ABSTRACT

A COMPARATIVE STUDY OF THE EFFECTS OF A MOTOR-PERCEPTUAL TRAINING PROGRAM ON FIRST-GRADE READING ACHIEVEMENT OF CHILDREN IN SELECTED URBAN AND SUBURBAN SCHOOLS

By

Edward Carl Turner

The Problem

In recent years there has been considerable interest in the area of motor-perceptual development. One reason for this interest is the group of well-publicized theories in motor-perceptual development by Kephart, Barsch, Getman, Cratty, and Frostig. Another reason is that tasks recommended by the theorists are relatively easy to execute. There is also an awareness by educators that obvious things such as skipping, hopping, and tracing lines cannot be accomplished by all children and may contribute directly or subtly to their total development.

This investigation attempts to make a further contribution to the literature pertaining to perceptual-motor development training programs at the first-grade level in relation to gains in reading achievement. There

are supportive and non-supportive studies of motor-perceptual programs and their relationship to reading achievement. However, these studies do not examine urban and suburban populations as this study does.

Purpose of the Study

This investigation was undertaken to explore the effects of a motor-perceptual program on first-grade reading achievement of children in selected urban and suburban schools. This study also examined the effects of the motor-perceptual program on perceptual development and motor development of the children. In addition, comparisons were made to ascertain which population, urban or suburban, received the most benefit, if any, from this type of program.

Sample

Two urban and two suburban elementary schools with a total of eight first grades, two in each school, agreed to participate in the project. Only those children who fell below specified criteria were selected to take part in the experiment. Thirty-eight urban children and twenty suburban children were included in the experimental and control groups. These children were randomly divided into experimental and control groups within their classes.

Methodology and Statistical Analysis

This investigation involved the implementation of an experimental motor-perceptual treatment for urban and suburban first graders. The experimental groups were given a structured, sequential program of motor-perceptual skills. Teacher aides conducted the treatments three times a week for twenty-minute periods during a ten-week period.

Pre- and post-test measures included the following: Gates-MacGinitie Reading Achievement Test, the Frostig Developmental Test of Visual Perception, and the Purdue Perceptual Motor Survey. In addition, the Lorge-Thorndike Cognitive Abilities Test was administered early in the study.

Twelve hypotheses were tested in the area of reading achievement, perceptual development, and motor development. The data were analyzed using multivariate analysis of variance.

Major Findings

A structured, motor-perception program did not significantly improve the reading growth of the children being studied. The urban children did not improve more than the suburban children in reading growth as a result of this program.

In the area of perception, the treatment group did not significantly improve as a result of this program. However, the suburban group did improve in perceptual

achievement to a greater degree ($p > .05$) than did the urban group.

In the area of motor achievement, no significant gains were indicated by either the total experimental group or the urban, suburban experimental group. The urban children did not improve any more than the suburban children in motor achievement.

The findings from this study did not support the use of a structured, sequential, motor-perceptual development program for the purpose of improving (1) reading achievement, (2) perceptual achievement, or (3) motor achievement. However, the suburban children improved to a significantly greater degree than did urban children in perceptual achievement.

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By

Edward Carl Turner

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Elementary Education

1972

DEDICATED TO

My wife Dorothy; without her encouragement, sacrifices, and understanding none of this would have been possible.

My children; Donna, Gail, Mark, and Greg, who were patient with their father.

My father; for his wisdom in encouraging me to persist.

My mother; who began it all, but could not be with me at the conclusion to enjoy the sense of accomplishment.

ACKNOWLEDGMENTS

Dr. William K. Durr, my major professor, has given me encouragement, support, and guidance throughout my doctoral program. I am extremely grateful to him for his time, patience, and understanding. I also appreciate the generous efforts of Dr. Jean LePere, Dr. Eileen Earhart, and Dr. George Myers who served ably and with interest on my doctoral committee.

I wish to express my gratitude to all the teachers, teacher aides, and administrators with whom I have been associated during this project. I would also like to express my thanks to those who have assisted me in the data analysis, proof reading, and typing. Finally, I would like to thank, for their significant contribution, all of the children who have participated in this project.

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CHAPTER I

THE PROBLEM

In this chapter, the purpose and needs for this study are described. The hypotheses to be tested and the theory used as the basis for the study are also presented, as well as the terms used throughout the study. An overview of the remaining chapters is presented in the concluding section.

Need for the Study

In recent years, there has been considerable interest on the part of the Federal government, educational administrators, researchers, and school teachers in the area of early childhood education, urban education, and the curricular area of reading. By concentrating on reading instruction through various treatment programs in early years, educators have hoped to insure later success in school. Many programs have been designed specifically for use with children in primary grades.

The problem to be studied in this paper may give some clues to the special training that may be required

in first grade to help prevent reading failures. Educators feel that reading primarily involves cognitive processes such as translating a visual word shape into a verbal symbol. One group of educators theorizes that the reading problems and other school achievement problems can be attacked by working with the cognitive process. In order to accomplish this they advocate the use of motor-perceptual programs. They contend that some children have a gap in their cognitive development and that motor-perceptual training can fill this gap. After this has been accomplished, they feel that these children will then begin to achieve success in subject matter.

Since 1960, the theoretical stances of people such as Piaget, Kephart, Barsch, Getman, Cratty, and Frostig have created a great deal of furor over the relative merits of motor-perceptual development.

Piaget and Kephart have given support to the proposition that a child must interact through movement with his environment, and that this direct interaction forms a basis for all learning. Piaget bases most of his assertions primarily on observations that the first kind of behavior children evidence is motoric. He then proceeds through various stages to more complicated behaviors.[1] Kephart uses many of Piaget's observations

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[1]Jean Piaget and Barbel Inhelder, The Child's Conception of Space (London: Routledge and Paul, 1956).

to develop his own perceptual-motor theory. Kephart theorizes that motor learning is a basis for later cognitive development.[2]

Getman suggests that vision is the key to learning. As a result, the training of visual behavior will tend to remediate learning problems. Getman suggests an entire series of exercises that should be carried out by parents to help increase a child's intelligence so that he will have no problems with school learning.[3]

Barsch's theory of movement--movigenics--is based on ten postulates synthesized from the work of numerous theorists and researchers in many disciplines. All ten postulates deal with man as a moving being within a spatial world. From the postulates, Barsch devises twelve dimensions pertaining to human learning which serve as the areas constituting the educational curriculum.[4]

Perhaps the most practical of the motor-perceptual theorists is Cratty, whose main concern is to have motor-perceptual training as part of the physical education

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[2]Newell C. Kephart, Slow Learner in the Classroom (Columbus, Ohio: Charles E. Merrill and Company, 1960).

[3]G. N. Getman, How to Develop Your Child's Intelligence (Luverne, Minn.: G. N. Getman, 1962).

[4]Ray Barsch, Achieving Perceptual-Motor Efficiency: A Space Oriented Approach to Learning (Seattle, Wash.: Special Child Publication, 1967).

program. He believes that moderation should be used in motor-perceptual training, but that there is carry over to the academic areas.[5]

Frostig has developed a diagnostic test, The Frostig Test of Visual Perception, which purports to predict difficulties in early school learning. Frostig reports her findings tend to show that, in the normal child, perceptual development is the most important indicator of the child's general development between the ages of three and seven years. After diagnosis with the test, Frostig has developed a program, The Frostig Program for the Development of Visual Perception, which prescribes treatment in five areas of visual perception. These five areas include eye-motor coordination, figure ground coordination, form constancy, position in space, and spatial relations.[6,7,8]

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[5]Bryant J. Cratty, Some Educational Implications of Movements (Seattle, Wash.: Special Child Publication, 1970).

[6]Marianne Frostig, "Teaching Reading to Children with Perceptual Disorders," Reading Disorders, ed. by Richard M. Flower (Philadelphia: F. A. Davis Company, 1965), pp. 113-27.

[7]Marianne Frostig and David Horne, The Frostig Program for the Development of Visual Perception (Chicago: Follett Publishing Company, 1964).

[8]Marianne Frostig, Paul Maslow, D. W. Lefener, and J. R. B. Whittlesey, The Marianne Frostig Developmental Test of Visual Perception [1963 Standardization] (Palo Alto: Consulting Psychologists Press, 1963).

All of these educators leave the teacher in a quandry. Will first-grade children who receive motor-perceptual training make significantly greater gains in reading achievement when compared with first-grade children who do not receive this training? Will first-grade children in urban schools or suburban schools show greater gains in reading achievement after participating in a motor-perceptual program? Will perception be the only area of improvement? Will motor skills be the only area of improvement? All these questions are raised in the minds of many teachers. Thus, it becomes the task of the researcher to test these programs, arrive at conclusions, and make specific recommendations to teachers as to where and for whom this type of program would be most beneficial.

Therefore, this study will concern itself with an attempt to compare the merits of a motor-perceptual training program on first-grade reading achievement in urban and suburban school children.

Purpose of the Study

This study is primarily interested in two specific problems. The first is to evaluate the effect of a motor-perceptual program on the reading achievement of first-grade children. The second is to compare the effects of a motor-perceptual program on reading

achievement with first-grade children in urban and suburban schools.

A secondary concern of this study is to measure the effects of a motor-perceptual program on motor development and perceptual development.

Educational Implications

The results of this study will have several practical implications. These implications will benefit teachers, administrators, and college instructors in the teaching of reading.

The results will help provide direction for teachers as they evaluate the desirability of inaugurating motor-perceptual training programs. The research will also suggest answers to which population, urban or suburban, might benefit from a motor-perceptual program and would have implications for teachers working in these situations.

This study will also have implications for administrators who are involved in curriculum planning for the primary grades. It may add support to the proponents of early physical education programs with the main emphasis on motor-perceptual activities.

College instructors are interested in more evidence in order to make judgments concerning motor-perceptual training. There are some instructors who are strongly opposed to any such program, while others are

objectively awaiting more conclusive evidence. This study will add more information in the field of motor-perceptual training and its relationship to reading success.

Definition of Terms

Perceptual-Motor and/or Motor-Perceptual.--For the purpose of this study and for ease in measurement, the term perceptual-motor will be separated into two components. Perception will be thought of as various types of sensory cues influencing performance.[9] It will be measured by the Frostig Developmental Test of Visual Perception which presents an overall perceptual quotient based on five perceptual skills: eye-hand coordination, figure ground, constancy of shape, position in shape, and spatial relationships. Motor skill implies the development of high degrees of precision in specific activities or a limited group of activities.[10] The Purdue Perceptual-Motor Survey will be used to place a child on a continuum from gross to fine. The term motor-perceptual is introduced and will be utilized due to the curriculum used, Improving Motor-Perceptual Skills. This program was developed by researchers at the Northwest Regional

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[9]Cratty, op. cit., p. 12.

[10]Eugene G. Roach and Newell C. Kephart, The Purdue Perceptual-Motor Survey (Columbus, Ohio: Charles E. Merrill Books, Inc., 1966).

Educational Laboratory. The terms perceptual-motor or motor perceptual will be used interchangeably throughout the study.

Reading Achievement.--Reading achievement will be defined as the grade level obtained from the Gates-MacGinitie Reading Test given in February and then ten weeks later.

Suburban Children.--Suburban children will be those who live and attend school in a community outlying a city.[11]

Urban Children.--Urban children will be those children who live and attend school in the central part of a large city. These areas have a high concentration of low-income families.

Hypotheses

In this study, twelve hypotheses are tested. For convenience, the hypotheses are presented under three major areas: reading achievement, perception, and motor achievement. Hypotheses 1c, 2c, and 3c infer that urban children will improve in all aspects of this planned program to a significantly greater degree than the suburban children. This is based on research of Cohen who states:

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[11]William Morris, ed., The American Heritage Dictionary of the English Language (Boston: Houghton Mifflin Company, 1969), p. 1284.

> Children from deprived environments appear to lack certain quantities and qualities of these (visual perceptual, visual motor, tactual and kinesthetic) experiences.[12]

Therefore a thorough sequential program of visual-motor activities should prove of greater benefit to urban children.

Reading Achievement

I. First-grade children who receive motor-perceptual training will make significantly greater gains in reading achievement when compared with first-grade children who do not receive this training as measured by the Gates-MacGinitie Reading Test.

   A. First-grade children in urban schools who receive motor-perceptual training will make significantly greater gains in reading achievement when compared with first-grade children in urban schools who do not receive such training as measured by the Gates-MacGinitie Reading Test.

   B. First-grade children in suburban schools who receive motor-perceptual training will make significantly greater gains in reading achievement when compared with first-grade children in suburban schools who do not

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[12] S. Alan Cohen, Teach Them All to Read-Theory, Methods and Materials for Teaching Disadvantages (New York: Random House, 1969), p. 80.

receive such training as measured by the Gates-MacGinitie Reading Test.

C. First-grade children in urban schools who receive motor-perceptual training will make significantly greater gains in reading achievement when compared with first-grade children in suburban schools who also receive such training as measured by the Gates MacGinitie Reading Test.

Perceptual Training

II. First-grade children who receive motor-perceptual training will make significantly greater gains in perceptual achievement when compared with first-grade children who do not receive such training as measured by the Frostig Developmental Test of Visual Perception.

A. First-grade children in urban schools who receive motor-perceptual training will make significantly greater gains in perceptual achievement when compared with urban children who do not receive such training as measured by the Frostig Developmental Test of Visual Perception.

B. First-grade children in suburban schools who receive motor-perceptual training will make

significantly greater gains in perceptual achievement when compared with suburban children who do not receive such training as measured by the Frostig Developmental Test of Visual Perception.

C. First-grade children in urban schools who receive motor-perceptual training will make significantly greater gains in perceptual achievement when compared with first-grade children in suburban schools who also receive such training as measured by the Frostig Developmental Test of Visual Perception.

Motor Achievement

III. First-grade children who receive motor-perceptual training will make significantly greater gains in motor achievement when compared with first-grade children who do not receive such training as measured by the Purdue Perceptual-Motor Survey.

A. First-grade children in urban schools who receive motor-perceptual training will make significantly greater gains in motor achievement when compared with urban children who do not receive such training as measured by the Purdue Perceptual-Motor Survey.

B. First-grade children in suburban schools who receive motor-perceptual training will make significantly greater gains in motor achievement when compared with urban children who do not receive such training as measured by the Purdue Perceptual Motor Survey.

C. First-grade children in urban schools who receive motor-perceptual training will make significantly greater gains in motor achievement when compared with suburban children who also receive such training as measured by the Purdue Perceptual-Motor Survey.

