A STUDY OF THE EFFECTS OF A KINDERGARTEN PERCEPTUAL-MOTOR DEVELOPMENT PROGRAM

Thesis for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
JOHN WINSTON KLANDERMAN
1971

This is to certify that the

thesis entitled

A STUDY OF THE EFFECTS
OF A KINDERGARTEN
PERCEPTUAL-MOTOR DEVELOPMENT PROGRAM

presented by

John Winston Klanderman

has been accepted towards fulfillment
of the requirements for

Doctor of Philosophy degree in Educational Psychology

Jean M. LeFevre
Major professor

Date OCTOBER 22, 1971

ABSTRACT

A STUDY OF THE EFFECTS
OF A KINDERGARTEN
PERCEPTUAL-MOTOR DEVELOPMENT PROGRAM

By

John Winston Klanderman

The primary purpose of this study was to test the implication that perceptual-motor development training will increase school readiness at the kindergarten level. This study was concerned primarily with the implications of the perceptual-motor development theories of Kephart, Barsch and Cratty. Their theories encourage the use of structured perceptual-motor training programs for young children, on the general premise that improvement in motor abilities contributes directly to certain components of classroom learning. This investigation attempted to make a further contribution to the literature pertaining to perceptual-motor development training programs at the kindergarten level in relation to gains in academic achievement. Several studies at the kindergarten level have demonstrated that children participating in a structured perceptual-motor development program have shown significant gains in reading readiness. However, these studies did not

control for the differential treatment given the children in the experimental group. Thus, this study was designed to control for differential treatment given the experimental group. To achieve this end, sixty children from the kindergarten class at Highland Elementary School, Skokie, Illinois, were randomly assigned to experimental and control groups in either the morning or afternoon sessions. Teacher variables were held constant and all experimental and control groups had the same pupil-teacher ratio during the treatment periods.

The experimental groups were given a structured, sequential program of perceptual-motor development skills. A physical education program based on low-organized activities and a kindergarten readiness program were given to the control groups. Each group had a total of two hours of differential treatment per week for twenty-four weeks.

Both pre- and post-measures were administered to all the groups. The pre-test measures included the Stanford Early School Achievement Test, the Boehm Test of Basic Concepts, and the Motor Facilitation Skill Survey. Post-testing measures included these three tests and, in addition, the matching and copying subtests of the Metropolitan Readiness Test. On each measure, the total raw score was used in analysis of the data.

The hypotheses of the study stated that a structured, sequential, perceptual-motor development program would demonstrate significant gains for the experimental groups

in (1) academic achievement, (2) mastery of basic skills, (3) gross motor skills, and (4) fine motor skills. All four of the hypotheses were unsupported by the analysis of results. That is, the analysis failed to reject the null hypothesis for each one of the research hypotheses.

A research question which applied to all four hypotheses was also asked regarding possible differences between the morning groups and the afternoon groups. Results of analysis indicated that the morning groups scored significantly higher than the afternoon groups in academic achievement and mastery of basic skills. However, in academic achievement the afternoon groups demonstrated a greater level of improvement than the morning groups when post-test scores were compared with pre-test scores.

In summary, this research did not support the use of a structured, sequential, perceptual-motor development program for the purpose of improving (1) academic achievement, (2) mastery of basic skills, (3) gross motor skills, and (4) fine motor skills, when all children in a kindergarten class were given differential treatment as well as an opportunity to develop fine and gross motor skills. Implications for further research suggested by this study concern small pupil-teacher ratios and comparison of perceptual-motor development programs for economically advantaged versus economically disadvantaged children.

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A THESIS

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

DOCTOR OF PHILOSOPHY

Department of Educational Psychology

1971

ACKNOWLEDGEMENTS

Dr. Jean Le Pere, my major professor, has unstintingly given me encouragement, support and guidance throughout my doctoral program. I am extremely grateful to her for investment of time in the furtherance of my professional goals. Dr. John Hurley, Dr. Harvey Clarizio, and Dr. William Sweetland also have served ably and with interest on my doctoral committee. I appreciate the generous efforts they have extended. I also wish to acknowledge the support and involvement of the late Dr. Buford Stefflre who served for several years on my doctoral committee.

At Highland Elementary School, Skokie, Illinois, I have been fortunate in the opportunity to work with competent and dedicated personnel on the treatment aspect of my dissertation. Particularly, Mr. Jerry Gregory, principal, Mrs. Joan Boaz and Mrs. June Borenstein, kindergarten teachers, and Mr. Ralph Larson, physical education teacher, were instrumental in the realization of this dissertation.

Also, I wish to thank Dr. Jerry Jenkins, research analyst for the Institute of Educational Research, Downers Grove, Illinois, for his help and guidance on the analysis of this study. Mrs. Pearl Slaton also deserves a word of

appreciation for the intensity with which she edited this thesis, as does Mrs. Mildred Swenson for doing much of the typing.

Finally, I wish to thank my wife, Natalie, for continued support and endurance of this dissertation. Kevin and Brian, who unwittingly had to share their daddy, also demand acknowledgement.

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CHAPTER I

THE PROBLEM

Since 1950, many educators, psychologists, and physical education instructors have concerned themselves with the relative merits of perceptual-motor development programs for young school-age children. Piaget, Kephart, Barsch, and Cratty, for example, have contributed to the perceptual-motor development theories. All of these persons have contributed to the theoretical literature concerning motor development or perceptual-motor development. Some implications of these theories have already been challenged and tested. Further implications remain to be investigated.

The theories of Kephart, Barsch, and Cratty, among others, imply that perceptual-motor development training will enhance and promote school readiness, especially in the young child. The implications of their theories of cognitive enhancement through perceptual-motor development training have been challenged at the kindergarten level in only a partial or limited manner.

Purpose of the Study

The primary purpose of this study was to test the implication that perceptual-motor development training

will increase school readiness at the kindergarten level. This study was concerned primarily with the perceptual-motor development theories of Kephart, Barsch, and Cratty. Their theories encourage the use of structured perceptual-motor training programs for young children, on the general premise that improvement in motor abilities contributes directly to certain components of classroom learning. This study tested these theories through a program designed to help each child in the experimental group develop perceptual-motor abilities.

Importance of the Study

An important function of this study was to add a further dimension to the ever-increasing body of research testing the validity of certain perceptual-motor development theories. These theories state that school readiness, as measured by academic achievement, can be increased through a structured, sequential perceptual-motor development training program. Specifically, this study has sought to contribute to the literature which tests these theories with children at the kindergatren level.

Uniqueness was attempted in this research by providing at the kindergarten level an experimental design that controlled for differential treatment for the experimental group. This was accomplished by providing a control group that received attention equal to that given to the experimental group in terms of adult-pupil

ratio. Previous studies, particularly at the kindergarten level, have failed to control for differential treatment given the experimental group.

Further, this study was designed to contribute a measure of research for School District #68, Skokie, Illinois. Two curriculum approaches to school readiness were compared. One approach included a structured, sequential perceptual-motor development training program; the second approach offered a readiness program consisting of low organized gym activities and a classroom readiness workbook.

