<thead>
<tr>
<th>KEY TERMS</th>
<th>CLASSIFICATION OF OBJECTIVES</th>
<th>CATEGORIZATION OF ITEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A-RECOGNITION</strong></td>
<td>and/or APPLICATION OF TECHNIQUES:</td>
<td>ability to identify explicitly stated (literal) details in a selection</td>
</tr>
<tr>
<td>A-1 Vocabulary</td>
<td>1-Recognize meaning of words in context</td>
<td></td>
</tr>
<tr>
<td>A-2 Sound Recognition</td>
<td>2-Recognize symbols, and sound and symbol correspondence</td>
<td></td>
</tr>
<tr>
<td>A-3 Literal Meaning</td>
<td>3-Recognize directly stated details</td>
<td></td>
</tr>
<tr>
<td>B-4 Simple Rewording</td>
<td>4-Comprehend the meaning of words and phrases expressed in synonymous terms or parallel form</td>
<td></td>
</tr>
<tr>
<td>B-5 Paraphrasing</td>
<td>5-Comprehend the meaning of ideas by paraphrasing</td>
<td></td>
</tr>
<tr>
<td>C-INTERPRETATION</td>
<td>ability to identify and comprehend major ideas in a passage and understand their interrelationships</td>
<td></td>
</tr>
<tr>
<td>C-6 Main Idea</td>
<td>6-Identify main purpose or idea of a sentence, paragraph, or passage</td>
<td></td>
</tr>
<tr>
<td>C-7 Relationships</td>
<td>7-Perceive relationships (cause-effect, time, size, part-whole, structure of prose or poetry, sequence)</td>
<td></td>
</tr>
<tr>
<td>C-8 Conclusions</td>
<td>8-Draw conclusions from GIVEN facts and statements</td>
<td></td>
</tr>
<tr>
<td>C-9 Inferences</td>
<td>9-Use contextual clues to infer meaning from ideas IMPLIED by the writer</td>
<td></td>
</tr>
<tr>
<td>D-ANALYSIS</td>
<td>ability to extend interpretation beyond the stated information</td>
<td></td>
</tr>
<tr>
<td>D-10 Extended Meaning</td>
<td>10-Extend meaning of indefinite or incomplete statements and ideas, and recognize omitted information</td>
<td></td>
</tr>
<tr>
<td>D-11 Author's Intention</td>
<td>11-Recognize and interpret tone, mood, and author's intent</td>
<td></td>
</tr>
</tbody>
</table>

*A-1 applies to TEST 1, A-2 through D-11, to TEST 2*
<table>
<thead>
<tr>
<th>KEY TERMS</th>
<th>LEVEL 1</th>
<th>LEVEL 2</th>
<th>LEVEL 3</th>
<th>LEVEL 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q</td>
<td>R</td>
<td>Q</td>
<td>R</td>
</tr>
<tr>
<td>A-1 Vocabulary</td>
<td>1-40</td>
<td>1-40</td>
<td>1-40</td>
<td>1-40</td>
</tr>
<tr>
<td>A-2 Sound Recognition</td>
<td>1-4, 6, 7</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>A-3 Literal Meaning</td>
<td>18, 27, 32, 33, 42</td>
<td>12, 17, 33, 40, 44</td>
<td>1, 12</td>
<td>-</td>
</tr>
<tr>
<td>B-4 Simple Rewording</td>
<td>23, 24, 27, 31</td>
<td>7, 9, 19, 23, 34, 37</td>
<td>6, 8, 8, 13, 36, 42, 27, 29</td>
<td>10, 19, 15, 19, 27, 29</td>
</tr>
<tr>
<td>B-5 Paraphrasing</td>
<td>-</td>
<td>-</td>
<td>8, 10, 18, 21, 30</td>
<td>5, 12-14, 5, 9</td>
</tr>
<tr>
<td>C-6 Main Idea</td>
<td>16, 22, 29, 30, 35, 43, 45</td>
<td>5, 11, 13, 22, 31, 34, 37, 45</td>
<td>2, 11, 20, 26, 34, 38</td>
<td>2, 11, 20, 34, 38</td>
</tr>
<tr>
<td>C-7 Relationships</td>
<td>5, 8-10, 13-15, 39, 41, 44</td>
<td>2, 4, 32, 32, 41, 42</td>
<td>9, 21, 35, 37, 39-41, 39-41</td>
<td>10, 37, 45, 44</td>
</tr>
<tr>
<td>C-8 Conclusions</td>
<td>11, 12, 17, 19, 21, 25, 26, 36, 38</td>
<td>20, 25, 28, 38, 36</td>
<td>16-18, 28, 33, 43</td>
<td>1, 3, 33, 41</td>
</tr>
<tr>
<td>C-9 Inferences</td>
<td>-</td>
<td>-</td>
<td>1, 3, 23, 39</td>
<td>4, 20, 22, 32</td>
</tr>
<tr>
<td>D-10 Extended Meaning</td>
<td>20, 28, 34, 37, 40, 42</td>
<td>6, 14, 18, 21, 35, 43</td>
<td>4, 7, 15, 25, 31, 43</td>
<td>2, 10, 14, 17, 25</td>
</tr>
<tr>
<td>D-11 Author's Intention</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
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</table>