Background Theories

The present interest and research in the area of motor training and perceptual deficiency is based on earlier theories of the importance of physiological competence. The current leaders in this area emphasize different aspects of motor training. The common link among all of them is the agreement that efficient functioning of sense modalities is the foundation on which the forms of higher cognitive processes are built.[13]

Five of the major theoreticians who have advocated motor-perceptual training for various reasons are:

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[13]Kephart, op. cit., p. 12.

Kephart, Barsch, Getman, Cratty, and Frostig. Kephart emphasizes the importance of perceptual-motor match. He feels that there is an interrelationship between gross motor activities in early childhood and perceptual skills in later developmental years. Kephart advocates the establishment of four types of basic motor generalizations which support perceptual accuracy and improve intelligence. They are posture and balance, locamotor training, contact and receipt, and propulsion. He develops exercises to fit each one of these categories.[14]

The most important factor in determining whether to use Kephart's procedures is the developmental level of the children in sensory-perceptual-motor areas. If the children are found deficient in one of the four areas, it is assumed that these children would profit from the techniques described by Kephart.

Barsch has developed what he terms a "movigenics" curriculum, a theory of movements. It is oriented toward helping the individual move about in many "space worlds." He is highly organized in his approach to movement training. Barsch states that survival in a spatial world is the prime objective of movement efficiency. The theory rests on ten postulates derived from the theorists and researchers in many disciplines. From the postulates,

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[14] Ibid., pp. 158-275.

he derives twelve dimensions pertaining to human learning.

The curriculum derived by Barsch is based on the twelve dimensions of development. They are muscular strength, dynamic balance, spatial awareness, body awareness, visual dynamics, auditory dynamics, kinesthetic, tactual dynamics, bilaterality, rhythm, flexibility, and motor planning.[15] In two volumes of work, Barsch prescribes activities for each of these areas.[16]

It is Getman's contention that, as most learning takes place through vision, improvement in ocular functioning will exert a positive influence on classroom performance. There are four concepts characteristic of Getman's remedial approach:

1. Educational success depends heavily on visual adequacy;
2. Direct experiences enhance perceptual development;
3. Children learn to perceive and learn to learn as well;
4. Perceptual success follows a logical, systematic sequence of development.[17]

He then outlines a program using these four concepts and establishes them in six sequential and interrelated developmental stages. These are based on the first years

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[15]Ray Barsch, A Movigenic Curriculum (Madison, Wis.: State Department of Public Instruction, 1965).

[16]Ibid., pp. 125-30.

[17]Getman, op. cit., pp. 24-31.

of life and include general movement patterns, special movement patterns, eye movement patterns, visual language patterns, visualization patterns, and visual perceptual organizations. Again exercises are recommended for each area.[18]

Cratty uses psychology, medicine, and education and attempts to integrate a program based on learning theory. He is primarily a physical education teacher who believes in using physical education as a means of giving success to children. Cratty holds that with success through physical education programs, children's self-esteem will increase and so will academic achievement. Throughout Cratty's program, the teacher is encouraged to assess accurately the learner, the situation, and herself prior to forming a plan. Cratty contends that a teacher should be sensitive to the numerous conditions which mold and channel performance. The teacher should then be flexible enough to use what she knows and apply it to each situation which arises.[19]

Frostig is best known for her application and testing of theories dealing with visual perception as demonstrated in the Administration and Scoring Manual of the Frostig Test of Visual Perception. Perceptual quotient is

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[18] Ibid.

[19] Cratty, op. cit., p. 291.

a deviation score obtained from the sum of the subtest scale scores after correction for age variation. It is defined in terms of constant percentiles for each age group with a median of 100 and upper and lower quartiles of 110 and 90 respectively.[20]

The five subtests include the following. (1) The eye-hand coordination which explores a restricted area of motor skills. (2) The figure-ground subtest which requires discriminating between intersecting figures and finding hidden figures. (3) Perceptual constancy which concerns the ability to recognize what is perceived as belonging to a specific class regardless of the image on the retina. (4) Position in space which refers to the ability to see an object in relation to one's own body. (5) Spatial relationship which refers to the ability to recognize the position of objects of reference points in relation to each other.[21]

Limitations

This study will have certain limitations. One limitation is that only four first grades will be used in each setting, urban and suburban. The small sample, then, will result in limited generalizations in relation to other populations.

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[20]Frostig, Lefener, and Whittlesey, op. cit., p. 5.

[21]Ibid., pp. 8-12.

Another limitation is that motor-perceptual training will only be carried on for ten weeks and any recommendations will be based on this training period. The ten-week period will be used because a student teacher or teacher aide may be available for only a ten-week period. Another factor affecting the time period is that cooperating teachers may be more willing to work for a short period of time rather than a whole year.

Overview of the Study

The general format of the study is organized in the following manner. In Chapter II, the research in the area of motor-perceptual training is examined. Special attention is given to the types of study, correlation or causal. Each section is also summarized. Procedures used in the study to secure the sample, devise the method of investigation, record the data, and collect the results are detailed in Chapter III. The results of this study are presented in Chapter IV. The summary and conclusions, as well as recommendations and implications for future research are presented in Chapter V.

CHAPTER II

A REVIEW OF THE LITERATURE AND RESEARCH

In this chapter, the literature pertinent to the importance of motor-perceptual training as well as the literature pertinent to visual perception is reviewed. Research studies are also reviewed in both of these areas. They include two different designs: the causal and correlated studies. Causal studies are those studies where the treatment prescribed for an experimental group has directly influenced a change in that group's behavior. For example, the motor-perceptual program for an experimental group of first graders causes a change in reading achievement test scores after a period of training. The correlation studies are those studies which seem to show a relationship of some type between those factors being studied. An example is the possibility that there is a relationship between perceptual-motor test scores and reading achievement test scores on two different tests.

These two types of studies are separated because of their different purposes and are reviewed separately in this chapter. Finally, a summary which analyzes the

research for each of the sections is briefly presented at the conclusion of this chapter.

Relative Importance of Perceptual-Motor Training

During the past decade, there has been increasing concern over the large number of children with learning problems. Many educators are interested in the movement attributes of such children. Cratty and Martin list the factors which contribute to this interest:

> (a) the emergence of well publicized theories which suggest that ordering a child to move better will remediate other educational deficiencies; (b) the tasks stemming from these theories are relatively easy to execute and to understand; (c) the growing awareness among educators that the obvious things some children cannot do well may contribute directly or subtly to their total well being.[1]

Cratty further states that perceptual-motor deficits should be identified as early as possible and children having these deficits should be placed in remedial programs.[2]

Harris reports that there are many specialists in learning disabilities who believe in special physiological or neurological conditions caused by heredity, severe environmental deprivation, or brain damage. These factors make it extremely difficult for some children with

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[1]Bryant J. Cratty and Sister Mary Margaret Martin, Perceptual-Motor Efficiency in Children (Philadelphia: Lee and Febiger, 1969), p. 1.

[2]Ibid., p. 3.

otherwise normal intelligence to learn to read. Among the characteristics stressed as frequently found in this group are poor visual and auditory perception, poor ability to make visual-auditory associations, directional confusion, distractibility, motor restlessness, clumsiness, and a short attention span.[3]

Myers and Hammill, in a summary of the beliefs of perceptual-motor theorists Barsch, Getman, and Kephart, state that the child's difficulty in reading has its beginnings in a more basic problem. That problem is perceptual-motor deficits. Once the child is trained thoroughly in perceptual-motor areas, he can then be taught to read by any of the standard teaching methods.[4]

Kephart states that some cases of reading difficulty are associated with perceptual-motor problems. These children with reading difficulties also fail to develop basic motor structure. Kephart suggests an entire space structure that a child must first internalize before he approaches the printed page. This space structure

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[3]Albert J. Harris, "Diagnosis and Remedial Instruction in Reading," Innovation and Change in Reading, Sixty-seventh Yearbook of the National Society for the Study of Education, Part II (Chicago: University of Chicago Press, 1968), pp. 159-94.

[4]Patricia I. Myers and Donald D. Hammill, Methods for Learning Disorders (New York: John Wiley and Sons, Inc., 1964), p. 83.

consists of body orientation, sequence, space localization, space structure, laterality, and directionality.[5]

Zaeske suggests that a child must be able to integrate his motor knowledge with perceiving information. A child who cannot make this perceptual-motor match lives in a world of confused impressions. He further suggests that this child will have difficulty with higher cognitive level learnings.[6]

Tarpey, in his review of Piaget, Hunt, and Kephart, suggests that they do not see development as automatic but rather as a process delayed or accelerated by the individuals' experiences with their environment. It is important to understand what children bring to school with them. It is often observed that children with learning difficulties exhibit some kind of movement or motor problem.[7]

Balow suggests six reasons why perceptual-motor programs may be added to curricula in the primary grades:

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[5]Newell C. Kephart, "Perceptual-Motor Aspects of Reading," Reading and Inquiry, ed. by J. Allen Figurel, Proceedings of the International Reading Association (Newark, Delaware: International Reading Association, 1965), pp. 363-66.

[6]Arnold Zaeske, "The Diagnosis of Sensory-Motor Disabilities," Reading Disability and Perception, ed. by George D. Spache, Proceedings of the International Reading Association (Newark, Delaware: International Reading Association, 1969), pp. 52-57.

[7]James Tarpey, "Motor-Perceptual Development and Physical Education," The Physical Educator, XXVIII (March, 1971), 11-12.

(1) the enjoyment and developmental appropriateness of motor activity, particularly for primary school boys for whom sitting still is so inappropriate developmentally;
(2) the personal recognition of success that can attend motor-perceptual activities, particularly for pupils long used to failure in school;
(3) the accompanying positive attention from significant adults; usually the classroom teacher, but often others as well;
(4) the fact of teaching, in direct drill form, a set of visual and motor skills that may be weak, or absent, and which relate to school demands but ordinarily are left to develop incidentally;
(5) teaching, via such visual and motor activities, habits and skills of attention, without which it is most difficult to succeed in school;
(6) teaching, via such visual and motor activities, habits, and skills of following direction, without which it is most difficult to succeed in school.[8]

Balow also cautions that these are non-specific additions and they will not replace specific skill teaching.[9]

Tidgewell attempts to summarize on what the theorists agree and disagree. He contends that motor-perceptual theorists disagree on terms and this causes a conflict. They also disagree on certain issues:

> Reconstructionism vs. critical period: Can gaps be filled in by going back and recovering the sequences, or, once having passed an optimum time for the learning a skill precept or concept, is it impossible to reconstruct?
> Sensory Integration: Which is the most important sense and when is it the most important?[10]

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[8]Bruce Balow, "Perceptual-Motor Activities in the Treatment of Severe Reading Disability," The Reading Teacher, XXIV, No. 6 (March, 1971), 523-24.

[9]Ibid.

[10]L. Tidgewell, "Motor-Perceptual Development: A Base for Reading?" Claremont Reading Conference, Thirty-first Yearbook, ed. by M. P. Duglass (Claremont, Calif.:

However, Tidgewell says that the perceptual-motor theorists do agree on three basic issues:

> 1) It is often observed that children with learning difficulties exhibit some kind of movement or motor problem. Kephart has differentiated between motor skills and motor patterns which permit the child to move in/over/around/through his environment without conscious effort. There is also the recognition that a child's problem may have arisen in the perceptual or conceptual level as well as at the motor level. 2) The literature seems to point more and more to the necessity of understanding what the child brings to school. If he brings a wealth of experiences with his environment, he comes better equipped for symbolic learning. Since his methods of modifying and being modified by his environment are via the senses and movement, we may conclude that by freeing the child to explore through movement, and helping him develop and integrate the sensory stimuli, we are providing him with the ingredients for a recipe of success with symbolic learning. Related to this is the stress on the kinesthetic and tactile senses. 3) The importance of the development of the child's body image and self-concept is another recurring theme.[11]

Tidgewell summarizes by saying,

> We must recognize the need for more movement experiences as evidenced by the observation that the child with learning problems often has motor problems and that increased movement opportunities often seems to help the poor learner.[12]

Correlation Studies in Perceptual-Motor Training

This section includes studies which suggest a relationship between perceptual-motor training and reading achievement. Investigators also try to show a relationship

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Claremont Graduate School Curriculum Laboratory, 1967), p. 231.

[11] *Ibid.*, pp. 233-34. [12] *Ibid.*

between academic aptitude and perceptual-motor training as well as academic achievement and perceptual-motor training.

In a correlation study, de Hirsch et al. attempted to determine the extent to which certain tests administered at kindergraten level to a sample of the general population predicted reading, writing, and spelling achievement two and a half years later in second grade. One of the instruments which correlated significantly with second-grade achievement was the Bender Visual Motor Gestalt Test. The researchers recommended "transition classes" between kindergarten and first grade with a variety of perceptual and gross motor training activities.[13]

Chissom, through correlational analysis, studied the degree of relationship between motor skills and academic achievement and between motor skills and academic aptitude in first-grade boys and third-grade boys. Chissom selected the Otis-Lennon Mental Ability Test Elementary I Form J as his criterion measure for academic aptitude. For academic achievement, a specially constructed teacher rating scale was used. For motor achievement, nine motor tasks were selected from various motor tests and surveys. The relationship between motor abilities and academic aptitude and academic achievement was statistically

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[13]Katrina de Hirsch, Jeannette J. Jansky, and William S. Langford, Predicting Reading Failure (New York: Harper and Row, 1966), pp. 86-87.

significant for the first-grade group of boys and not significant for the third-grade group of boys.[14]

Skubic and Anderson investigated the relationship between perceptual-motor achievement, academic achievement, and intelligence. Eighty-six fourth-grade boys and girls of normal intelligence were studied. Forty-one were then designated as low achievers and forty-five were designated as high achievers according to the Stanford Achievement Test. The California Test of Mental Maturity and a perceptual-motor battery consisting of eleven tests were also administered to the children.

Scores on the perceptual-motor battery for all children correlated significantly with their California Test of Mental Maturity and Stanford Achievement Test scores. The combined group of male and female high achievers performed significantly better than the low achievers on all subtests of the aptitude battery. The high achievers also performed significantly better on six of the eleven motor tests. On the five remaining tests, no differences were noted.[15]

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[14]Brad S. Chissom, "A Factor-Analytic Study of Relationship of Motor Factors to Academic Criteria for First and Third Grade Boys," Child Development, XLII (October, 1971), 1133-43.