Theoretical Background for the Study

The rationale for physiological or motor training has its historical roots in the writings of John Locke. In describing his theories of sense empiricism, he challenged the then prevalent ideas of "inborn capacity" and "common human nature." In their place Locke developed his "tabula rasa" theory, which stated that the human mind is a blank tablet on which is written knowledge and understanding. According to this theory, knowledge and understanding result from individual experience, and the knowledge supplied to the individual is gained through his senses as he is in contact with his environment.

Rousseau, enlarging upon Locke's idea, wrote:

> At the commencement of life, when memory and imagination are yet inactive, the child limits his attention to what actually affects his senses. He wants to touch and handle everything. Do not check his restlessness. This is a necessary part of his training. He is looking, fingering and hearing and above all by comparing sight and touch he learns to feel the heat and cold, the hardness and softness, the heaviness and lightness of bodies and to judge of their size and form and all their physical properties.[1]

Rousseau stated, "It is only by movement that we learn there are things other than ourselves and only by our movement that we get the idea of space."[2] He believed that if a child were left free to play, to interact with his environment and with his peers, his motor development would come naturally. But, Rousseau concluded, "the senses have to be deliberately trained, not only to be increasingly sensitive, but to discriminate between objects and thus be able to exert judgment."[3]

Both Locke and Rousseau, by focussing on sense experience of the individual as he comes in contact with the environment, provided an intellectual climate for which the perceptual-motor development theories of later centuries could develop. They fostered the theory that training was required to maximize the potential of each specific ability.

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[1]Miriam S. Magdol, "An Historical Perspective to Physiological Education," Academic Therapy Quarterly, III (Spring, 1968), p. 162.

[2]William Boyd, From Locke to Montessori (New York: Henry Hall, 1914), p. 52. From Boyd's translation of Emile.

[3]Magdol, op. cit., p. 163.

The contributions of Jean Piaget are pertinent to the theory of enhancement of cognitive development through perceptual-motor training. Piaget believes that perception is developed in nature and that it changes significantly with age through the interaction of maturation and experience. According to his theory, sensory-motor experience is basic to later intellectual operations.[4] Piaget calls the period between birth and two years a sensory-motor period of development. He identifies the period of ages two through four as one of "preconceptual thought" and the period of ages four to seven as that of "intuitive thought." Piaget believes that an organism develops because of constant exchange or contact with its environment. He takes the position that the organism acts on the environment, that there are slight changes every time the baby acts, and that consequently there are slight modifications of the action itself. The baby "assimilates" by "accommodation," that is, by slightly modifying his acts to the conditions of the environment. There is something like a spiral of assimilation and accommodation with the organism over here and the environment over there.[5]

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[4]David Elkind, "Piaget's Theory of Perceptual Development: Its Application to Reading and Special Education," The Journal of Special Education, I (Summer, 1967), p. 357.

[5]Clara Lee Edgar, "Perceptual Training as an Aid to Development of Reading Abilities," Claremont College Reading Conference Yearbook, XXVI (1967), pp. 220-221.

Significant elements of Piaget's theory are: 1) interaction with the environment is important to a child's development, and 2) a sensory-motor period of development is a necessary stage for the development of later intellectual development. The most crucial period for sensory-motor activities in promoting perceptual development occurs during the child's experiences from preschool through first grade.

Since 1960 three theorists have developed fairly elaborate perceptual-motor theories. These theories all imply that a perceptual-motor training program will contribute directly to certain components of classroom learning, such as acquisition of academic skills and a greater understanding of specific concepts.

In recent studies, Newell Kephart has emphasized the importance of perceptual-motor match. He believes that there is a significant interrelationship between motor activities which are initially only of a gross, exploratory nature in early childhood and perceptual skills of later development years. He takes the position that through this process of perceptual-motor matching, perceptual data come to supply the same consistent body of information that earlier motor data supply. Kephart states:

> By manipulation of things and of his own body in relationship to things, an individual perfects sensory motor process and learns to match sensory data to motor data. He builds up a plastic, adaptive perceptual-motor process which will allow him to fit his behavior

> into the varied demands of the situations in which he will later find himself.[6]

The essence of the perceptual motor theory is a sequence of learning stages through which the child progresses. Later, complex learnings are built upon initial learnings in a hierarchical fashion.[7] The organization of this hierarchy is presented in Figure 1.1.

According to Kephart, when the perceptual system has been integrated, the child is ready for the next stage of development, that of concept formation.

> The learning of concepts by children involves manipulation of relationships between percepts with the resulting emergence of unique elements. Concepts and symbolic manipulations present a highly desirable ability, since they permit us to manipulate large areas of our environment freely and efficiently. The formation of adequate concepts can be considered the goal of the long process of sequential development. Since concept formation depends upon the manipulation of perceptual data, it follows that a breakdown in the process of perceptual organization can interfere with the more complex developments to follow.[8]

Thus, the motor activities of the child become important not only for their own sake but for the contribution they must make to the more complex activities which the child will be required to perform in later stages of his developments.

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[6]Newell Kephart, The Slow Learner in the Classroom (Columbus, Ohio: C. E. Merrill Books, 1960), p. 13.

[7]Newell Kephart and Eugene G. Roach, The Purdue Perceptual-Motor Survey (Columbus, Ohio: C. E. Merrill Books, 1966), p. 3.

[8]Ibid., pp. 9, 10.