A-1 applies to TEST 1, A-2 through D-11, to TEST 2
<table>
<thead>
<tr>
<th>KEY TERMS</th>
<th>CLASSIFICATION OF OBJECTIVES</th>
<th>CATEGORIZATION OF ITEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-RECOGNITION and/or APPLICATION OF TECHNIQUES: ability to recognize and apply appropriate rule correctly</td>
<td>A-1 Spelling 1-Recognize correctly and incorrectly spelled words</td>
<td></td>
</tr>
<tr>
<td></td>
<td>**A-2 Punctuation 2-Recognize and apply rules of punctuation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>**A-3 Capitalization 3-Recognize and apply rules of capitalization</td>
<td></td>
</tr>
<tr>
<td></td>
<td>***A-4 Correct Usage 4-Recognize and apply correct grammatical principle required</td>
<td></td>
</tr>
<tr>
<td>B-TRANSLATION: ability to reword or paraphrase phrases and sentences and select the most appropriate paraphrased expression</td>
<td>***B-5 Economy/Clarity 5-Select the word, phrase, or sentence which provides the greatest clarity and/or economy of expression</td>
<td></td>
</tr>
<tr>
<td>C-INTERPRETATION: ability to comprehend sentence meaning and perceive appropriate and inappropriate relationships</td>
<td>***C-6 Syntactical Relationships 6-Discern the relationships of different parts of sentences and perceive inappropriate relationships</td>
<td></td>
</tr>
<tr>
<td></td>
<td>***C-7 Word Choice 7-Comprehend author’s implication (tone, mood, form) in an incomplete sentence and select the appropriate word to complete it</td>
<td></td>
</tr>
</tbody>
</table>

*Applies to TEST 5 • LANGUAGE Spelling
**Applies to TEST 3 • LANGUAGE Mechanics
***Applies to TEST 4 • LANGUAGE Expression
<table>
<thead>
<tr>
<th>KEY TERMS</th>
<th>LEVEL 1 Q</th>
<th>LEVEL 1 R</th>
<th>LEVEL 2 Q</th>
<th>LEVEL 2 R</th>
<th>LEVEL 3 Q</th>
<th>LEVEL 3 R</th>
<th>LEVEL 4 Q</th>
<th>LEVEL 4 R</th>
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</thead>
<tbody>
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<td>*A-1 Spelling</td>
<td>1-30</td>
<td>1-30</td>
<td>1-30</td>
<td>1-30</td>
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<td>1-30</td>
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<tr>
<td>***A-4 Correct Usage</td>
<td>26-33,</td>
<td>26-33,</td>
<td>26-35</td>
<td>26-35</td>
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<td>39-46</td>
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</tr>
<tr>
<td>***C-6 Syntactical Relationships</td>
<td>51-55</td>
<td>51-55</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>***C-7 Word Choice</td>
<td>34-38,</td>
<td>34-38,</td>
<td>36-50</td>
<td>36-50</td>
<td>36-45</td>
<td>36-45</td>
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</tr>
</tbody>
</table>