[15]Vera Skubic and Marian Anderson, "The Inter-relationship of Perceptual-Motor Achievement, Academic Achievement, and Intelligence of Fourth Grade Children," Journal of Learning Disabilities, III (August, 1970), 413-20.

Pedder studied the relationship of visual-motor skills to reading achievement to determine whether the prediction of reading success was related more to a measure of integrated visual motor functioning or to separate measures of visual-discrimination and motor functioning. The sample consisted of eighty-four first-grade boys. Integrated functioning was measured by the Bender Gestalt Test and reading (word recognition) was measured by the Wide Range Achievement Test. Perception was measured by the Frostig Tests and Science Research Associates Perceptual Speed Tests. An R (multiple correlation of .54 ($p < .01$) was obtained between word recognition and integrated visual motor skills. An R of .56 ($p < .01$) was obtained between word recognition and separate perceptual and motor measures. Statistics were also computed on comprehension test scores and their relationship to an integrated test or separate test score measures in the prediction of comprehension. The major finding was that, with intelligence (Mental Age score of SRA Verbal Meaning Test), the Bender Gestalt Test was able to predict reading achievement as well as the combination of intelligence and separate measures of visual perception and perceptual speed.[16]

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[16]Donald Pedder, "Discrimination Abilities and Motor Skills in Relation to Reading," Dissertation Abstracts, XXXII (1971), 252A.

Chang and Chang conducted a study to obtain data on the relationship of reading achievement to visual-motor development. They hypothesized that there would be a higher correlation between visual-motor skills and reading skills in a sample of younger, superior, primary students than there would be for older, average, primary students. The findings indicated that the relationship of visual-motor development and reading achievement were positive and significantly higher for the younger superior and gifted pupils.[17]

Kalakian explored the possibility of predicting academic achievement from perceptual-motor efficiency. Twenty educable mentally retarded children served as subjects. The Purdue Perceptual-Motor Survey was utilized as the measure of perceptual-motor efficiency. The Lower Primary California Achievement Test: Reading and Arithmetic was used as the measure of academic achievement. Seven significant correlation coefficients were found to exist between perceptual-motor efficiency and academic achievement with a range from .44 to .66.[18]

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[17]T. M. C. Chang and Vivian Chang, "Relation of Visual Motor Skills and Reading Achievement in Primary Grade Pupils of Superior Ability," Perceptual and Motor Skills, XXIV (February, 1967), 51-53.

[18]Leonard H. Kalakian, "Predicting Academic Achievement from Perceptual-Motor Efficiency in Educable Mentally Retarded Children," Dissertation Abstracts, XXXII (1971), 3122.

Causal Studies in Perceptual-Motor Training

Many of the investigations in the area of perceptual-motor training are causal studies. Most of these studies attempt to show a cause (perceptual-motor training) and effect (reading achievement or academic achievement) relationship.

Sapir attempted to determine whether children with deficits in perceptual-motor skills and language development difficulties grouped in small self-contained classes, taught with special techniques, and trained in the areas of the deficit made more gains than those in traditional heterogeneous classes. Group one was composed of one experimental class with twelve children diagnosed as having perceptual and language difficulties. Group two was a group composed of eighteen children, six with problems and twelve normal children. Group three consisted of twenty-four heterogeneous children. Groups two and three received traditional methods of instruction while Group one received special perceptual-motor and language treatment. Experimental children received treatment from October until March. At the end of the experiment, the experimental group showed significantly greater growth in language development and perceptual-motor training. However, academic achievement at the end of first grade showed no important differences. The researcher in this

study believed that the samples were too small and the length of her training too short to cause academic changes.[19]

Silver, Hagen, and Hersh reported that ten boys with reading disabilities, ranging in age from eight to eleven, and having a WISC I.Q. above 85, were paired on age, I.Q., and diagnoses with ten other boys. One member of each pair received six months of individual training in perceptual stimulation in areas of maximal deficit. The other member of the pair received conventional teaching from a basal reading series from the same teacher. Each child received two forty-five minute individual sessions per week. The group that received perceptual training made significant improvement on the Wide Range Achievement Test Reading and Spelling and on the Metropolitan Reading Achievement Test. The group which received individual conventional reading instruction failed to make significant improvement in any of these areas.[20]

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[19]Selma G. Sapir, "A Pilot Approach to the Education of First Grade Public School Children with Problems in Bodily Schema, Perceptual-Motor, and Language Development," ERIC Document No. ED 024163 (April, 1967).

[20]Archie Silver, Rosa A. Hagin, and Marilyn F. Hersh, "Specific Reading Disability: Teaching Through Stimulation of Deficit Perceptual Areas" (paper presented to the American Orthopsychiatric Association, March 20, 1965, New York Department of Psychiatry and Neurology, New York University Medical Center) printed in Review of Educational Research, XXXIII (February, 1966).

Lipton studied the effects of a perceptual-motor physical education program on visual perception and reading readiness of first-grade children. He used four first-grade classes which were equated on the variables of age, height, sex, and weight. Two of the classes became the experimental group and two became the control group. The experimental group had a special physical education curriculum concentrating on perceptual-motor development while the control had a regular physical education program. The results on the post test were all significant beyond the .01 level in support of the perceptual-motor experimental group for the three variables tested.[21]

Painter investigated the effects of a highly structural rhythmic and sensory motor activity program. Kindergarten children were used in the program which included body image training and perceptual-motor integration. Twenty children in the lower 50 per cent of a kindergarten class were matched and placed into experimental and control groups. The experimental group received twenty one-half hour training sessions three times a week for a period of seven weeks. The experimental group showed higher gains in body image as tested by the Draw A

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[21]Edward D. Lipton, "A Perceptual-Motor Development Program's Effect on Visual Perception and Reading Readiness on First Grade Children," Research Quarterly American Association of Health, Physical Education, and Research, XLI (October, 1970), 402-05.

Man Test, and higher psycholinguistic competence as tested by the Illinois Test of Psycholinguistic Ability.[22]

Warry explored the effect of perceptual-motor training on thirty boys, nine to twelve years of age, who were classified as remedial readers. The samples were divided randomly into two groups both of which received remedial reading instruction. The experimental group also received perceptual-motor training. Of the thirty-three variables tested, eighteen were significantly different as determined by the "t" test at the .05 level of significance in favor of the experimental group. The differences appeared not only in all areas of reading, but also in writing, spelling, language mechanics, and listening. The study appears to produce evidence that perceptual-motor training does make a difference in the reading performance of the so-called "disabled reader."[23]

Rutherford studied the effects of a perceptual-motor training program on the performance of normal kindergarten children on the Metropolitan Readiness Test. Subjects for the study were the sixty-four children enrolled in four kindergarten classes. Through random

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[22]Genevine B. Painter, "The Effect of A Rhythmic and Sensory Motor Activity Program on Perceptual-Motor-Spatial Abilities of Kindergarten Children," Exceptional Children, XXXIII (October, 1966), 113-15.

[23]Rhoda E. Wharry, "Perceptual-Motor Generalizations and Remedial Reading," Dissertation Abstracts, XXIX (1969), 1930-A.

assignment, the children were divided into experimental and control groups. The difference in mean gains between the experimental and control groups was significant at the .01 level in favor of the experimental group. The study also indicated that the training program was more effective for boys than for girls in the area of reading readiness.[24]

Moroson conducted a study with seventy-seven third and fourth grade children. All the children were involved in remedial reading instruction. His major purpose was to investigate if a group visual-motor-perceptual training program over a three-month period would raise the reading achievement scores of children who received such training in comparison with those who did not. Children in the experimental group received Getman's and Kephart's perceptual-motor training in groups of five or six three times a week for thirty minutes. Moroson also included a placebo group as well as a control group. The placebo group received three periods a week of art training. The statistical analysis of the data indicated that the experimental group made significant gains ($p < .01$) in reading over each of the other groups.[25]

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[24]William L. Rutherford, "Effects of a Perceptual-Motor Training Program on the Performance of Kindergarten Pupils on the Metropolitan Readiness Tests," Dissertation Abstracts, XXV (1965), 4584-85.

[25]Gloria S. Moroson, "The Effects of Perceptual Training on the Reading Achievement of Third and Fourth

The area of perceptual-motor training is one where great controversy is found. Research related to perceptual-motor training programs is both supportive and non-supportive of such programs. A review of this research indicates the diversity of conclusions. The following studies are those which are non-supportive of motor-perceptual training.

Most researchers in the area of perceptual-motor training investigate perceptual-motor training on young children six, seven, and eight years old. Roach deviated from this age group by attempting to work with slow readers ranging in ages from eight to thirteen. Eighty children were divided into two equal groups matched by age, sex, grade placement, reading level, and Peabody Picture Vocabulary Test results. The experimental group was divided into smaller groups of six to eight children. Each group received thirty minutes of perceptual-motor training each day for eight weeks. Reading was measured at the beginning and end of this program. The growth in reading achievement for the experimental group during the period of study was not significantly superior to that of the control group.[26]

Grade Retarded Readers," Dissertation Abstracts, XXXI (1970), 2192.

[26]Eugene G. Roach, "Evaluation of an Experimental Program of Perceptual Motor Training with Slow Readers," Vistas in Reading, ed. by J. Allen Figurel, Proceedings of the International Reading Association (Newark, Delaware: International Reading Association, 1966), pp. 446-50.

Roy and Roy, in an Office of Education sponsored project, investigated whether a perceptual training program increased the likelihood that kindergarten children would succeed in learning to read. Forty-five kindergarten children were randomly placed into three groups. Group one received a perceptual training program, group two received augmented attention, but no program, and Group three was a control group which received no special program or attention. The program and attention sessions were carried on once a week for twenty-five minutes during the entire school year. Children in Group one, perceptual training, scored higher than those in Group two, augmented attention, who in turn scored higher than children in the third group, control. However, the differences were not significant.[27]

Litchfield attempted to determine to what extent visual motor and perceptual training would improve the reading and general achievement of children with visual motor and perceptual difficulties. Eighty first, second, and third graders identified as having such handicaps were randomly divided into experimental and control groups. For one-half hour sessions each day for six months, training exercises and activities were conducted in visual motor

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[27]Irving Roy and Muriel Roy, "Effects of a Kindergarten Program of Perceptual Training Upon the Later Development of Reading," XVIII, ERIC Document No. ED 030491 (October, 1968).

and perceptual categories. Pre- and post-tests were used in all areas. The achievement tests showed no gains for the experimental group over the control group. However, the tests which were used for visual motor functioning showed more improvement by the experimental group.[28]

August examined the effect of a physical education program emphasizing the development of laterality and directionality skills on: (a) reading readiness, (b) visual perception, and (c) perceptual motor development in an experimental group of kindergarten children. There were six experimental and six control groups, each having twenty kindergarten boys and girls. All of the children received a thirty-six session physical education program. The experimental group received a special program emphasizing directionality and laterality. The control subjects received the conventional primary program. The conclusions were: (1) a physical education program emphasizing laterality and directionality raised the level of visual perception and perceptual-motor performances significantly for a group of kindergarten children; and (2) the changes in perceptual-motor performances did not significantly

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[28]Tinknor B. Litchfield, "A Program of Visual-Motor-Perceptual Training to Determine Its Effects Upon Reading and Learning Deficiencies" (final report, Ramopo Central School District 1, Albany, New York, New York State Education Department, 1969).

correlate with the changes in reading readiness and visual perception.[29]

The Relative Importance of Visual Perception

Most authorities agree that visual perception is important in the beginning stages of reading, particularly in the primary grades. Beyond this level, other skills are assumed to be of greater importance to the reading process.

Visual perception in reading according to Vernon is a four-part process in which the child reading a word attends to it until he can translate the printed word form into its oral counterpart. First he is aware of the visual symbols standing out from the background of the page of the book. Second, he sees essential similarities for the general classification of the word. Third, he classifies the visual symbols of the word within the general class. Fourth, he identifies the word, usually by naming it. Visual perception then is a learned process which considers acuity, discrimination, and memory.[30]

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[29]Irwin August, "A Study of the Effect of a Physical Education Program on Reading Readiness, Visual Perception, and Perceptual-Motor Development in Kindergarten Children," Dissertation Abstracts, XXXI (1970), 3212.

[30]M. D. Vernon, The Psychology of Perception (Baltimore: Penguine Books, Inc., 1962).

Coleman suggests that vision and visual perceptual experiences play a key role in the child's understanding of the environment. Those children who have visual-perceptual deficits are generally low in academic achievement and are poorly adjusted in the classroom. The period of maximum development of vision and visual-perceptual skills occurs during the early school years. Any gaps in development at this time may severely handicap the growth and the development of the child.[31]

Frostig states that visual perception difficulties are frequently found in children with learning difficulties. She continues,

> . . . it must be stressed, however, that all psychological functions are interrelated. Although perceptual training may often need to be the focus of a development of remedial reading, it cannot be divorced from training in language, sensory-motor functioning, higher thought processes and social behavior. In addition it must be kept in mind that perception needs to be practiced until it becomes automatic, that training in memory and in attention are of great importance, and that any techniques which help the child to direct his attention appropriately is valuable.[32]

Deutsch argues from a sociological position that the kinds of experiences which influence specific aspects of perception and the way in which they are influential

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[31]Howard Coleman, "Visual Perception and Reading Dysfunction," Journal of Learning Disabilities, I (February, 1968), 116-23.

[32]Marianne Frostig, "Visual Perception, Integrative Functions and Academic Learning," Journal of Learning Disabilities, V (January, 1972), 1-3.

should be considered. It is her thesis that the quantity of experiences in making the discriminations influences the level of skill in discriminating. Fewer stimuli mean fewer opportunities for differentiation; too many stimuli may mean distraction and little opportunity for establishing discrimination.[33]

de Hirsch designed tests to discover potential reading difficulties at the six-year level. Visual perception of a child who was ready to learn to read was described as the ability to differentiate small details, to use the relationship between parts and the whole, to see a figure stand out from its background, to perceive relationships as in sorting and categorizing, and to develop concepts of spatial relationships. She found that some children were unable to differentiate the "figure" from the "ground." Nothing on the printed page stood out for them; instead, the page appeared as a meaningless design. She stated that visual-motor competence of poor readers was inferior to that of good readers.[34]

Of special interest is a study by Goins in which she administered fourteen perceptual measures to two first

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[33]Cynthia P. Deutsch, "Sociological Aspects of Reading," Perception and Reading, ed. by Helen K. Smith, Proceedings of the International Reading Association (Newark, Delaware: International Reading Association, 1968), pp. 112-23.