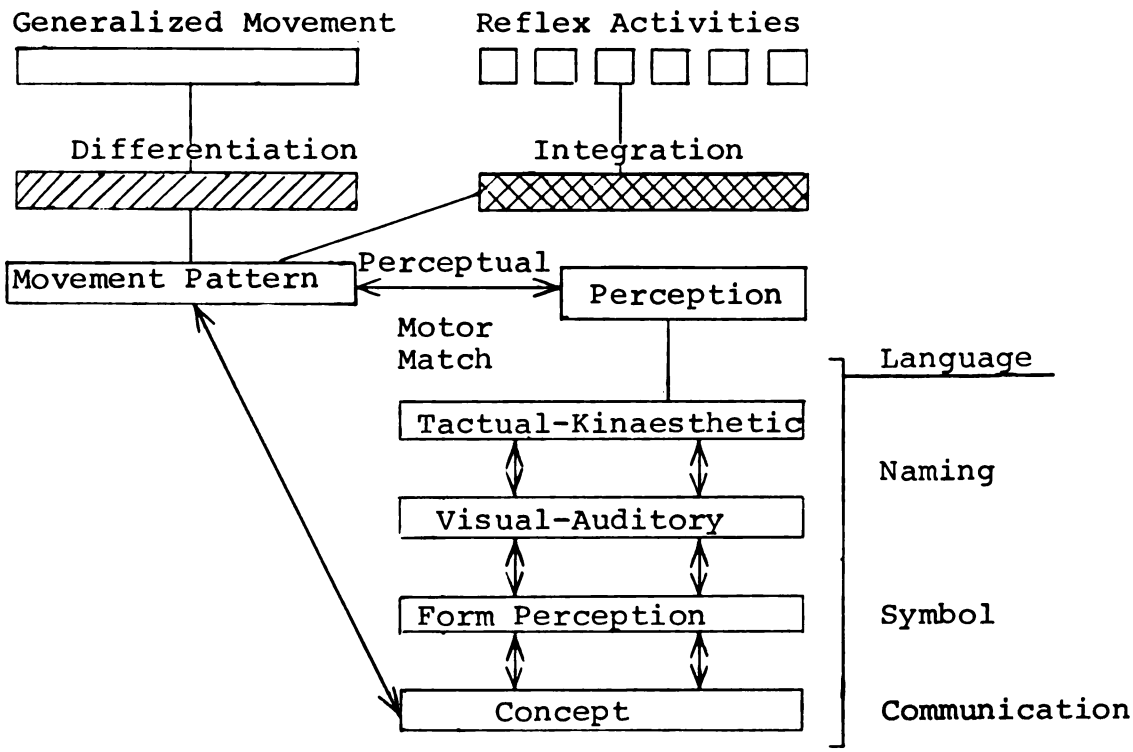

FIGURE 1.1--Theoretical constructs of Kephart's Perceptual-Motor Theory.

The implication of Kephart's theory is that a sequential, perceptual-motor development program is necessary for and will enhance development of school readiness abilities. He concludes that:

> Classroom teaching, therefore, involves attention to both perception and motor ability, and especially to the very important feedback or matching between them, just as much as it involves attention to integration of experience and intelligence. Gross motor activities are a part of the total reading process and the too frequent distinction between the motor phase and intellectual activities becomes untenable.[9]

A second theorist, Ray Barsch, has developed a perceptual-motor development theory which he calls a "movigenic theory." He advocates a curriculum which is oriented towards helping the individual move more effectively and efficiently in the many "space worlds" in which he finds himself. Movigenics is a theory of movement as it relates to learning. It is an effort to view man as a totality in everything he does and to account for all components of that totality in any of his performances. Movigenic theory has the following basic constructs:

I. The fundamental principle underlying the design of the human organism is movement efficiency;

II. The primary objective of movement efficiency is to economically promote the survival of the organism;

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[9]Kephart, op. cit., p. 65.

III. Movement efficiency is derived from the information the organism is able to process from an energy surround;

IV. The human mechanism for transducing energy forms into information is the percepto-cognitive system;

V. The terrain of movement is space;

VI. Developmental momentum provides a constant forward thrust toward maturity and demands an equilibrium to maintain direction;

VII. Movement efficiency is developed in a climate of stress;

VIII. Adequacy of the feedback system is critical in the development of movement efficiency;

IX. Development of movement efficiency occurs in segments of sequential expansion; and

X. Movement efficiency is symbolically communicated through a divisual-spatial phenomenon called language.[10]

These constructs theorize how a child must learn to use the processing modality in a meaningful way in order to function in his space world. The child must learn to translate the energies impinging on him, that is, the light, the sun, and the pressure that surround him, into meaningful patterns and experiences. The primary movement task involves movement through space. To master gravitational pull and to propel himself through space, the child must discover the dimensions of space and find their counterparts within

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[10]Ray H. Barsch, Perceptual Motor Curriculum (Seattle: Special Child Publications, 1967-8), pp. 33-64.

himself. He must build movements in terms of up and down, side to side, forward and back. As this organization takes place, the child is also building an ever-widening world for himself. The boundaries of this world are moving farther and farther away from himself. Pure sensation is becoming perception and cognition; soon he will be able to communicate by means of symbols, concepts and generalizations. However, none of these, according to Barsch, can occur without movement. The individual is able to process information through six modalities: vision, audition, kinesthesia, tactuality, and through the olfactory and gustatory senses. Motor planning at the physical and cognitive levels is an inescapable component of man's ability to move toward the cultural and economic complexities in today's world.[11]

Barsch's theory is by far the most highly organized approach to movement training. As with Kephart's theory, Barsch's theory implies that sequential perceptual-motor development training will enhance school readiness.

The third significant perceptual-motor development theory of recent years is that of Bryant J. Cratty. He

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[11]Ray H. Barsch, "Project M.O.V.E. as a Model for Rehabilitation Theory" (From a summary based on a paper presented at the American Psychological Association Convention, Philadelphia, Pennsylvania, April, 1963).

postulates a three-level theory of perceptual-motor behavior.[12] This theory assumes that factors at three levels influence final performance in learning output. At the base level are general behavior supports, including aspirational level, arousal, ability to analyze a task, and perhaps various perceptual abilities. The qualities at the base of the pyramid are relatively fixed but in turn they are influenced and modified by an individual's self-assessments of performance attained. At the second level are various perceptual-motor factors spawned by the factorial studies. Ability trains, such as static strength and extent of flexibility, are placed here. At the apex of the triangle are placed factors specific to the task and situation. Such factors as the unique energy demands of the task, the immediate values impinging upon the motivational state of the performer, and the perceptual components specific to the task may be found here. Figure 1.2 presents a diagram of the three-level theory of behavior.

Cratty considers that:

> The effective teacher should thus be sensitive to these three levels of influence upon perceptual-motor performance and particular attention should be directed toward their mutual influence. The lower levels constitute the basic orientation and alertness of the performer, but in turn are influenced by his constant

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[12]Bryant J. Cratty, Perceptual Motor Behavior and Educational Processes (Springfield, Illinois: Charles C. Thomas, 1969), pp. 28-29.