* Applies to TEST 5 • LANGUAGE Spelling  
** Applies to TEST 3 • LANGUAGE Mechanics  
*** Applies to TEST 4 • LANGUAGE Expression
### Table 5
PROCESS CLASSIFICATION OF ITEMS BY ITEM NUMBERS
LANGUAGE—TESTS 3, 4, AND 5, FORMS Q AND R

<table>
<thead>
<tr>
<th>KEY TERMS</th>
<th>LEVEL 1</th>
<th>LEVEL 2</th>
<th>LEVEL 3</th>
<th>LEVEL 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q</td>
<td>R</td>
<td>Q</td>
<td>R</td>
</tr>
<tr>
<td>*A-1 Spelling</td>
<td>1-30</td>
<td>1-30</td>
<td>1-30</td>
<td>1-30</td>
</tr>
<tr>
<td>***A-4 Correct Usage</td>
<td>26-33,</td>
<td>26-33,</td>
<td>26-35</td>
<td>26-35</td>
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<tr>
<td></td>
<td>39-46</td>
<td>39-46</td>
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<td></td>
</tr>
<tr>
<td>***C-6 Syntactical Relationships</td>
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<td>51-55</td>
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<td>***C-7 Word Choice</td>
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<td>34-38,</td>
<td>36-50</td>
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<td>47-50</td>
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</tr>
</tbody>
</table>

* Applies to TEST 5 - LANGUAGE Spelling
** Applies to TEST 3 - LANGUAGE Mechanics
*** Applies to TEST 4 - LANGUAGE Expression
### Table 6
CLASSIFICATION OF OBJECTIVES AND CATEGORIZATION OF ITEMS
ARITHMETIC - TESTS 6, 7, AND 8, FORMS Q AND R

<table>
<thead>
<tr>
<th>KEY TERMS</th>
<th>CLASSIFICATION OF OBJECTIVES CATEGORIZATION OF ITEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A-1 Application of Technique</strong></td>
<td>A-RECOGNITION and/or APPLICATION OF CONCEPTS and TECHNIQUES: ability to recognize appropriate method, operation, structure, formula, or principle and/or apply it correctly</td>
</tr>
<tr>
<td></td>
<td>1-Recognize and apply technique in addition, subtraction, multiplication, and division</td>
</tr>
<tr>
<td><strong>A-2 Recognition of Concept</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-Recognize and apply concept</td>
</tr>
<tr>
<td><strong>B-3 Converting Form</strong></td>
<td>B-TRANSLATION: ability to convert concepts expressed in one language to another language</td>
</tr>
<tr>
<td></td>
<td>3-Convert concepts expressed in one numerical, verbal, or graphic form to another numerical, verbal, or graphic form</td>
</tr>
<tr>
<td><strong>C-4 Equations</strong></td>
<td>C-INTERPRETATION: ability to comprehend numerical concepts and perceive their interrelationships</td>
</tr>
<tr>
<td></td>
<td>4-Perceive relationships in equations or mathematical sentences</td>
</tr>
<tr>
<td><strong>C-5 Comparisons</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-Perceive relationships of comparison</td>
</tr>
<tr>
<td><strong>C-6 Other Relationships</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6-Perceive other types of relationships (ratio, time, part-whole, sequence, geometric)</td>
</tr>
<tr>
<td><strong>C-7 Selecting Method</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7-Comprehend problem and select method of solving</td>
</tr>
<tr>
<td><strong>C-8 Solving Problem</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8-Comprehend problem and solve</td>
</tr>
<tr>
<td><strong>D-9 Organization</strong></td>
<td>D-ANALYSIS: ability to extend interpretation beyond given data and organize components of total problem</td>
</tr>
<tr>
<td></td>
<td>9-Organize all facts, permitting grasp of overall problem, recognition of relevant and/or omitted information, and logical inference</td>
</tr>
</tbody>
</table>

*Applies to TEST 6 - ARITHMETIC Computation
**Applies to TEST 7 - ARITHMETIC Concepts
***Applies to TEST 8 - ARITHMETIC Applications

**NOTE:** C-6 Other Relationships: Items in this category are included in TEST 7 at Levels 1 and 2 and in TEST 8 at Levels 3 and 4. D-9 Organization: Items in this category are included in both TEST 7 and TEST 8, except at Level 1.