[34]Katrina de Hirsch, "Prediction of Reading Disability," Bulletin of the Orton Society, VIII (1963), 72-74.

grades. Her purpose was to determine if there was any relation between performance on the tests and reading achievement. Goins determined that scores on pattern copying and reversals on the combined perceptual score correlated most highly with reading achievement. Two other factors also rated highly. One she called P-1, which was related to speed of perception. The second factor was called P-2, which was designed as strength of closure or the ability to keep in mind a figure from a distraction.[35]

Barrett reported that three out of nine readiness factors made strong contributions in predicting first-grade reading achievement. One of these factors, pattern copying, appeared to support Goins' findings.[36]

Frostig describes a perceptual instrument which is purported to be useful as a predictive and diagnostic measure. The test diagnoses five areas of visual perception. The Frostig Test of Visual Perception measures perception in the areas of visual motor coordination, position in space, spatial relationship, figure-ground perception, and form constancy.[37]

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[35]Jean T. Goins, Visual Perceptual Abilities and Early Reading Progress, Supplementary Educational Monographs 87 (Chicago: University of Chicago Press, 1958).

[36]Thomas Barrett, "Visual Discrimination Tasks as Predictors of First Grade Reading Achievement," Reading Teacher, XVIII (January, 1965), 276-82.

[37]Marianne Frostig and David Horne, The Frostig Test of Visual Perception (Palo Alto, Calif.: Consulting Psychologists Corporation, 1966).

Frostig has also developed a training program which provides aid to teachers in training children who are diagnosed as having visual perceptual difficulties.[38]

From the literature briefly reviewed, it appears that visual perception is one of the factors which influences a primary child's reading ability.

Correlation Studies in Visual Perception Training

In this section the research reported illustrates that there is a relationship between visual perception and reading achievement. Researchers also attempt to discover relationships between visual perception and other variables such as intelligence and reading readiness.

Sprague evaluated the Frostig Visual Perception Test as a predictor of reading achievement in first-grade children. The study group was selected from first grades in one school system. The children were given the Frostig Visual Perception Tests and Draw-a-Figure Test. The scores of the Metropolitan Readiness, Reading Achievement Tests, and other data were obtained from each child's cumulative school record form. Coefficients of correlation were obtained between the scores of the various tests and subtests. The significant correlations between the Frostig Visual Perception Tests, and the Metropolitan Readiness

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[38]Marianne Frostig, Program of Visual Perception (Chicago: Follett Publishing Company, 1964).

Test, and the Reading Achievement Tests indicated the importance of visual perception in pre-reading and later reading achievement.[39]

Ayres' study was designed to discover and demonstrate relationships among the different kinds of sensory perception, motor activity, laterality, and selected areas of cognitive functions. A battery of thirty-five perceptual-motor tests were given individually to each member of two separate groups of children. One group was selected on the basis of suspected or known perceptual deficits; the other group was chosen from the public and private schools without reference to behavior or academic performance. Sixty-nine males and thirty-one females comprised the group with suspected perceptual dysfunction. The control group of fifty was chosen to approximate the experimental group on variables of age, intelligence, and socio-economic class. Intercorrelations between the thirty-five test scores plus age were subjected to an R-technique (multiple correlations). For the dysfunction group, twenty-three factors emerged from the R-technique analysis. Five factors accounted for most of the variance: (1) poor movement control; (2) deficient visual, tactile, and kinesthetic perception of position in two-dimensional space; (3) hyperactive, distractable behavior,

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[39]Ruth H. Sprague, "Learning Difficulties of First Grade Children Diagnosed by the Frostig Visual Perception Tests; a Factor Analytic Study," Dissertation Abstracts, XXV (1964), 4006.

and avoidance of tactile stimulation; (4) deficient left-right discrimination and coordination; (5) figure-ground discrimination. She then described and proposed means of identification for each of these areas.[40]

Frostig described a pilot project with a group of twenty-five children between the ages of four and one-half and six and one-half who were to be exposed to reading material but not forced to use it. All children who decided to use it were to be given training in word attack skills, phonics, observation of configuration, and use of contextual clues. The Frostig test was administered and eight of the children were found to have visual perceptual quotients of ninety or below. Frostig considered this score of ninety or below to be the one where a child may have difficulty. It was predicted that these eight children would not attempt to learn to read because of difficulties. The prediction proved to be highly accurate. None of the children with a visual perceptual quotient below ninety was reading. Of the two children with a perceptual quotient of ninety, one learned to read very well while the other did not. Frostig concluded this report by stating that, in other beginning reading

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[40]Jean A. Ayres, "Patterns of Perceptual-Motor Dysfunction in Children: A Factor Analytic Study," Perceptual and Motor Skills, Monograph Supplement 20 (April, 1965), 335-88.

situations, a correlation of between .4 and .5 between the visual perception test and reading scores was reported.[41]

Bryan also investigated the importance of intelligence and visual perception in predicting reading achievement. He used ninety-one children in his population chosen from kindergarten through grade three. The Kulman-Anderson Test and the Frostig Test of Visual Perception were administered to all children and correlations were then computed. Results indicated that visual-perception as measured by the Frostig Test of Visual Perception may be applied as a predictor of reading success. At the first grade level reading achievement appeared to correlate more closely with visual perception than with intelligence or readiness.[42]

Berger also investigated the interrelationships of visual and auditory perception, intelligence, and personality traits with reading achievement at the end of grade one and attempted to determine a combination of testing instruments to be used by first-grade teachers.

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[41]Marianne Frostig, Paul Maslow, Donald Lefener, and John H. Whittlesey, The Marianne Frostig Developmental Test of Visual Perception (Palo Alto, Calif.: Consulting Psychologists Press, 1963), pp. 493-95.

[42]Quentin R. Bryan, "Relative Importance of Intelligence and Visual Perception in Predicting Reading Achievement," California Journal of Educational Research, XV (January, 1964), 44-48.

The investigator worked with two stratified samples of above and below average readers who were selected from the entire population of 5,612 children completing the first grade in Edmonton, Alberta, Canada. This was gradually broken down until the final sample came from six schools where two groups were then matched as nearly as possible on group intelligence scores. An examination of the means and the standard deviations of each subtest indicated no significant difference on subtests II and IV, figure ground and spatial relations respectively. However, subtests I and III, eye motor coordination and form constancy, showed difference at the .01 level of significance. Subtest V, spatial relations, showed a difference at the .05 level of significance. Benger concluded that: " . . . a battery of tests including the Frostig Developmental Test of Visual Perception appeared to have merit for diagnosing perceptual weaknesses which might underlie primary reading deficiencies."[43]

Olson investigated the relationship between The Frostig Test of Visual Perception and reading achievement with third-grade children. He found the correlation between the form constancy subtest and all reading skills and achievement subtests significant at the .01 level.

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[43]Kathlyn Benger, "The Relationship of Perception, Personality, Intelligence, and Grade One Reading Achievement," Perception and Reading, ed. by Helen K. Smith, Proceedings of the International Reading Association (Newark, Delaware: International Reading Association, 1968), pp. 112-23.

The total Frostig score also showed a significant correlation with all reading skills and achievement tests except spelling. Olson concluded that The Frostig Test of Visual Perception is a fair predictor of school achievement and specific reading skill ability.[44]

Ashlock studied the relationship between visual perception of children in the primary grades and reading performance. He was specifically concerned with answering three questions:

1. Are some types of visual perceptual tests more highly related to reading performance than others?
2. Is visual perceptual performance to some extent a function of the nature of the stimulus?
3. Does the importance of visual perception, as a predictor of reading performance, decrease as the grade level increases?[45]

Fifteen boys and fifteen girls in each grade, first, second, and third, constituted the sample.

Ashlock reached the following conclusions:

1. It was found that there was not a statistically significant difference in types of visual perceptual tests as to how highly they were related to reading performance.
2. The proposed hierarchy of difficulty of perceptual tasks was not found to be present at any grade level.

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[44]Arthur Olson, "School Achievement, Reading Ability, and Specific Visual Perception Skills in the Third Grade," The Reading Teacher, XIX (April, 1966), 490-92.

[45]Patrick Ashlock, "The Visual Perception of Children in the Primary Grades and Its Relation to Reading Performance," Reading and Inquiry, ed. by J. Allen Figurel, Proceedings of the International Reading Association (Newark, Delaware: International Reading Association, 1968), p. 331.

3. It was found that the importance of visual perception as a predictor of reading performance was less as the grade level increased.[46]

Most of the studies reviewed seem to indicate that visual perception is a factor that has a relationship with reading achievement at the primary grade levels.

Causal Studies in Visual Perception Training

Many researchers attempt to see if there is a causal relationship between visual perception training and reading achievement. In attempting to evaluate this relationship, the investigators institute various training programs to determine whether special training causes improvement in reading achievement. As subjects in their experiments, they use children from various grade levels and from special classes. Some of these studies are supportive and some are non-supportive of visual perception training. Both aspects are presented in this review.

Carleton evaluated the effects of a Frostig program of visual perception on pre-kindergarten children. He speculated that most pre-school programs duplicated existing programs. By introducing a visual perception training program at an early age, he hoped to develop a unique program for pre-schoolers. All of the children who were below 90 (perceptual quotient) in visual

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[46] Ibid., p. 332.

perception were randomly assigned to experimental and control groups. The experimental group received daily thirty-minute training sessions for a period of four weeks. Post-testing followed. The experimental group made significant gains in visual perception as tested by the Frostig Developmental Test of Visual Perception. However, when follow-up testing was administered in readiness at the end of kindergarten, no significant difference between experimental and control groups was found.[46]

Segal reported on the effects of four different kinds of perceptual training on I.Q. and reading readiness in a population of lower socio-economic level kindergarten children. Fifty-four disadvantaged five-year-olds were randomly assigned to treatment groups. The same general treatment was carried on in each group, but each group stressed a different kind of perceptual training. Group one stressed general readiness, non-alphabet, and visual skills; group two stressed alphabet perceptual skills in a primarily visual mode; group three stressed alphabet perceptual skills in a primarily auditory mode; and group four stressed auditory and visual alphabet. At the end of the treatment period of thirty-five days, all

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[46]Raymond C. Carleton, "An Evaluation Study of the Frostig Program in Remediating Visual-Perception Deficits with a Group of Head Start Children," Dissertation Abstracts, XXXII (1971), 2477.

four groups improved one or more stanine points on reading readiness.[47]

Alley and Snider, in a causal study evaluated the Frostig Developmental Program of Visual Perception on culturally deprived children in a reading readiness program. The study included 108 kindergarten children of unselected mental ability from an urban Iowa elementary school. They were engaged in an eight-month, twenty-five minute a day training program with the Frostig materials. All children were administered the Frostig Test of Visual Perception and the Metropolitan Reading Readiness Tests. Significant differences at the .05 level of significance in mean scores were assessed when comparing the two groups on a reading readiness measure after eight months of visual perceptual training.[48]

In another study, McClanahan studied the effects of thirty-five hours of visual perceptual training on four groups of children. One experimental and one control group consisted of slow-learning first graders; the other experimental and control group consisted of educable

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[47]Marilyn Segal, "Effects of Four Different Perceptual Training Programs on I.Q. and Reading Readiness in the Lower Socio-Economic Level Kindergarten Child" (paper presented at the annual meeting of the American Educational Research Association, February, 1971, New York, New York), ERIC Document, ED 46974.

[48]Gordon Alley and William Snider, "Reading Readiness and the Frostig Training Program," Exceptional Children, XXXV (September, 1968), 48.

mentally retarded children. Analysis of the pre-test data yielded no significant differences between the experimental and control groups for either the slow-learning first graders or the educable mentally retarded sample. On the post-test, the first grade experimental group achieved significantly higher gains at .01 level of confidence on the Frostig Developmental Test of Visual Perception. This group also achieved significantly higher gains at the .05 level on the California Achievement Test-Reading.[49]

Studies which are non-supportive in the area of visual perception training are also cited in this section. Some investigators fail to find a definite cause and effect relationship between reading achievement and visual perception. Again, the groups with which the researchers work are varied.

A causal study which rejected visual perception training as recommended by Frostig was conducted by Wiederholt and Hammill. They reported on kindergarten and first-grade pupils who were trained in visual perception for sixteen weeks. These experimental pupils scored no higher than their controls on the academic test, The Metropolitan Achievement Test, or in readiness, the Metropolitan Readiness Test. However, the authors criticized

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[49]Lloyd J. McCanahan, "The Effectiveness of Perceptual Training for Slow Learners," Dissertation Abstracts, XXVIII (1968), 2560A.

their own study by stating that other research studies should assign subjects randomly to treatment groups, provide instruction to testers and trainers, use a larger sample, and monitor in a systematic fashion the actual training sessions.[50]

Rosen investigated the effects of perceptual training on selected measures of reading achievement in first grade. Twelve experimental classrooms of first-grade children received a concentrated twenty-nine day adaptation of the Frostig program while thirteen control classes added comparable time to the regular reading instruction program. Analysis of the data revealed significant differences between the treatment groups in most of the post-perceptual capabilities favoring the experimental groups without concommitant effects on reading criterion measures. While the total score from the Frostig appeared to have a strong predictive function regarding first-grade reading, the training of visual perception subskills did not appear to have a significant effect on reading ability at the end of first grade.[51]

Church examined the effects of two kinds of visual perception training in kindergarten on reading

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[50]J. Lee Wiederholt and Donald D. Hammill, "Use of the Frostig Horne Visual Perception Program in the Urban School," Psychology in the Schools, VIII (July, 1971), 268-74.