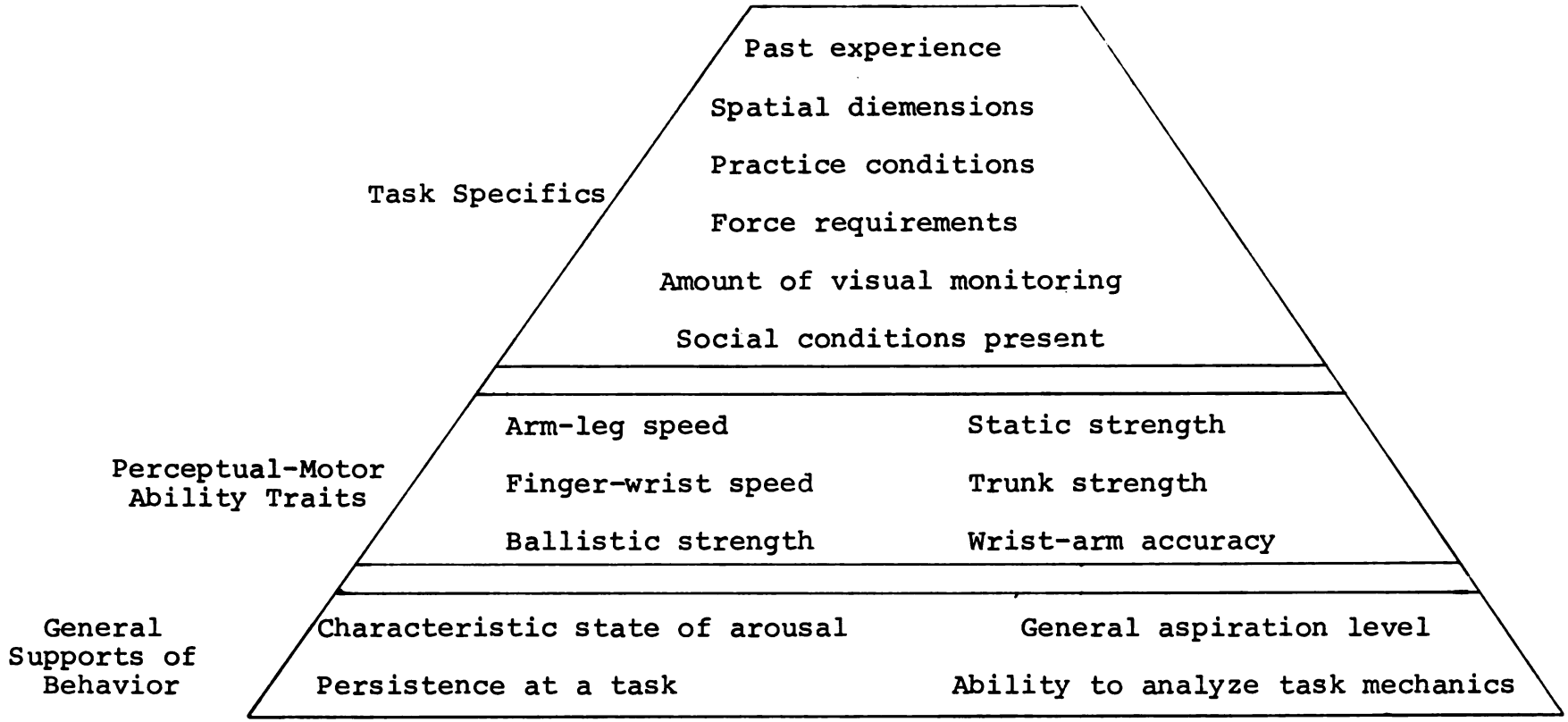

FIGURE 1.2.--Cratty's three-level theory of perceptual-motor behavior.

> assessment of the performance output at the apex of the construct. Ability traits within the middle of the task are influential not only on the particular task under consideration, but to varying degrees on other and similar perceptual-motor activities. Ability traits in turn are changed if the individual continues to practice activities which enhance these attributes or begins to avoid activities which result in a diminution of certain movement capacities.[13]

In general, Cratty implies that performance and learning are not divisible into mental and motor components, and he advocates increased attention to the development of motor skills. He concludes:

> It is believed that the term perceptual-motor not only indicates a growing awareness on the part of educators and physical educators that the perceptual process, the formation of judgment, is important to the ultimate motor expression which comes out of the child, but at the same time indicates that intellectual growth on the part of the child can be encouraged by manipulating the complexity of the perceptual input in intelligent ways.[14]

As with Kephart and Barsch, Cratty's theory of perceptual-motor development implies enhancement of school readiness abilities through specific perceptual-motor development training.

The theoretical literature, then, strongly supports a training program of structured sequential perceptual-motor development for elementary school children. Specifically, as applied to the kindergarten curriculum, perceptual-motor training may be defined as a systematic program of sensory-motor experience designed to improve the efficiency with which 1) we receive stimulation from our environment

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[13] Ibid., p. 29.

[14] Ibid., p. 19.

and from within ourselves, 2) integrate these two sources of input with each other and with past experience, and 3) use the processed information in planning and carrying out a purposeful unit of motor response of behavior.[15] This study was designed to test such a program at the kindergarten level in its relationship to school readiness enhancement as measured by comparison of basic concepts and scores in academic achievement between control and experimental groups. For an overview of the theories that have been presented in this section see Figure 1.3.

Hypotheses of the Study

Four hypotheses and one research question were considered in this study. The first two hypotheses are basic; they relate directly to the theoretical framework of this study involving enhancement of school readiness abilities through a structured, sequential perceptual-motor development program. The third hypothesis deals specifically with gains in gross motor coordination, and the fourth specifically with gains in fine motor coordination. The research question was asked in order to take into account any differences that might exist between morning and afternoon kindergarten sessions. It relates to all four hypotheses.

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[15]Donna Obrecht, The Motor Facilitation Program of School District 21 (Report prepared by the Elk Grove Training and Development Center, Elk Grove, Illinois, 1969), p.12.

THEORIST	MAJOR BELIEF AS RELATING TO PERCEPTUAL-MOTOR DEVELOPMENT THEORY
Early Theorists	
Locke	Sense empiricism and individuality
Rousseau	Sense training in early childhood
Developmental Theorist	
Piaget	Sensorimotor experience is basic to later intellectual operations
Major Theorists	
Kephart	Closed-cycle theory--perceptual-motor match, motoric skills form basis of future learning
Barsch	Movigenic theory--origin and development of movement patterns, perceptual-motor development training
Cratty	Three-level theory of perceptual behavior, perceptual-motor development training

FIGURE 1.3.--Overview of Perceptual-Motor Development Theories.

Hypotheses:

One. Kindergarten children participating in a structured, sequential perceptual-motor development program will achieve significantly higher scores at the end of treatment, in academic achievement as measured by the Stanford Early School Achievement Test, than will kindergarten children participating in a program consisting of low organized gym activities and a readiness workbook.

Two. Kindergarten children participating in a structured, sequential perceptual-motor development program will achieve significantly higher scores at the end of treatment, in mastery of basic concepts as measured by the Boehm Test of Basic Concepts, than will kindergarten children participating in a program consisting of low organized gym activities and a readiness workbook.

Three. Kindergarten children participating in a structured, sequential perceptual-motor development program will achieve significantly higher scores at the end of treatment, in mastery of gross motor activities as measured by an adaptation of the Wheeling Motor Facilitation Skill Survey, than will kindergarten children participating in a program consisting of low organized gym activities and a readiness workbook.

Four. Kindergarten children participating in a structured, sequential perceptual-motor development program will achieve significantly higher scores at the end of treatment, in visual perception and motor control as measured by two subtests of the Metropolitan Readiness Test, than will kindergarten children participating in a program consisting of low organized gym activities and a readiness workbook.

Research Question:

> Will there be significant difference in scores on the Standard Early School Achievement Test, the Boehm Test of Basic Concepts, the Motor Facilitation Skill Survey, and the Matching and Copying subtests of the Metropolitan Readiness Test at the end of treatment, between morning and afternoon kindergarten sessions for all of the above four hypotheses?

Assumptions of the Study

The study attempted to test the theory that perceptual-motor training could increase intellectual growth. It proceeded, therefore, on the assumption that all of the children in the sample generally had been exposed to the same types of activities outside of school which might possibly contribute to growth in perceptual-motor areas. Whatever extremes of perceptual development which might have occurred due to the natural process of growth and the in-home experiences of the children were accounted for, from the research standpoint, by the random assignment of children to groups.