[51]Carl L. Rosen, "An Investigation of Perceptual Training and Reading Achievement in First Grade," American Journal of Optometry, XLV (May, 1968), 322-32.

readiness and first-grade reading ability. Her purpose was to investigate whether formal training in visual perception was more beneficial to beginning readers than informal manipulative materials designed to aid in visual perception prepared by the investigator. The subjects were children in four sections of kindergarten classes. Two groups used the Frostig Program for the Development of Visual Perception and two groups used the materials prepared by the investigator. All of the children were given the Frostig Developmental Test of Visual Perception at the beginning of the year. At the end of the kindergarten year, the Frostig test and the Metropolitan Readiness Test were administered. The following year, when the children were in first grade, a reading achievement test and another visual perception test were given. Results showed no significant differences between the two treatment groups on any measure. Both groups showed significant gains from the first administration of the Frostig Test to the second. Results indicated that one method was not superior to the other in preparing for reading readiness tests or for actual reading.[52]

Jacobs attempted to evaluate the Frostig Visual Perceptual Training Program. In each of three schools,

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[52]Marilyn Church, "Effects of Two Kinds of Visual Perception Training in Kindergarten on Reading Readiness and First Grade Reading Ability," Dissertation Abstracts, XXXII (1970), 2733.

six classes were selected: two pre-kindergarten classes, two kindergarten classes, and two first-grade classes for a total of eighteen classes. One class within each grade and each school was selected to receive the Frostig Training. The other classes were identified as the control. Pre- and post-testing was conducted in September and May. The largest difference in achievement gains between the experimental and control groups appeared at the first-grade level; less difference but still favoring the experimental groups appeared at the pre-kindergarten and kindergarten levels. All scores were significant beyond the .05 point. Jacobs also administered the Metropolitan Readiness Test to evaluate the effect of visual-perception training on reading readiness. There was no evidence in this experiment to show that experimental group children performed better on a reading readiness test.[53]

Jacobs followed up this study with another study using the same design. This time, his main purpose was to discover whether Frostig-trained children achieved better on reading tests as compared to controls. He concluded that pupils who take the Frostig program seemed to have no advantage as far as reading achievement was concerned.[54]

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[53]James N. Jacobs, "An Evaluation of the Frostig Visual-Perception Training Program," Educational Leadership, XXV (January, 1968), 332-40.

[54]James N. Jacobs, Lenore D. Wirthlin, and Charles B. Miller, "A Follow-up Evaluation of the Frostig Visual-Perceptual Training Program," Educational Leadership, XXVI (November, 1968), 169-75.

Summary of Literature and Research

The literature concerning the importance of perceptual-motor training and visual perception training is summarized in this section. Research studies of both a causal and a correlative nature are investigated in the areas of visual perception and visual-motor perception.

Many educators who write and conduct research in the area of perceptual-motor training agree on its importance in the school curriculum. Cratty, Martin, Harris, Myers, Hammill, Balow, Zaeske, Tarpey, and Tidgewell suggest various reasons why perceptual-motor training is of interest to educators. Among the reasons given are the following: a great deal of publicity in this area, the training is easy to understand and carry out, and children who exhibit reading difficulties also exhibit perceptual-motor lags. However, some of the experts mentioned caution that there is still controversy in this area. Balow strongly suggests tangential effects, but also encourages skill teaching to go along with the motor-perceptual teaching.

In the research reviewed of a correlative nature, de Hirsch and Pedder found a high correlation between reading achievement and the Bender Gestalt Test. This indicated that the Bender Gestalt Test may be a good predictor of reading achievement. Chang and Chang, and Skubic and Anderson discovered correlations between high

achieving students and their skills on a visual-motor task. Chissom found relationships between motor abilities and academic aptitude and academic achievement. Kalakian also relates seven significant correlations between perceptual-motor efficiency and academic achievement.

The correlated studies reviewed indicate a relationship between perceptual-motor efficiency, academic achievement, and reading achievement.

Causal studies in perceptual-motor training are of two types, supportive and non-supportive. Sapir, Silver, Hagen, Hersh, Lipton, Warry, Rutherford, and Moroson all report some type of positive results after perceptual-motor training with experimental groups. Most of the researchers experimented with the primary area, pre-kindergarten, kindergarten, first, and second graders. The statistical analyses indicate that the experimental groups made significant gains in reading achievement or reading readiness after perceptual-motor training.

On the opposite side, Roach, Roy and Roy, Litchfield, and August have not found any significant changes in reading readiness or reading achievement due to treatment in perceptual-motor training.

The literature written about visual perception seems to indicate its importance in the reading act. Vernon reports that perception is a four-part process and that children may have difficulty anywhere in the process.

Coleman, Frostig, and de Hirsch all indicate that visual perception training is most beneficial at an early age. Goins discovered that pattern copying and reversals correlated highly with reading achievement in first grade. Barrett substantiated the findings of Goins in a later study. Frostig describes a test and a training program which appear to have merit in diagnosing and training visual perception.

Correlation studies attempt to discover the relationship between visual perception and reading achievement and reading readiness. Sprague, Frostig, Bryan, Benger, and Olson have found significant correlations between the Frostig Test of Developmental Perception and reading achievement and in some cases reading readiness. The investigators appear to agree that the Frostig test has merit and may be a good predictor of reading success. Ashlock concluded that the importance of visual perception as a predictor of reading performance decreases as the grade level increases. Ayers has added a number of perceptual and motor tasks and then correlated them and submitted the results to factorial analysis. Five main factors associated with reading difficulties emerged: (1) poor movement control, (2) deficient visual, tactile, and kinesthetic perception of position in two-dimensional space, (3) hyperactive, distractable behavior and avoidance of tactile stimulation,

(4) deficient left-right discrimination and coordination, and (5) figure-ground discrimination.

It appears from the studies reviewed, that the Frostig Test of Visual Perception is capable of measuring visual perception. And, visual perception appears to correlate with reading achievement in some of the studies reviewed.

In the causal studies, we see both supportive and non-supportive results. However, even in supportive studies, investigators discover that only some of their hypotheses are true. An example of such a study was that of Carleton. He found increases in visual perception but not in reading readiness when he studied pre-schoolers over a period of time. Segal found an improvement in four groups of children given various types of perceptual treatment. Alley and Snider found significant differences in reading readiness after eight months of visual perception training. McClanahan found both improvement in visual perception and reading achievement when working with slow learners and educable mentally retarded children.

Some causal studies rejected visual perception training. Wiederholt, Hammill, and Church investigated visual perception training and its effect on reading readiness and reading achievement. They found no significant change in readiness scores and achievement scores. Rosen concluded that first-grade children who were trained

for thirty minutes a day for twenty-nine days on the Frostig Perception Program were not superior on the Metropolitan Reading Readiness Test. Jacobs, in his study, contends that there is no evidence which would support the claim that visual perception training increases reading achievement.

The results of an analysis of the literature and the research in both areas of perceptual-motor training and visual perception training are inconclusive. Researchers seem to agree that there is a relationship between visual perception and reading; however, the studies relating to a causal existence seem to be supportive in some instances and non-supportive in other instances.

The research investigated in this study draws on and profits from the research reported in this chapter. It strives to avoid some of the previous errors made and incorporates some new ideas. The study which is described in the next chapter investigates the effects of a motor-perceptual program on reading achievement, perception, and motor development in two populations, urban and suburban.

CHAPTER III

METHODS AND PROCEDURES

The design and sample population are described in this chapter. Also included are the measures used, the hypotheses tested, and the procedures adopted in analyzing the data.

Design

This is a comparative study with two populations, urban and suburban. Within each of these populations, two schools with two first grades each are used. This provides a total of four schools and eight first-grade classrooms. The design used is the pre-test, experimental group, control group (without pre-experimental sampling equivalence), and post-test. This design is recommended by Campbell and Stanley in Chapter Five, "Experimental and Quasi-Experimental Designs for Research on Teaching" in the Handbook of Research on Teaching.[1]

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[1]Donald T. Campbell and Julian C. Stanley, "Experimental and Quasi-Experimental Designs for Research on Teaching," Handbook of Research on Teaching, ed. by N. L. Gage (Chicago: Rand McNally and Company, 1963), pp. 171-246.

The experimental and control groups were in the same classroom. The children who received the experimental treatment were randomly selected from one-half of the population who displayed a need for this treatment. The remaining children who displayed a need became the control.

Setting of the Study

For the purposes of this study, two school districts were used, one with an urban inner-city population and one with a suburban population.

Approval was received to use two inner-city schools in a mid-western city. Both of the schools met the criteria stipulated in Chapter I. The city had a population of 130,211 people according to the 1970 census.[2] The school district had fifty elementary schools with a school population (K-6) of 18,000 pupils.

The suburban schools were chosen from a community which borders the mid-western city. Two schools were selected from this school district. They met the criteria stipulated in Chapter I. The suburban school district had six elementary schools (K-6) with a school population of 2,500 pupils.

Primary consideration was given to schools in which no other research was being conducted. In all

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[2] The State Journal (Lansing), February 6, 1972, p. P-7, col. 1.

cases, the investigator contacted principals from those recommended by central office administrators. The research project was explained to the principals and their cooperation was obtained. Meetings were then arranged with the teachers who would participate in the project.

Selection of Instruments

Four instruments were used in collecting the data. Intelligence was assessed by the Lorge-Thorndike Intelligence Test, Primary 1, Form 1, Cognitive Abilities Test. Reading achievement was assessed by the Gates-MacGinitie Reading Test, Primary A, Forms 1 and 2. Motor development was measured by the Purdue Perceptual Motor Survey. Visual perception was measured by the Frostig Test of Visual Perception, Third Edition.

Intelligence

The Lorge-Thorndike Cognitive Abilities Test was given to compare the intelligence of the experimental and control groups. This group test has pictorial materials and oral instructions which were developed for use in the kindergarten and first grades. The test consisted of three subtests, each of which took about seven or eight minutes to administer. This test was normed on a stratified sample of communities using over 136,000 children from forty-four communities in twenty-two different states. Four types of norms were developed: (1) intelligence

quotient equivalent, (2) grade percentile, (3) grade equivalent, and (4) age equivalent. Alternate form reliability ranges from .76 to .90 at all levels. The lower two levels of the primary battery correlate with the Stanford-Binet Intelligence Test at .63 and with the Wechsler Intelligence Scale for Children at .54.[3]

Reading Achievement

The Gates-MacGinitie Reading Test, Primary A, Forms 1 and 2,measured vocabulary and comprehension for first grade. This group test was available in two forms. Items for the Gates-MacGinitie Reading Tests were selected on the basis of a nationwide try out which involved more than 25,000 pupils. On the basis of the item analysis, only the most effective items were retained for use in the final forms. Norms for the tests were developed by administering the tests to a new nationwide sample of approximately 40,000 pupils in thirty-eight communities. The norms for the first grade were established in January 1965. Alternate form reliability for vocabulary is .86 and for comprehension .83. The Split-half Reliability was .91 for vocabulary and .94 for comprehension. Validity was obtained by correlation between subtests of the

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[3]Oscar K. Buros, ed., The Fifth Mental Measurements Yearbook (Highland Park, N.J.: The Gryphon Press, 1969), pp. 478-84.

Gates-MacGinitie Reading Test. Grade one vocabulary and comprehension correlated at .67.[4]

Visual Perception

The Marianne Frostig Developmental Test of Visual Perception, Third Edition, was selected as a measure of visual perception. The test was constructed to test development in five areas of visual perception.

> Test 1. Eye-motor coordination, a test of eye-hand coordination involving the drawing of continuous straight, curved, or angled lines between boundaries of various widths or from point to point without guidelines.
>
> Test 2. Figure-ground, a test involving shifts in perception of figures against increasingly complex grounds. Intersecting and "hidden" geometric forms are used.
>
> Test 3. Constancy of shape, a test involving the recognition of certain geometric figures presented in a variety of sizes, shadings, textures, and their positions in space, and their discrimination from similar geometric figures. Circles, squares, rectangles, ellipses, and parallelograms are used.
>
> Test 4. Position in space, a test involving the discrimination of reversals and rotations of figures presented in series. Schematic drawings representing common objects are used.
>
> Test 5. Spatial relationships, a test involving the analysis of simple forms and patterns. There are lines of various lengths and angles which the child is required to copy using dots as guide points.[5]

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[4]Arthur Gates and Walter H. MacGinitie, Technical Manual for the Gates-MacGinitie Reading Tests (New York: Teachers College Press, Columbia University, 1965).

[5]Marianne Frostig, Welty Lefever, John R. B. Whittlesey, Administration and Scoring Manual Developmental Test of Visual Perception (Palo Alto, Calif.: Consulting Psychologists Press, 1966), p. 5.

Austin reports in the Sixth Mental Measurement Yearbook,

> The Frostig Test appears to be a significant one. It has proved useful as a screening tool with groups of nursery school, kindergarten, and first grade children, primarily because it permits identification of those children who need special perceptual training in five important areas of visual perception.[6]

Test-retest reliability of the perceptual quotient is .80. Subtest scale score test-retest correlations range from .42 to .80. Split-half reliability correlations range from .78 to .89. Validity correlations between scale scores and teacher ratings of classroom adjustment are .44, motor coordination, .50, intellectual functioning, .50.[7]

Motor Achievement

The Purdue Perceptual-Motor Survey was originally developed to isolate areas of difficulty for non-achievers. The survey was not a test, but an individually administered check list to be used in detecting problem areas. Norms were established using fifty students at each grade level, one through four.

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[6]Oscar K. Buros, ed., Sixth Mental Measurements Yearbook (Highland Park, N.J.: The Gryphon Press, 1965), pp. 109-28.

[7]Marianne Frostig, Phyllis Maslow, Welty Lefever, and John R. B. Whittlesey, The Marianne Frostig Developmental Test of Visual Perception 1963 Standardization (Palo Alto, Calif.: Consulting Psychologists Press, 1964), pp. 488-92.

The validation of the survey was accomplished with children sent to a clinic and labeled as non-achievers. The clinic sample consisted of twenty-five first graders, twenty-five second graders, twenty-five third graders, and twenty-two fourth graders, a total of ninety-seven subjects. Based on this analysis a cutoff score of 65 is used to differentiate between achievers and non-achievers. There are twenty-two activities and the rater may score each item 1 to 4.

Sample

Two urban and two suburban elementary schools with a total of eight first grades, two in each school, agreed to participate in the project. One hundred and ninety-nine first graders were given the Gates-MacGinitie Reading Test, Primary A, Form 1. One hundred and one children were in the two suburban schools and ninety-eight children were in the urban schools. A raw score of 23 in vocabulary on this test placed a child in the fiftieth percentile in vocabulary. A raw score of 12 in comprehension placed a child in the forty-sixth percentile on the national norms. All children who scored below 23 in vocabulary or 12 in comprehension, a grade equivalent score of 1.5, were included in the study.

The children scoring below 1.5 were then given the Frostig Test of Visual Perception. Those children who scored below a perceptual quotient of 90 were

eligible for the control or experimental groups. They were also given the Purdue Perceptual Motor Survey to verify their motor coordination.

After the pretesting was completed, thirty-eight urban children and twenty suburban children were found eligible for the experiment. These children were then selected to be placed in the treatment group or the control group by using a table of random numbers. One-half of the children in the urban population, nineteen, constituted the experimental group. The other half, nineteen, constituted the control group. In the suburban population, the same procedure was followed with a resulting ten children in each of the two groups.

Later the Cognitive Abilities Test was given to the sample population. Table 3.1 indicates the distribution of the population according to sex and intelligence.

Table 3.2 gives the breakdown of the urban and suburban population by chronological age.

Children in the urban first grades were using a programmed reader as their basic series. The suburban children were using a basal series as their reading program. None of the children had any structured program in motor or visual perceptual training previous to this research.

TABLE 3.1.--Distribution of Sample, by Sex, Population, and Intelligence Levels.

Sex	Intelligence Levels: Below Average (I.Q.'s below 91)	Average (I.Q.'s 91-110)	High (I.Q.'s above 110)	Totals
Urban				
Boys	19	4	1	24
Girls	9	5	0	14
				38
Suburban				
Boys	3	4	2	9
Girls	1	8	2	11
				20

TABLE 3.2.--Distribution of Sample by Population and Chronological Age (six-month intervals).

	Age Levels: 6.0-6.6	6.7-7.0	7.1-7.6	7.7-8.0	8.1-8.6	Totals
Urban	12	14	7	4	1	38
Suburban	7	9	3	1	0	20
Totals	19	23	10	5	1	58

Treatment

The treatment involved in the experimental groups consisted of two basic parts. One part was two twenty-minute periods per week for ten weeks of motor development. The motor development program consisted of specific lessons centered around each of four categories: general coordination, body image, balance, and eye-hand coordination. Improving Motor-Perceptual Skills developed by the Portland, Oregon, Public School System in cooperation with the Northwest Regional Educational Laboratory was used as the curriculum. Most of the lessons were based on Kephart's theory of perceptual-motor development. This curriculum was selected because it had already been used in the Portland, Oregon, School System, and because Kephart's programs or adaptations of Kephart's programs have been widely used in many areas.[8]

The second part of the treatment involved the use of the Frostig Workbooks for one twenty-minute period per week. The five areas of training are described in the Teachers Guide of the workbooks.[9]

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[8] Improving Motor-Perceptual Skills (Corvallis, Oregon: Continuing Education Publications, 1970).

[9] Marianne Frostig, The Developmental Program in Visual Perception Beginning Pictures and Patterns Teachers Guide (Chicago: Follett Educational Corporation, 1966).

> Visual-motor. Visual-motor coordination exercises help develop printing, writing, and drawing skills. They also help children become acquainted with two-dimensional forms and position of forms on a sheet, and help develop the integration of visual and fine muscle skills in general.[10]
>
> Figure-ground Perception. The objectives of figure-ground perception exercises are to develop the children's ability to read words in their proper sequence and to see relevant letters and words distinctly without confusing them with the surrounding letters and words.[11]
>
> Perceptual Constancy. Exercises for perceptual constancy help develop children's ability to generalize with regard to visual material. They help children learn to recognize geometrical forms regardless of size, color, or position and lead them later to recognize words they have learned if they occur in unfamiliar contexts or different kinds of printing or writing.[12]
>
> Position in Space. A child with faulty perception of position in space is handicapped in many ways. His visual world is distorted, he is clumsy and hesitant in his movements, and he has difficulty understanding what is meant by the words designating spatial position, such as in, out, up, down, before, behind, left, right. His difficulties become most apparent when he is faced with his first academic tasks, because letters, words, phrases, numbers, and pictures appear distorted to him and thus confuse him.[13]

If a child completed the Beginners Workbook, he continued on to an Intermediate Workbook. In the Intermediate Workbook, the fifth area was developed.

> Spatial Relationships. Perception of spatial relationships is the ability of an observer to perceive the position of two or more objects both in relation to himself and in relation to each other.[14]

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[10] Ibid., p. 8.

[11] Ibid., p. 9.

[12] Ibid.

[13] Ibid., p. 10.

[14] Marianne Frostig, The Developmental Program in Visual Perception Intermediate Pictures and Patterns,

Therefore, the experimental group received two twenty-minute periods per week of motor training and one twenty-minute period per week of visual perception training. The rationale for two twenty-minute motor periods was that children working in a gym or with large motor activities needed more time to execute a planned program. The visual perception exercises which were workbook activities did not require as much time.

The Frostig Workbook contains eighty pages of perception exercises. The ten children in the suburban experimental group completed from forty-three to seventy-one of the pages in the workbook. Five children completed seventy-one pages of workbook exercises. The motor exercise book contains twenty-five motor activities. All children completed at least fourteen of the exercises and five children completed all the motor exercises.

Of the nineteen children in the urban experimental population seven completed all the Frostig exercises. The remaining twelve completed from twenty-three to forty-three of the exercises. In motor exercises twelve children completed fourteen exercises and seven completed all the exercises.

Teachers Guide (Chicago: Follett Educational Corporation, 1966), p. 12.

Aide Training

Because of the materials used in the treatment, an inordinate amount of time was not needed to train instructional personnel. The Frostig Workbooks have specific directions which the aides read to the children. The motor-perceptual curriculum consisted of twenty-eight structured lessons using a lesson plan format: objectives, materials, procedures, and evaluation.

The investigator spent approximately three hours with each aide explaining both programs, demonstrating methods with a small group of non-sample children, and answering questions presented by the aides. The investigator was also "on call" in the event any crisis occurred and he visited each school at least once a week while the training was in progress.

The four aides chosen to implement the treatment had a variety of experiences. The two aides in the urban schools were full-time aides assigned to the first-grade teacher as regular assistants. Their salaries were paid with federal funds for which the school qualified due to the population served.

In one of the suburban schools a high school senior who belonged to a Future Teacher's Program and had worked in the school for the first twenty weeks of the school term agreed to continue working with the program. In the other suburban school, two parents whose children were

not in the first grade volunteered to work with the first-grade children. Both mothers had had previous experience; one had been a physical education aide, and the other was an ex-teacher.

Collection of Data

The Gates-MacGinitie Reading Test, Forms 1 and 2, the Frostig Test of Visual Perception, and the Purdue Perceptual Motor Survey were used as pre-test and post-test measures. The pre-test was administered the first two weeks in February. The post-test was administered during the last two weeks in May. In addition to the pre-test measures, the Lorge-Thorndike Cognitive Abilities Test was also administered in February in order to compare the intelligence of the urban and suburban populations.

The investigator administered the Gates-MacGinitie Reading Test in the suburban schools. In the urban schools the test was administered in February by the reading specialist in each school as part of school policy. This same procedure was followed for the post-testing in May.

The investigator and three trained testers administered the Frostig Test in both February and May. The tests were all scored by the investigator in order to maintain consistency.

The Purdue Perceptual Motor Survey was also given in February and May. Three trained testers were used to administer this survey. In order to maintain consistency,

the testers were assigned to the same schools for both testing sessions.

Tester Training

Three test administrators were trained by the investigator prior to the testing period. Initially, they became familiar with the test format, directions, and materials needed for each test. A demonstration with first-grade children not in the study permitted the testers to observe procedures. Each tester then individually practiced administering the tests to non-sample children. The practice tests were scored so that any questions regarding scoring could be answered.

Two of the four testers were graduate students working on Master's degree programs in Early Childhood Education. One of the testers was a post-Master's student and a Learning Disability Consultant on leave to pursue advanced studies. The fourth tester was this investigator.

The investigator met with each principal and arranged the schedule of times and rooms for the test administration. All tests were given in the first two weeks of February and the last two weeks in May.

Order of Testing

The first test administered to the eight first grades was the Gates-MacGinitie Reading Test, Primary A, Form 1. This test was administered in the two urban

schools by the reading consultants at each school. The investigator administered the test in the two suburban schools. After scoring was completed and the children scoring below 1.5 were selected for the study, the next two tests were administered. The Frostig Test of Visual Perception and the Purdue Perceptual Motor Survey were then administered by the trained testers. The last test administered was the Cognitive Abilities Test. The same procedure was followed for the post-testing in May except that the Cognitive Abilities Test was not given a second time.

Time	Event
January	Tester Training
February	Training Aides in use of Curriculum Materials
February Pre-test	Administer Gates-MacGinitie Reading Test, Frostig Test of Visual Perception, Purdue Perceptual-Motor Survey, Cognitive Abilities Test
February-March-April	Motor-Perception Program, Treatment by the Aides
May Post-test	Administer Gates-MacGinitie Reading Test, Frostig Test of Visual Perception, Purdue Perceptual-Motor Survey

Figure 3.1.--Overview of Research Procedures.

Testable Hypotheses

In this section the null forms of the hypotheses are used. There are twelve null hypotheses to be tested. For convenience the hypotheses are presented in three major areas: reading achievement, perception, and motor achievement.

Reading Achievement

I. No significant difference will be found in reading achievement as measured by the Gates-Mac Ginitie Reading Test between first-grade children who receive motor-perceptual training and first-grade children who do not receive this training.

   A. No significant difference will be found in reading achievement as measured by the Gates-MacGinitie Reading Test between first-grade children in urban schools who receive motor-perceptual training and first-grade children in urban schools who do not receive such training.

   B. No significant difference will be found in reading achievement as measured by the Gates-MacGinitie Reading Test between first-grade children in suburban schools who receive motor-perceptual training and first-grade children in suburban schools who do not receive such training.

C. No significant difference will be found in reading achievement as measured by the Gates-MacGinitie Reading Test between first-grade children in urban schools who receive motor-perceptual training and first-grade children in suburban schools who also receive such training.

Perceptual Training

II. No significant difference will be found in perceptual achievement as measured by the Frostig Developmental Test of Visual Perception between first-grade children who receive motor-perceptual training and first-grade children who do not receive this training.

A. No significant difference will be found in perceptual achievement as measured by the Frostig Developmental Test of Visual Perception between first-grade children in urban schools who receive motor-perceptual training and first-grade children in urban schools who do not receive such training.

B. No significant difference will be found in perceptual achievement as measured by the Frostig Developmental Test of Visual Perception between first-grade children in suburban

schools who receive motor-perceptual training and first-grade children in suburban schools who do not receive such training.

C. No significant difference will be found in perceptual achievement as measured by the Frostig Developmental Test of Visual Perception between first-grade children in urban schools who receive motor-perceptual training and first-grade children in suburban schools who also receive such training.

Motor Achievement

III. No significant difference will be found in motor achievement as measured by the Purdue Perceptual Motor Survey between first-grade children who receive motor-perceptual training and first-grade children who do not receive such training.

A. No significant difference will be found in motor achievement as measured by the Purdue Perceptual Motor Survey between first-grade children in urban schools who receive motor-perceptual training and first-grade children in urban schools who do not receive such training.

B. No significant difference will be found in motor achievement as measured by the Purdue Perceptual Motor Survey between first-grade children in suburban schools who receive motor-perceptual training and first-grade children in suburban schools who do not receive such training.

C. No significant difference will be found in motor achievement as measured by the Purdue Perceptual Motor Survey between first-grade children in urban schools who receive motor-perceptual training and first-grade children in suburban schools who also receive such training.

Method of Analysis

To analyze the data collected, the statistical treatment is a three-factor analysis of variance procedure. The program is Finn's Multivariance Program.[16] This statistical treatment has been chosen for several reasons. The analysis of variance segment of the statistical analysis provides information required in the testing for significant difference between control and experimental

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[15]Jeremy D. Finn, Univariate and Multivariate Analysis of Variance and Co-Variance, modified by David J. Wright, Michigan State University (East Lansing, Mich.: Office of Research Consultation, College of Education, March, 1970).

groups as well as between urban and suburban populations. This analysis also provides for interaction effects resulting from any combination of the factors tested. The program also estimates the magnitude of the effects and their standard errors. Another advantage of this program is that it simultaneously tests variables while controlling for the alpha level. Thus, this program is a sensitive analysis procedure for testing differences between groups. Each of the twelve hypotheses is tested at the .05 level of confidence.

Summary

The thrust of this investigation is to evaluate the effects of a perceptual program upon the reading achievement, perceptual achievement, and motor achievement of urban and suburban first-grade students. In addition to comparisons between the total experimental and control groups, comparisons are also made within the urban group, within the suburban group, and between the urban and suburban groups. Thirty-eight urban and twenty suburban first-grade children were used to test the hypotheses.

The experimental groups were given a structural sequential program of motor-perceptual development skills. Each experimental group received a total of three, twenty-minute periods per week of treatment conducted by teacher aides who had been trained in administering the motor-perceptual program.

The data collected and analyzed by the procedures described in this chapter are presented in Chapter IV.

CHAPTER IV

RESEARCH FINDINGS

The data gathered from the pre- and post-testing of this study are presented in the order of the hypotheses as stated in Chapter III. The null hypotheses are re-stated and the results are described. The hypotheses were designed to discover if motor-perceptual training effects reading achievement, perceptual achievement, and motor achievement in first-grade children in two situations, urban and suburban. The analysis of variance tables are presented and relate the results of each of the hypotheses tested. A discussion of the results of the study concludes Chapter IV.

Analysis of Research Findings

The analysis of covariance is the statistical method used to determine if there are differences in the two groups. The chi square test of the four covariates indicates that two are predicting; as a result, the other two are deleted. The chi square test for these two is 25.1136 with 8 DF which is significant at less than .0015. These two covariates are retained for the analysis.

The computation of the data first compares the entire treatment group and the entire control group, each containing twenty-nine children. The second analysis is the comparison of the twenty suburban children with the thirty-eight urban children. The third analysis is concerned with interaction. This interaction indicates that the four groups differ in some way which is not accounted for by the overall differences: treatment versus control and urban versus suburban. The analysis used tests simultaneously both hypotheses concerning the treatment, control groups, and the urban, suburban populations.

The results of the analysis indicate that there is no interaction between the groups in the study. Therefore, the method of analysis indicates that there is no need to further analyze the data by smaller units.

Reading Achievement

Arthur I. Gates and Walter H. MacGinitie, in the technical manual of the Gates-MacGinitie Reading Achievement Test discourage the use of averaging vocabulary and comprehension scores to report a reading score. They explain that the two skills being tested are separate skills and need to be analyzed as such. Therefore, in analyzing the data regarding reading achievement, vocabulary scores and comprehension scores are analyzed separately.