This study related, also, to Piaget's theory of cognitive development. Piaget believes that, while perceptual development seems to be continuous, intellectual development progresses in steplike ways in discrete stages. The order of succession of stages is constant, although the ages at which different stages are attained may vary somewhat, depending on the child's motivation, practice, and cultural milieu. As the child moves from one stage to

the next, early structures become integrated with later ones.[16]

Another assumption of this study was that measuring academic achievement and mastery of basic concepts in the young child within the limits of the Stanford Early School Achievement Test and the Boehm Test of Basic Concepts provides a sample of school readiness abilities. That is, the assumption was made that these tests generate responses that can be classified as an adequate measure of school readiness.

It was also assumed in the study that there was a high degree of independence while the children were not involved in participation in either the experimental or control groups. That is, for example, it was assumed that the particular child's functioning on either classroom worksheets or participation in gym activities was not significantly influenced by the children in the group.

A final assumption concerned the expectation that children would improve on the measures that were administered to the children in both pre- and post-testing situations.

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[16]Paul H. Mussen, The Psychological Development of the Child (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1963), p. 53.

It was assumed that, regardless of the special treatment, all the children would show improvement on the same test that was given early in the kindergarten year and late in the kindergarten year.

Limitations of the Study

The primary limitation of the study is in its application to school populations outside of School District #68, Skokie, Illinois. Since the sample population was drawn from one school in a middle to upper middle class socio-economic area, caution must be used in terms of generalizing the findings of the study beyond School District #68, Skokie, Illinois.

A second limitation arises from the fact that it was not possible to compare the results of the study of children who participated in the perceptual-motor development training program with those of a study of children who did not receive any additional training. Because of extensive community involvement in the curriculum and activities of this school in School District #68, Skokie, Illinois, it was decided, primarily as a public relations matter, that it would be advisable for all children to receive some type of individualized attention. Thus, the control group in this study was disguised as a group participating in an alternate curriculum approach.

This study has presented a packaged perceptual-motor development program which included a distinct gross motor component and a distinct fine motor component. However, it has not made any attempt to rule out either the fine or gross motor operations in terms of statistical analysis. Thus, the analysis of the data must be accepted as pertaining to a combination of gross and fine motor components. This type of program was designed deliberately, however, because the literature has not been sufficiently supportive of a fine or gross motor development training program researched as a single element.[17]

Definition of Terms Used in the Study

Academic Achievement

For purposes of this study, academic achievement is defined within the limits of the Stanford Early School Achievement Test. Specifically, academic achievement refers to the four parts of this test which are: The Environment, Mathematics, Letters and Sounds, and Oral Comprehension. These four subtests are designed to provide a measure of the child's cognitive abilities. Academic achievement in the context of this study refers to the assessment of the part of the kindergarten program relating to cognitive development as defined by the four parts of this test.

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[17] See figures 2.1 and 2.2.

Basic Concepts

The fifty concepts measured by the Boehm Test of Basic Concepts comprises the essence of this term when used in this study. This test was designed to measure children's mastery of fifty concepts considered necessary for achievement in the first years of school.[18]

Visual Perception

This term refers to the visual recognition of similarities involved in the Matching subtest of the Metropolitan Readiness Test. Within the context of this subtest, visual perception is the ability to visually discriminate a given picture from a set of three pictures.

Motor Control

As used in this study, this term refers to the Copying subtest of the Metropolitan Readiness Test in which motor control is the child's ability to reproduce a given symbol motorically.

Fine Motor Activities

When used in this study, this term refers to activities demanding small muscle control such as using pencils, crayons, scissors, and small toys.

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[18] See Appendix B for a list of the fifty specific concepts.

Gross Motor Activities

The limits of this term for this study are defined by the activities measured by the Motor Facilitation Scale Survey. They include forward, backward and sideward walk, jumping, hopping and skipping, as well as trunk movements.

Perceptual-Motor Program

In this study this term applies specifically to a combined program of both fine and gross motor activities. The use of this term is based on Kephart's theoretical assumption which stresses the importance of perceptual-motor orientation of the child as a foundation for the symbolic and conceptual activities in the classroom.

Visual-Perceptual Program

A program in which only fine motor training or exercises are used defines the limits of this term for this study. This type of program is based on the theories of Frostig and Getman.[19]

Readiness Program

The Readiness Program in this study refers to the total sum of the activities given the control group. These activities include a gymnasium program consisting of low organized activities and a classroom workbook which provides for readiness activities involving cutting, pasting, coloring, and copying.

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[19] See Chapter II for description of Frostig and Getman theories.

Low Organized Activities

These activities refer to the activities given the control group in the gymnasium. Low organized activities involve group games and group exercises and operate in a setting in which one teacher takes over the central commands.

Performance Growth Rate

This term as used in this study refers to the amount of gain made by a treatment group (either experimental or control) on test scores between pre- and post- testing.

Organization of the Remainder of the Study

The review of the literature pertinent to the theory of enhancement of school readiness through a structured perceptual-motor development training program, as supported by Kephart, Barsch and Cratty, is presented in Chapter II. Also presented in Chapter II are the related theories of Getman, Frostig, and Delacato; that chapter concludes with a review of research pertinent to the programs supported by these theorists.

Included in Chapter III are descriptions of the sample, the measures used in the study, and the method of data collection. An explanation of the rationale for the content of the curriculum in both experimental and control groups is additionally presented in Chapter III. An analysis and discussion of the results of the findings of this study

are developed in Chapter IV. Chapter V consists of the summary, conclusions, and implications for future study.

The review of literature is offered next in Chapter II in order to place this study into perspective in relation to research in perceptual-motor training as a way to increase school readiness.

CHAPTER II

REVIEW OF LITERATURE

Studies of perceptual-motor development began initially by tracing a relationship between underachievement or learning difficulties and visual-perceptual difficulties. Studies then looked for gains in terms of reading ability and/or word recognition ability by means of a visual-perceptual training program, of which Frostig's program was the most commonly used. Then studies became more involved with the perceptual-motor theory of Kephart; more recently, Kephart's theory is seen in studies at the kindergarten level. Overall, there has been a shift in the dependent variable from (1) reading achievement to (2) reading readiness at the kindergarten level to (3) a broader interest in academic readiness and overall academic achievement.

The review of literature in this chapter concerns studies of perceptual-motor development programs. The review is divided into two major sections. The first section is concerned with perceptual-motor development programs relating to the theories of Kephart, Barsch, and Cratty. Studies at the kindergarten level are reviewed in depth. The second major section contains a description of the related perceptual-motor development theories of Getman,

Frostig, and Delacato. Research studies related to their theories, as well as some research dealing with perceptual-motor development programs in special education classroom situations, are considered.