The four hypotheses tested are listed and Tables 4.1 and 4.2 give the results for each of the hypotheses in reading vocabulary and comprehension.

Hypothesis I

> No significant difference will be found in reading achievement as measured by the Gates-MacGinitie Reading Test between first-grade children who receive motor-perceptual training and first-grade children who do not receive this training.

In order to secure data for this hypothesis, the Gates-MacGinitie Reading Tests, Forms 1 and 2 were used as the pre-test and post-test measures. This test was administered in February where a score of below 1.5 made a first-grade child eligible for the study. All 199 children in the eight first grades were administered the reading test. From this group, 97 children scored below 1.5 in vocabulary and comprehension. Fifty-eight children were finally selected because they had also scored below the desired score in perception. Twenty-nine children became the treatment group and twenty-nine children became the control group.

The data were analyzed using the analysis of covariance. The decision rule was made to fail to reject the null hypothesis if the $p > .05$. In vocabulary, the total treatment group compared to the control group showed an F value of .0041 with a $p < .5039$. In analyzing the comprehension scores for the same groups, an F value of .0828 indicated a $p < .7747$. Therefore, the null hypothesis

TABLE 4.1.--Analysis of Covariance for Reading Achievement-Vocabulary

Test of Hypotheses	Source of Variation	Degrees of Freedom	F	P less than	Results of Hypotheses Testing
I	Treatment-Control	1	.0041	.5039	Fail to reject
IA, IB	Urban-Suburban vs. Treatment Control	1	.7302	.3938	Fail to reject
IC	Urban-Suburban	1	.0041	.9495	Fail to reject

TABLE 4.2.--Analysis of Covariance for Reading Achievement-Comprehension.

Test of Hypotheses	Source of Variation	Degrees of Freedom	F	P less than	Results of Hypotheses Testing
I	Treatment vs. Control	1	.0828	.7747	Fail to reject
IA, IB	Urban-Suburban vs. Treatment-Control	1	.7809	.3810	Fail to reject
IC	Urban-Suburban	1	.0823	.7755	Fail to reject

fails to be rejected. There is no evidence that first-grade children who participated in this motor-perceptual program significantly improved more than first-grade children who did not participate in such a program on reading achievement either in vocabulary or comprehension.

Hypothesis IA

> No significant difference will be found in reading achievement as measured by the Gates-MacGinitie Reading Test between first-grade children in urban schools who receive motor-perceptual training and first-grade children in urban schools who do not receive such training.

Hypothesis IB

> No significant difference will be found in reading achievement as measured by the Gates-MacGinitie Reading Test between first-grade children in suburban schools who receive motor-perceptual training and first-grade children in suburban schools who do not receive such training.

Hypotheses IA and IB are discussed simultaneously because there is no evidence of interaction effect which would indicate that they should be considered separately.

In order to secure data to test these hypotheses, the Gates-MacGinitie Reading Tests Forms 1 and 2 were used as the pre-test and post-test measures of reading achievement. This test was administered in February where a score of below 1.5 made a child eligible for the study. Twenty first-grade children composed the suburban experimental and control groups and thirty-eight children composed the urban experimental and control groups.

Post-testing was completed in May after ten weeks of motor-perceptual training.

The data for these hypotheses were analyzed simultaneously, thus producing the same results. The decision rule was to fail to reject the null hypotheses if the $p > .05$. On vocabulary, Hypotheses IA and IB showed an F score of .7302 with a $p < .3938$. The null hypotheses fail to be rejected. There is no evidence that either experimental group, urban or suburban, significantly improved in reading achievement-vocabulary. On comprehension, Hypotheses IA and IB showed an F score of .7809 and a $p < .3810$. The null hypotheses fail to be rejected. There is no evidence that either experimental group, urban or suburban, significantly improved on reading achievement-comprehension.

Hypothesis IC

> No significant difference will be found in reading achievement as measured by the Gates-MacGinitie Reading Test between first-grade children in urban schools who receive motor-perceptual training and first-grade children in suburban schools who also receive such training.

In order to secure the data to test this hypothesis, the Gates-MacGinitie Reading Tests Forms 1 and 2 were used as the pre-test and post-test measures of reading achievement. This test was administered in February where a score of below 1.5 made a child eligible for the study.

Hypothesis IC involves the analysis of the urban, suburban total population. Twenty children were in the total suburban group while the urban group was composed of thirty-eight first graders. Post-testing was completed in May, after ten weeks of motor-perceptual training.

The decision rule was to fail to reject the null hypothesis if the $p > .05$. On vocabulary, an F score of .0041 with a $p < .9495$ was obtained. On comprehension, an F score of .0823 with a $p < .7755$ was derived. Therefore, the null hypothesis fails to be rejected. There is no evidence that first-grade urban children who receive motor-perceptual training will improve to a significant degree in reading achievement more than suburban children who had this same training.

Perceptual Achievement

In order to secure data to test these hypotheses, the Frostig Developmental Test of Visual Perception was administered as a pre-test and post-test measure of perceptual change. Only children who scored below a perceptual quotient of 90 were included in the study. The hypotheses were designed to discover whether or not motor-perceptual training affects perception. Data relevant to Hypotheses II, IIA, IIB, and IIC are included in Table 4.3.

TABLE 4.3.--Analysis of Covariance for Perceptual Achievement.

Test of Hypothesis	Source of Variation	Degrees of Freedom	F	P less than	Results of Hypothesis Testing
II	Treatment-Control	1	3.1506	.0818	Fail to reject
IIA, IIB	Urban-Suburban vs. Treatment-Control	1	1.1439	.2898	Fail to reject
IIC	Urban-Suburban	1	5.0329	.0292	Reject

Hypothesis II

No significant difference will be found in perceptual achievement as measured by the Frostig Developmental Test of Visual Perception between first-grade children who receive motor-perceptual training and first-grade children who do not receive this training.

In order to secure the data to test this hypothesis, the Frostig Developmental Test of Visual Perception was administered to all children who scored below 1.5 on the Gates-MacGinitie Reading Test which was given in February. This group was comprised of ninety-seven children. The children who scored below a perceptual quotient of 90 were included in the study. Fifty-eight children comprised the total population, those who scored below 1.5 on the reading test and below 90 on the perceptual test. Twenty-nine first graders were in the treatment group and twenty-nine first graders were in the control group. The Frostig

Developmental Test of Visual Perception was also administered in May as a post-test after the children completed ten weeks of motor-perceptual training.

The test scores were analyzed using the analysis of covariance. The decision rule was to fail to reject the null hypothesis if the $p > .05$. Hypothesis II showed an F value of 3.1505 which gave a $p < .0818$. The null hypothesis fails to be rejected. First-grade children who participated in a motor-perceptual program did not improve significantly more in perceptual achievement than first-grade children who did not participate in such a program.

Hypothesis IIA

> No significant difference will be found in perceptual achievement as measured by the Frostig Developmental Test of Visual Perception between first-grade children in urban schools who receive motor-perceptual training and first-grade children in urban schools who do not receive such training.

Hypothesis IIB

> No significant difference will be found in perceptual achievement as measured by the Frostig Developmental Test of Visual Perception between first-grade children in suburban schools who receive motor-perceptual training and first-grade children in suburban schools who do not receive such training.

Hypotheses IIA and IIB are discussed simultaneously because there is no evidence of interaction effect which would indicate that they should be considered separately.

All the data for these two hypotheses were analyzed simultaneously and produced the same results. In order to secure data to test these hypotheses, the Frostig Developmental Test of Visual Perception was administered in February. The score which made a child eligible for perceptual training was a perceptual quotient of 90 or below. There were ten children in each of the suburban experimental and control groups. The urban experimental and control groups had nineteen children in each group.

The decision rule was to fail to reject the null hypotheses if the $p > .05$. Hypotheses IIA and IIB obtained an F value of 1.1432 which resulted in a $p < .2898$. The null hypotheses fail to be rejected. There is no evidence that either experimental group, urban or suburban, significantly improved in perception.

Hypothesis IIC

> No significant difference will be found in perceptual achievement as measured by the Frostig Developmental Test of Visual Perception between first-grade children in urban schools who receive motor-perceptual training and first-grade children in suburban schools who also receive such training.

In order to secure data to test this hypothesis, the Frostig Developmental Test of Visual Perception was administered to all children who scored 1.5 on the Gates-MacGinitie Reading Test Form 1 in February. There were ninety-seven children who scored below 1.5 in reading

achievement. Of these ninety-seven children, fifty-eight scored below 90 in perception. Of the fifty-eight children, twenty were in the suburban first grades and thirty-eight were in the urban first grades. These groups were then equally divided into experimental and control groups. The Frostig Developmental Test of Visual Perception was again administered in May after ten weeks of motor-perceptual training.

This hypothesis compared the twenty suburban first graders with the thirty-eight urban first graders. The decision rule was to fail to reject the null hypothesis if the $p > .05$. The F value obtained was 5.0329 which resulted in a $p < .0292$. Since the p was less than .05, Hypothesis IIC is rejected.

This result indicates that suburban children improve to a significantly greater degree when compared with urban children who receive this same treatment. In further analyzing the data relevant to this hypothesis, cell means were calculated. The total urban population mean was 86.31 while the suburban population mean was 97.10. A difference of 10.79 points in favor of the suburban population indicates a significant improvement in the suburban group.

Motor Achievement

In order to secure data to test this hypothesis, the Purdue Perceptual Motor Survey was administered as a pre-test and post-test measure. A score of 65 indicated that a child needed help in motor development. Only those children who scored below 65 were included in the study. The four hypotheses for motor achievement are listed and the data relevant to Hypotheses III, IIIA, IIIB, and IIIC are included in Table 4.4.

TABLE 4.4.--Analysis of Covariance for Motor Achievement.

Test of Hypothesis	Source of Variation	Degrees of Freedom	F	P less than	Results of Hypothesis Testing
III	Treatment-Control	1	3.8475	.0552	Fail to reject
IIIA, IIIB	Urban-Suburban vs. Treatment-Control	1	.3500	.5567	Fail to reject
IIIC	Urban-Suburban	1	3.3641	.0724	Fail to reject

Hypothesis III

> No significant difference will be found in motor-achievement as measured by the Purdue Perceptual Motor Survey between first-grade children who receive motor-perceptual training and first-grade children who do not receive such training.

In order to secure the data to test this hypothesis, the Purdue Perceptual Motor Survey was administered to the fifty-eight children who had already been selected by failing to meet the 1.5 criterion on the Gates-MacGinitie Reading Test and the 90 perceptual quotient on the Frostig Developmental Test of Visual Perception. A score of 65 or below on the motor test indicated that a child was having difficulty with motor skills. The Purdue Perceptual Motor Survey was administered individually to each child in February and again in May after ten weeks of motor-perceptual training. The data used to test this hypothesis came from the fifty-eight children involved in this study, twenty-nine experimental and twenty-nine control.

The test scores were analyzed using the analysis of covariance. The decision rule was to fail to reject the null hypothesis if the $p > .05$. In Hypothesis III, the entire treatment group compared to the entire control group obtained an F value of 3.8475 which resulted in a $p < .0552$. Therefore, Hypothesis III fails to be rejected. First-grade children who participated in a motor perceptual program did not improve significantly more in motor achievement than first-grade children who did not participate in such a program.

Hypothesis IIIA

No significant difference will be found in motor achievement as measured by the Purdue Perceptual Motor Survey between first-grade children in urban schools who receive motor-perceptual training and first-grade children in urban schools who do not receive such training.

Hypothesis IIIB

No significant difference will be found in motor achievement as measured by the Purdue Perceptual Motor Survey between first-grade children in suburban schools who receive motor-perceptual training and first-grade children in suburban schools who do not receive such training.

Hypotheses IIIA and IIIB are discussed simultaneously because there is no evidence of interaction effect which would indicate that they should be considered separately.

All the data for these two hypotheses were analyzed simultaneously and produced the same results. In order to secure data to test these hypotheses, the Purdue Perceptual Motor Survey was administered in February to the children who had already failed to meet the 1.5 score in reading and the 90 perceptual quotient in perception. To test these hypotheses, there were ten children in each of the suburban experimental and control groups. There were nineteen children in each of the urban experimental and control groups.

The decision rule was to fail to reject the null hypotheses if $p > .05$. For Hypotheses IIIA and IIIB,

an F value of 1.1432 was obtained and resulted in a $p < .2898$. The null hypotheses fail to be rejected. There is no evidence that either experimental group, urban or suburban, significantly improved in motor achievement.

Hypothesis IIIC

> No significant difference will be found in motor achievement as measured by the Purdue Perceptual Motor Survey between first-grade children in urban schools who receive motor-perceptual training and first-grade children in suburban schools who also receive such training.

In order to secure data to test this hypothesis, the Purdue Perceptual Motor Survey was administered to all children who scored below 1.5 in reading and a 90 perceptual quotient in perception. Of the fifty-eight first-grade children in the sample, twenty were in the suburban first grades and thirty-eight were in the urban first grades. These children were then equally divided into experimental and control groups in each situation. This hypothesis was tested by comparing the twenty suburban children with the thirty-eight urban children.

The decision rule was to fail to reject the null hypothesis if the $p > .05$. This hypothesis obtained an F value of 3.3641 which resulted in a $p < .0727$. The null hypothesis fails to be rejected. First-grade urban children who participated in a motor perceptual program

did not improve significantly more in motor achievement than did first-grade suburban children.

Discussion

This study does not support the use of a structured sequential motor-perceptual program for the purpose of improving: (1) reading achievement, (2) perception, or (3) motor achievement. Therefore, the motor-perceptual theorists who imply that motor and perceptual development will increase reading achievement at the first-grade level are not supported.

Additional hypotheses which compared urban and suburban first graders receiving treatment and those who did not receive such treatment displayed no significant difference in reading achievement and motor achievement.

In perceptual achievement, suburban children improved to a significantly greater degree than urban children after motor-perceptual training. On pre-testing the urban experimental group had a mean score of 78.05; the suburban experimental group had a mean score of 81.30. After training, the post-test mean score of the urban experimental group was 88.57. On post-testing, the suburban experimental group mean score was 101.80. The urban experimental group increased 10.52 points while the suburban experimental group increased 20.50 points.

Further analysis of the results of Hypothesis III concerning motor achievement, seems to indicate a trend toward significance. The p value approaches significance. In this hypothesis, the entire treatment-control population indicates a p of < .0552 with a level of significance of p > .05. Further analysis of the mean scores of the treatment and control groups indicate that on pre-testing the suburban children had a mean score of 54.65, the urban mean score was 58.57, leaving a difference of 3.92. On post-testing, the mean score for the suburban children was 61.25, a gain of 6.60 points. The urban children's mean score on post-testing was 62.65, a gain of 4.08 points from the pre- to the post-testing. The suburban children actually made a greater gain, 2.52 points, than did the urban children. However, significance was not reached. Both groups fell below the 65 point criteria on the Purdue Perceptual Motor Survey indicating that more training may be necessary.

The next and final chapter summarizes the results of the study and presents recommendations for further research.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This investigation was undertaken to explore the effects of a motor-perceptual program on the first-grade reading achievement of children in selected urban and suburban schools. The study also examined the effects of a motor-perceptual program on perceptual development and motor development. In addition to comparisons between the total experimental and control groups, comparisons were also made within the urban groups, within the suburban groups, and between the urban and suburban groups.

In recent years there have been many studies conducted in the area of motor-perceptual development. Literature and research in this area has contained both supportive and non-supportive studies. However, this study differs in that it has compared two populations, an urban and a suburban population.

To accomplish this, two schools in a mid-western city were chosen to represent the urban population and two schools in an adjacent suburban area were selected to

represent the suburban population. In the four schools, all first graders were given the Gates-MacGinitie Reading Test Primary A, Form 1. A raw score of 23 or below in vocabulary or 12 in comprehension which is a grade equivalent score of 1.5, included that child in the study. The children scoring below 1.5 were then given the Frostig Test of Visual Perception. Those children who scored below a perceptual quotient of 90 were then eligible for the control or experimental groups in this study. They were also given the Purdue Perceptual Motor Survey to verify their motor coordination. After the pre-testing was completed, thirty-eight urban children and twenty suburban children were found eligible for the experiment. These children were then selected to be placed in either the treatment group or the control group by using a table of random numbers. Nineteen children in the urban population constituted the experimental group. The other nineteen children constituted the control group. In the suburban population, the same procedure was followed with a resulting ten children in each of the two groups. The Cognitive Abilities Test was also given to the sample populations to compare their intelligence.

The experimental groups were given a two-part program: motor activities in Improving Motor-Perceptual Skills which were based on Kephart's theories, and perceptual activities which were from the Frostig Developmental Program in Visual Perception, Beginning Pictures

and Patterns. For ten weeks, teacher aides at four schools conducted two twenty-minute periods per week on motor activities and one twenty-minute period per week with visual perception workbooks.

Post-test measures were again administered to all groups. They included the Gates-MacGinitie Reading Test, Primary A, Forms 1 and 2, the Frostig Test of Visual Perception, and the Purdue Perceptual Motor Survey.

The hypotheses of the study stated that a structured sequential motor-perceptual development program would demonstrate significant gains for the experimental groups in (1) reading achievement, (2) perceptual achievement, and (3) motor achievement. Further hypotheses also stated that first-grade children in urban schools who received motor-perceptual training would improve more in reading achievement, perceptual achievement, and motor achievement. A total of twelve hypotheses were tested. The analysis failed to reject the null hypotheses for eleven of the twelve hypotheses.

The one hypothesis which indicated a significant difference was the hypothesis that compared the urban first-grade children to the suburban first-grade children in perceptual achievement. The significant difference was in favor of the suburban children. The suburban children may have improved to a greater degree because of a number of factors. The volunteers who conducted

the treatment were volunteer parents and a high-school aide. In training sessions and observations, they appeared to be highly motivated to do a thorough job. They were enthusiastic, prepared, and cheerful when working with the children. Another factor may have been that there were fewer children in the suburban groups, three to five children as compared to six to eight children in the urban groups. More exercises and pages in the workbook were completed in the smaller suburban groups. Still another possibility is that higher intelligence quotients in the suburban groups may have led to greater growth for these students.

In total essence, this study does not support the perceptual-motor theorists who suggest that a structured sequential motor-perceptual development program will increase first-grade reading achievement or that it will benefit urban or suburban first graders to a greater degree.

Conclusions

On the basis of the analysis of results in Chapter IV, the following conclusions are presented:

1. A structured, sequential, motor-perceptual development program did not significantly improve the reading test scores on a test of vocabulary and comprehension for all first-grade children who participated in the program. Neither did it significantly improve the reading achievement of urban experimental and suburban experimental groups

within the total groups. Finally, it did not lend support to the hypothesis that reading scores of urban children would improve more than suburban children by participating in a motor-perceptual program. Thus, this study did not lend support to the motor-perceptual theorists who imply that a motor-perceptual development program will increase reading achievement.

2. A structured, sequential, motor-perceptual development program did not significantly improve the perceptual achievement for all first-grade children who participated in such a program. Neither did it significantly improve the perceptual achievement of urban experimental and suburban experimental groups within the total groups.

3. The major positive finding of this study suggested that suburban children when given the perceptual training improved to a significantly greater degree than the urban children in perceptual achievement.

4. A structured, sequential, motor-perceptual development program did not significantly improve the motor achievement for all first-grade children who participated in such a program. Neither did

it significantly improve the motor achievement of the urban experimental and suburban experimental groups within the total groups. Finally, it did not lend support to the hypothesis that motor achievement of urban children would improve more than suburban children as a result of participating in a motor-perceptual program. Thus, this study does not lend support to the motor-perceptual theorists who imply that urban children may not need as much motor training as suburban children.[1]

5. On the three tests that were administered in both the pre-testing and post-testing (Gates-MacGinitie Reading Test, Frostig Developmental Test of Visual Perception, and Purdue Perceptual Motor Survey) both experimental and control children made gains that might be expected over a ten-week period.

6. It is indicated from the evidence presented in this study, that there was no significant difference in growth between the experimental and control groups in reading achievement, perceptual achievement, or motor achievement.

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[1]Bryant J. Cratty and Sister Mary Margaret Martin, Perceptual-Motor Efficiency in Children (Philadelphia: Lee and Febiger, 1969), p. 3.

Recommendations

Although this study did not reveal significant growth in reading achievement, perceptual achievement, or motor achievement as a result of a motor-perceptual training program in first grade, there are additional research areas which could be explored more definitively to determine the effects of such training.

1. Replicate the present study and also administer the treatment over a longer period of time while increasing the number of sessions per week that the treatment takes place.

2. Some teachers and administrators from schools without planned physical education programs may want to investigate the effects of using certain aspects of this program as part of a physical education program.

3. Investigators may wish to explore the effects of a motor-perceptual program on listening ability. In order to participate in these programs listening to follow directions is a prerequisite skill.

4. Investigators may wish to explore the effects of a motor-perceptual program on the attention span of pupils in urban schools who have difficulty in focusing on any activity for any length of time.

5. Investigators may wish to explore the effects of a motor-perceptual program on the self-concepts of the pupils involved in the program. Accomplishing motor-perceptual tasks may improve a pupil's self-image.

6. Investigators might well concentrate explorations on a whole complex of factors which may influence reading achievement rather then concentrating on any one aspect, such as motor-perceptual training as a single factor leading to increased reading achievement.

The present investigation is exploratory in that it attempts to examine in a systematic way small groups of urban and suburban children who would be having reading difficulty. Although this research offers no final word on motor-perceptual treatment, it does offer some tentative conclusions. It is hoped that this research will add more information to our body of knowledge.

Although this research deals with groups of children, the ideal philosophy of education emphasizes dealing with individual children. Individual children may benefit from perceptual-motor programs but principals, teachers, and reading specialists should be cautioned as to generalizing the use of a perceptual-motor program for all children.

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APPENDICES

APPENDIX A

EXCERPTS OF LESSON PLANS FROM IMPROVING MOTOR-PERCEPTUAL SKILLS

hop and skip

Objectives

1. To hop a distance of six feet on the right foot and six feet on the left foot.

2. To skip a distance of twenty feet on three different occasions.

General Purpose

Hopping on one foot requires the child to use one side of his body only. He has to shift his posture and maintain his balance. Hopping and skipping are related to the child's ability to control his musculature and to alternate activities across the center of gravity of his body.

Materials

Records: Childhood Rhythm Records, Series II, "Elevators," "Heel and Toe," "Step and Point, " (Ruth Evans). "Indian War Dance," (Bowmar). "Teddy Bear's Picnic," (Capitol).

Suggested Directions to Children	Directions for Teachers
1. Watch me and do the same thing I do. When I raise my arms, you raise your arms. When I put my arms down, you put your arms down. When I lift my foot up, you lift your foot up. Let's start with our arms. The music will help us do it together. Ready, arms first. Up-down, up-down, up-down. Our feet. Up-down, up-down, up-down, up-down. (Repeat)	1. Teacher demonstrates each step, giving directions. Music: "Elevators"
2. We will clap our hands three times in front of us, then three times above our heads. When we have finished clapping our hands, we will lift one foot, hop three times, then lift the other foot and hop three times. Watch and do it with me.	2. This may be a good stopping place for the first day. Teach only as much per day as children can handle.
3. Above your head, clap, clap, clap. In front, clap, clap, clap. (Repeat). On your foot, hop, hop, hop. Other foot, hop, hop, hop. (Repeat and then alternate).	3. Do with children. Music: "Heel and Toe"

4. We will open and shut our hands to the music. Watch me. Soon I will change. I will lift one foot and hop one time, then lift the other foot and hop one time, like this. Let's do our hands first. Ready. Open-shut, open-shut, open-shut, open-shut, (repeat). Your feet. Up-hop, up-hop, up-hop, up-hop, (repeat).

4. Do with children. Music: "Heel and Toe"

5. Indians walk very quietly. They can hardly be heard. Let's pretend we are Indians and dance around the room on our toes to the music, step-hop.

5. Let children dramatize this step using war whoops. Music: "Indian War Dance"

6. Let's go skipping lightly around the room. Let your arms help you.

6. Let children skip spontaneously to music. Music: "Teddy Bear's Picnic"

For the Child Having Difficulty

Give him more experience in hopping and step-hopping. Jump on the jump board.

Minimum Acceptable Performance

Child can (1) hop a distance of six feet on his right foot and six feet on his left foot and (2) skip a distance of twenty feet on three different occasions.

Variations:

1. Hop on one foot to designated target. Change feet and hop back.
2. Skipping games (Examples: The Muffin Man, Mother May I, Looby Loo, How Do You Do My Partner.)
3. Skip to "Pop Goes the Weasel," sitting down on "Pop."
4. Record: Phoebe James, "Skip and Twirl."

walking board—sidewise

Objective

To move equally well sidewise in either direction, using a step-slide step, the full length of the walking board.

General Purpose

Walking the board sidewise is a unilateral movement which develops directionality. It is also designed to provide additional practice in balancing.

Materials

12 foot walking board, four inch side up.

Suggested Directions to Children	Directions for Teachers
1. Stand on the left end of the board with feet together, facing across the board. Move your right foot to the right, then bring your left foot up to it. Go all the way to the end of the board.	1. Demonstrate the action.
2. Now move your left foot to the left. Bring your right foot up to it. Go all the way to the end of the board.	2. The child should use normal sized steps. a. Be sure the child moves slowly. b. Ask child to look straight ahead.
3. Say, "I am walking sidewise. I am walking to the right. I am walking to the left."	3. Verbalize direction and movement. Be sure the child experiences going both directions all the way across the board. **For the Child Having Difficulty** Watch for children who have particular difficulty moving in one direction. Let them practice "angels-in-the-snow" to gain control of body parts on the nondominant side. Practice step-slide step on the floor, leading with the nondominant foot. If children have difficulty maintaining balance, let them practice using the jump board.

Minimum Acceptable Performance

Child can move equally well in either direction using a step-slide step the full length of the walking board.

Variations:

1. Walk forward across the board. Do not step off, but turn and walk back sidewise.
2. Walk sidewise to the middle of the board. Turn and walk backward to the end.
3. Step-slide step to music across the board.
4. Place a bean bag at center. Slide-step, pick up bag and return.
5. Walk across board sidewise using the two inch side.

pegboard designs

Objective

To copy five pegboard designs from memory when presented one at a time.

General Purpose

To improve eye-hand coordination and to apply the principles taught in likenesses and differences through the use of pegboards.

Materials

Pegs
Pegboards

Suggested Directions to Children	Directions for Teachers
	Work with a small group of children (five or six). Provide each with a set of enough pegs of the same color to copy the design.
1. Put your pegs in your pegboard so it looks like mine.	1. Place before the children a pegboard with design number 1 from page 88. Children are asked to reproduce the design. Leave the model in full view so children may consult it.
2. Look at my pegboard. Remember how it looks. I am going to remove mine, then let you put your pegs in your board to make the same design. Then we will check to see if your design is like mine. Did you remember?	2. Show the model figure briefly. When children begin to work, the model is removed and they are asked to complete the activity with no further reference to the model. When the children have finished, let them compare their design with the model. With each design move from lesson 1 to lesson 2 as rapidly as possible. If the children are successful with design No. 1 doing both lesson 1 and 2, have them continue with the other patterns in sequence. (See page 88.)

For the Child Having Difficulty

Mark with chalk the area of the board child is to fill with pegs. Have child watch you make the design. Give him opportunities to do puzzles, match parquetry blocks or design blocks.

Minimum Acceptable Performance

Child can copy five pegboard designs from memory when presented one at a time.

Variations:

1. Use different colors, i.e. red outside, blue inside.
2. Use increased speed as the child progresses.
3. Practice filling the entire pegboard to develop finger dexterity.
4. Use designs of increased difficulty.

APPENDIX B

SAMPLE OF RECORD SHEETS FOR MOTOR-PERCEPTUAL EXERCISES KEPT BY AIDES

MOTOR PERCEPTUAL ACTIVITIES PUPIL'S NAME_____

1. Jump	
2. Hop and skip	
3. March	
4. Step, slide, gallop	
5. Basic fall	
6. Somersault	
7. Hoop activities	
8. Jump board	
9. Walking board forward	
10. Walking board sideways	
11. Walking board backward	
12. Balance board	
13. Body parts	
14. Movement	
15. Leaning right	
16. Angels in the snow	
17. Stepping stones	
18. Animal walks	
19. Obstacle course	
20. Bean bag	
21. Ball activities	
22. Vertical horizontal lines	
23. Circles	
24. Drawings	
25. Pegboard	