Review of Perceptual-Motor Development Studies

Kindergarten Studies

James Lazroe conducted a study of the effects of motor training on the reading readiness of children on the kindergarten level. This study was designed to: (1) determine whether there was a significant difference between reading readiness test scores of (a) kindergarten children given certain motor training and (b) kindergarten children given regular training; (2) determine whether there was a significant difference between reading readiness test scores and perceptual test scores of male and female kindergarten children given certain motor training; (3) determine whether there was a significant difference in reading readiness test scores and perceptual test scores that was attributable to the age of kindergarten children given certain motor training; (4) determine whether there was a significant difference in reading readiness test scores that was attributable to the mental age of kindergarten children given certain motor training. Children from sixteen kindergarten classes served as subjects for the Lazroe study. Eight of the classes had been

randomly selected for the experimental program, while the remaining classes served as control subjects. The experimental program consisted of prescribed gross motor activities for one-half hour daily over an eight-week period. Eight teachers participated, each one having an experimental and a control class randomly assigned for morning or afternoon sessions. The Pintner-Cunningham Primary Test was used to determine mental ages of the subjects. The Perceptual Forms Test and the Form A of the Metropolitan Readiness Test were used as pre- and post-measurements of readiness for reading. Scores earned on the pre- and post-tests of the Perceptual Forms Test and the Metropolitan Readiness Test were treated by analysis of co-variance technique.[1]

This study concluded that the inclusion of a systematic program of gross motor activities in the curriculum of kindergarten children had the following effects: (1) it significantly improved their readiness for reading; (2) it improved the reading readiness of boys and girls to a similar degree; (3) it improved the reading readiness of older and younger children to a similar degree; (4) it improved the reading readiness of children of both higher and lower mental age to a similar degree; (5) it improved the reading readiness of higher mental age subjects significantly more than it improved the reading readiness of lower mental age subjects.

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[1]James J. Lazroe, "An Investigation of the Effects of Motor Training on the Reading Readiness of Kindergarten Children," Dissertation Abstracts, XXIX (3-A, 1969), p. 2609.

Thus, the Lazroe study suggested that perceptual-motor development programs could have significant results in terms of academic achievement. However, it appeared easier to get results with lower mental age subjects. Sex and chronological age were ruled out by Lazroe as significant factors. This study did not take into account the fact that the experimental group was getting extra individualized attention that the subjects of the control groups were not getting. Also, this study did not include training in any fine motor activities.

William Rutherford conducted an investigation into the effects of a perceptual motor training program on the performance of kindergarten pupils on the Metropolitan Readiness Test. The purpose of this study was to determine whether a group of normal kindergarten children would show greater growth in reading, number, and total readiness as measured by the Metropolitan Readiness Test after engaging in a perceptual-motor training program than would a comparable group of children who continued in the regular school program. Rutherford's training program was based on the program suggested by Kephart. It provided sensory-motor and ocular training through the use of certain equipment and activities. Sixty-four children enrolled in four kindergarten classes were used as subjects. These subjects were classified as "older" and "younger" and, by random assignment of the older and younger subjects of each sex,

were then divided into experimental and control groups. Members of the experimental group received perceptual-motor training during their 15-minute recess each day for eight weeks.[2]

The findings of the Rutherford study indicated that the perceptual-motor training program used was highly effective in promoting total readiness as measured by the Metropolitan Readiness Test. The program was effective to a lesser degree in improving performance on the reading and number readiness tests. No significant differences were found relating to sex or to the older or younger subjects. This study also suggested that a perceptual-motor program would enhance cognitive growth, but as in the previous investigation, this study did not control for the differential treatment given the experimental group.

The Wheeling, Illinois, School District conducted a study under the direction of Donna Obrecht to evaluate its own motor-facilitation program at the kindergarten level. In this perceptual-motor development program, each child participated in a series of motor activities in combination with the use of the Frostig visual-perceptual material. Since all of the Wheeling district was involved in the program, the study was conducted by comparing district

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[2]William L. Rutherford, "The Effects of a Perceptual-Motor Training Program on the Performance of Kindergarten Pupils on Metropolitan Readiness Tests," Dissertation Abstracts, XXV (3,1965), p. 4583.

results on the Metropolitan Readiness Test for the school year of 1967, when children did not participate in a motor facilitation program, with the results in 1969, when all children participated in the motor facilitation program. Significant differences at the .01 level were found between scores for these two years.[3] This study, however, provided only a gross evaluation as it did not control for variables such as teacher changes and socio-economic changes.

A study of Grace Zirbel and Glenn R. Thompson was designed to assess the effects upon reading achievement of a kindergarten perceptual-motor program at the end of first grade. Sixteen girls and twelve boys were randomly assigned to one of two kindergarten classes for this study. The control class received conventional kindergarten programming, while the experimental class received perceptual-motor exercises in addition to the regular program. At the completion of first grade the two groups were compared on reading achievement, using the Metropolitan Reading Test. Results showed the experimental group to have significantly outscored the control group. The study was seen as supporting the value of a perceptual-motor training program

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[3]Donna Obrecht, The Motor Facilitation Program of School District 21, (Report Prepared by the Elk Grove Training and Development Center Elk Grove, Illinois, 1969), pp. 79-90.

at the kindergarten level.[4] Again, this study did not control for the differential treatment given the experimental group.

In a study done in Kenilworth School District, Illinois, under the direction of Thomas Kriewall, the effects of motor facilitation treatment on several physiological and learning characteristics of pupils were investigated. Part of the study randomly assigned kindergarten children to one of three classes in order to examine the effects of motor facilitation treatment on the measures obtained in the pre- and post-testing. In one class all children received a motor-facilitation treatment; in the second class, only specially selected children received the treatment; in the third class, none of the children received the treatment. Results were obtained by use of the subtests of the Illinois Test of Psycholinguistic Abilities (ITPA), Binet Sentence Repetition Test, several gross motor tasks, the subtests of the STAR Test, and the subtests of the Frostig Test.

No significant advantage appeared to exist for either the control or the experimental group over the other. Multivariate analysis of co-variance revealed that only the

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[4]Grace Zirbel and Glenn R. Thompson, "The Influence of a Perceptual-Motor Program Upon First Grade Reading Achievement: A Study in Early School Intervention," American Educational Research Association Annual Meeting Abstracts, 1971, p. 65.

Binet Sentence Repetition Test and the Visual Retention subtest of the ITPA reflected significant differences between the motor facilitation treatment group and the no-motor facilitation treatment group. In general, mean scores on all measures increased for all treatment groups from Fall to Spring, while the variances decreased correspondingly.[5] In a very general sense, the Kenilworth study tended to negate the theory of cognitive enhancement through perceptual-motor development training, but the study did not specifically test for academic or reading readiness. The Kriewell investigation did not control for differential treatment given experimental groups. The Kenilworth study was conducted in a relatively small district with a highly select pupil population; the socio-economic level of this district is very high.

A study coordinated by Paul Smith was concerned with perceptual-motor program methodology. It attempted to compare the effects of three methods of presenting perceptual-motor skills on the reading readiness of randomly placed kindergarten children. Kindergarten classes in six schools participated in this study. Classes participated in perceptual-motor movement patterns on an average of three days per week for twenty-five weeks; teachers devoted

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[5]Thomas E. Kriewall, Detection and Prevention of Early Learning Disabilities (Institute for Educational Research Progress Report No. 104, Downers Grove, Illinois, 1970), pp. 1-3.

twenty minutes per day to the project lessons. Two days each week were spent in regular physical education. All classes were taught identical movement skills through the use of a multisensory approach. The twelve classes were divided into three groups (I, II, III) of four classes each. The major difference in the various group experiences during the project lay in the teacher's particular method of presentation. The Metropolitan Readiness Test was given as the pre- and post-testing measure.

Comparison of mean score improvement indicated that there was no significant difference between directed and problem-solving methods of teaching. There was, however, an 8.73 point greater mean score gain in the combined directed and problem-solving groups (Groups I and II) when compared to Group III. Since Groups I and II verbalized the directions toward which movement patterns developed and Group III did not, it would appear that simply carrying out the movements will not bridge all perceptual-motor learning gaps. There appeared to be a greater understanding and transfer of learning if a verbal command for each movement was used to reinforce that movement.[6] The Smith study offers a significant contribution in the area of perceptual-motor training methodology.

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[6]Paul Smith, "Perceptual-Motor Skills and Reading Readiness of Kindergarten Children," Journal of Health, Physical Education and Recreation, XLI (April, 1970), pp. 43-44.

A study was done by William Wimsatt on the effect of sensory-motor training on the learning abilities of grade school children. Experimental groups at kindergarten, first, and second grade levels were given perceptual-motor training periods each day over one school year's time. As measured by the Gates Advanced Primary Test, the first and second grade children in the experimental group showed no significant gains when compared to the control group subjects. However, as measured by the Monroe Reading Aptitude Test, significant gains favoring the experimental group were made by the kindergarten children.[7] This experiment did suggest that early gains in academic achievement could be made through perceptual-motor development training but that these gains would be minimized over time. At the kindergarten level, where one class out of three was randomly chosen for experimental treatment in this study, teacher variables were not taken into account. Also, differential treatment of experimental groups was not taken into account at any of the grade levels.

A final kindergarten study reviewed in this section is concerned with perceptual-motor ability as it relates to the socio-economic level of the kindergarten child. Enno

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[7]William R. Wimsatt, "The Effects of Sensory-Motor Training on the Learning Abilities of Grade School Children," Dissertation Abstracts, XXVIII(1-B, 1967), p. 347.

Lietz undertook a study with the purpose of determining if the perceptual-motor ability of the advantaged kindergarten child was any different from that of a kindergarten child who comes from an economically disadvantaged home. Fifty children who came from homes where the income was less than three thousand dollars a year and fifty children who came from homes where the income was more than three thousand dollars a year were individually administered a revision of the Purdue Perceptual-Motor Survey. The results of Lietz's study indicated that the advantaged children, as a group, scored significantly higher on tests of perceptual-motor development. Lietz concluded that it appears that the overall perceptual ability of the advantaged child appears to be superior to that of the disadvantaged child.[8] The Lietz study does have implications for this research as this study was undertaken in an economically advantaged area.

First and Second Grade Studies

In a study by Clarence McCormick, an experimental group was given perceptual-motor training while another group was given standard physical education training. A third group received no extra training or attention. Results

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[8]Enno Lietz, "An Investigation of the Perceptual-Motor Abilities of the Economically Disadvantaged Kindergarten Child as Compared to the Advantaged Kindergarten Child," Dissertation Abstracts, XXIX (4-A, 1969), p. 3530.

of this study as measured by the Lee-Clark Reading Tests showed statistically significant gains (averaging over .2 grade levels) for the group which received the perceptual-motor training but not for the other two groups.[9] In a similar study, McCormick obtained significant results for underachievers who received perceptual-motor training. The results of this study, however, were not significant for the total first grade groups.[10] Edward Lipton studied the effect of gross-motor training to develop directionality of movement on reading readiness of first grade children. The analysis of the data of this study revealed significant mean differences favoring the experimental group with respect to reading readiness as measured by the Metropolitan Readiness Test.[11]

The effects of Kephart-type physical activities on academic achievement of first graders were considered in research by Colleen O'Conner. She did not obtain significant

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[9]Clarence C. McCormick, "Improvement in Reading Achievement through Perceptual-Motor Training," The Research Quarterly, XXXIX (March, 1968), pp. 627-633.

[10]Clarence C. McCormick, Janice N. Schnobrich, and S. Willard Footlik, "The Effect of Perceptual-Motor Training on Reading Achievement," Academic Therapy, IV(Spring, 1969), pp. 171-176.

[11]Edward D. Lipton, "The Effect of a Physical Education Program to Develop Directionality of Movement on Perceptual-Motor Development, Visual Perception, and Reading Readiness of First Grade Children," Dissertation Abstracts, XXX (2-A, 1969), p. 2362.

results as measured by the Metropolitan Readiness Test.[12] A recent study by Wayne Collins also did not obtain significant results, as measured by the Metropolitan Readiness Test, for children participating in a Kephart program of perceptual-motor training.[13] Coralie Emmons designed a study involving the comparison of selected gross-motor activities of the Getman and the Kephart perceptual-motor training programs and their effects upon certain readiness skills of first grade Negro children. As measured by the Metropolitan Readiness Test, significant results were not obtained between either of the groups of the control group. Emmons concluded that gross motor training in the perceptual-motor skills was effective only for slow learners.[14]

Rebecca Swanson studied the relationship between perceptual-motor skills and the learning of word recognition among children in the second grade. She tested word

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[12]Colleen M. O'Conner, "The Effects of Physical Activities upon Motor Ability, Perceptual Ability, and Academic Achievement of First-Graders," Dissertation Abstracts, XXIX (5-A, 1969), p. 4310.

[13]Wayne J. Collins, Motor Facilitation Study, (Report prepared by School District #41, Glen Ellyn, Illinois, 1970), pp. 1-4.

[14]Coralie Emmons, "A Comparison of Selected Gross-Motor Activities of the Getman-Kane and the Kephart Perceptual-Motor Training Programs and Their Effects upon Certain Readiness Skills of First-Grade Negro Children," Dissertation Abstracts, XXIX (4-A, 1969), p. 3442.

recognition on specific sections from standardized tests; She obtained significant results at the .01 level favoring the experimental groups.[15]

Summary

In the first section of Chapter II, literature relating to the central theory of enhancement of school readiness growth by means of a structured, sequential, perceptual-motor training program was reviewed. Figure 2.1 provides an overview of the specific studies discussed. Criticism of these studies falls mainly into two categories: (1) none of these studies controlled for the differential treatment given children in the experimental group, and (2) two of these studies were marked by inadequacies in sampling because of inability to provide for any type of randomization.

Review of Related Theories and Research

This section of Chapter II contains a description of the research related to the theories of three theorists in perceptual-motor development. Getman and Frostig have developed visual-perceptual development theories; Delacato

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[15]Rebecca G. Swanson, "A Study of the Relationship Between Perceptual-Motor Skills and the Learning of Word Recognition," Dissertation Abstracts, XXIX (3-A, 1969), pp. 2158-2159.

Investigator	Length of Treatment	Disposition of Results
Kindergarten (perceptual-motor) Studies		
1. Lazroe	8 weeks	Sig. gains in reading readiness
2. Rutherford	11 weeks	Sig. gains in reading readiness
3. Wheeling School District	One school year	Sig. gains in reading readiness
4. Zirbel and Thompson	One school year	Sig. gains in reading readiness
5. Kenilworth School District	One school year	No sig. gains on several learning characteristic measures
6. Smith	25 weeks	No sig. differences among methodologies
7. Wimsatt	One school year	Sig. gains in reading readiness
8. Lietz	Correlational	Sig. higher perceptual ability for advantaged versus disadvantaged children
First and Second Grade (perceptual-motor) Studies		
1. McCormick, et al.	7 weeks	Sig. gains in reading achievement
2. McCormick, et al.	9 weeks	Sig. gains in reading achievement only for underachievers
3. Lipton	12 weeks	Sig. gains in reading readiness
4. O'Conner	6 months	No sig. gains in achievement
5. Collins	8 months	No sig. gains in reading readiness
6. Emmons	10 weeks	Sig. gains in achievement only for slow learners
7. Swanson	6 months	Sig. gains in achievement only for underachievers

FIGURE 2.1.--Overview of Perceptual-Motor Development Program Studies.

has developed a gross motor development theory. This section also provides a review of several studies dealing with perceptual-motor development programs in special education classroom situations.

Visual-Perceptual Theories

An optometrist by training, G. N. Getman claims that vision is intelligence. "Intelligence," he says, "is the ability to make a judgment, decision or action best suited to the problem of the moment, based upon the total knowledge gained from one's experience."[16] He aims to integrate "biological" and "cultural" intelligence by supplying a meaningful experiental background. Getman's sequence demands (1) training in general motor patterns, (2) the development of special movement patterns leading to hand-eye coordination, (3) the development of eye movement patterns which substitute for and thus reduce exploratory movement, (4) communication patterns which also replace action and visual patterns to supply skill and comparison, and finally (5) visual memory and projection. This sequence leads to the final stage: the development of "visual-perceptual organization." Furthermore, Getman claims that

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[16]G. N. Getman, How to Develop Your Child's Intelligence (Luverne, Minnesota: Research Publication, 1962), p. 14.

this visual training program correlates with reading abilities and, to a lesser degree, to school grades.[17]

The importance of visual-perception is also stressed by Marianne Frostig. She defines visual-perception as the ability to recognize and discriminate stimuli and to interpret those stimuli by associating them with previous experiences. The interpretation of visual stimuli occurs in the brain, not in the eyes. She believes that proficiency in visual-perception helps children to learn to read, write, and spell, to do arithmetic, and to develop all the other skills necessary for success in school work.[18] To improve and develop visual-perception, Frostig has developed a developmental program that centers on training in the following areas: eye-hand coordination, figure-ground perception, perceptual constancy, position in space, and spatial relationships. Frostig's sequence moves from the sensory motor development of the first two years of life to the emphasis on speech development that takes place up to the age of four, to the visual perceptual development from three and one half to seven and one half years of

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[17]Stanley Kreppner, "Pre-Readiness Approaches in Reading," Education, LXXXVII (September, 1966), p. 17.

[18]Marianne Frostig and David Horne, The Frostig Program for the Development of Visual Perception (Chicago, Illinois: Follett Publishing Co., 1964), p. 8.

age, to the development of higher cognitive processes that starts at age seven, eight, or older.[19]

Both Getman's and Frostig's theories imply that a sequential visual-perceptual training program will stimulate and enhance school readiness as seen in reading ability and school achievement.

Kindergarten Studies.--Several studies deal primarily with the hypothesis of improvement in reading readiness, as measured by the Metropolitan Readiness Test, through participation in the Frostig program. James Jacobs found no evidence to support the hypothesis that kindergarteners who had participated in the Frostig visual-perceptual program for nine months performed better on a reading readiness test than those who had not been involved in such a program.[20] In a follow-up evaluation study of the Frostig Visual-Perceptual Training Program, Jacobs found the experimental group to have somewhat higher scores on the Metropolitan Readiness Test than the control group, although the difference did not reach a statistically significant level. He also found no significant difference

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[19]Miriam S. Magdol, "An Historical Perspective to Physiological Education," Academic Therapy Quarterly, III (Spring, 1968), p. 169.

[20]James N. Jacobs, "An Evaluation of the Frostig Visual-Perceptual Training Program," Educational Leadership, LLV (January, 1968), pp. 322-340.

in the achievement of the Frostig program pupils or controls on reading tests at the end of grade one.[21]

Gordon Alley and William Snider hypothesized that the Frostig program would be an appropriate method for culturally deprived children in a reading readiness program. The results indicated significant differences in mean scores in favor of the experimental group when comparing the two groups on Metropolitan Reading Readiness Tests after approximately eight months of visual-perceptual training. This finding appears to support the authors' hypothesis, with the reservation that the total teaching presentation, personality, interests, and classroom management of the two kindergarten teachers were not statistically controlled.[22]

The effect of two instructional programs on the attainment of reading readiness, visual-perception, and science process skills on kindergarten children was examined by William C. Ritz. The two programs were a science process approach and the Frostig program. Most of the significant findings of this study appeared to demonstrate that science and/or visual-perceptual instruction can be included in

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[21]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), pp. 169-175.

[22]Gordon Alley and William Snider, "Reading Readiness and the Frostig Training Program," Exceptional Children, XXXV (September, 1968), p. 68.

kindergarten programs without impairing the readiness attainment of children so trained.[23]

In a study by Mary H. Bosworth, it was hypothesized that an arbitrary sequence of learning activities for improving visual-motor skills of kindergarten children would improve ability in word discrimination. Pre- and post-testing using the Betz Word Form Test supported her hypothesis by demonstrating significant improvement with the experimental subjects' word discrimination ability.[24] A companion study was conducted by Katherine DiMeo. It demonstrated a significant relationship between kindergarten subjects' achievement and word discrimination and their ability to focus on perceived differences of stimulus characteristics of geometric forms.[25]

Richard Keim attempted to determine the effects of a visual-motor training program on the readiness and intelligence of kindergarten children. Three groups of children were matched on the basis of intelligence and pre-kindergarten readiness for this study. The experimental

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[23]William C. Ritz, "The Effect of Two Instructional Programs (Science-A Process Approach and the Frostig Program for the Development of Visual-Perception on the Attainment of Reading Readiness, Visual Perception), and Science Process Skills in Kindergarten Children," Dissertation Abstracts, XXX (1-A, 1969), p. 1082.

[24]Mary H. Bosworth, "Pre-Reading: Improvement of Visual-Motor Skills," Dissertation Abstracts, XXVIII (4-A, 1968), p. 3545.

[25]Katherine DiMeo, "Visual-Motor Skills: Response Characteristics and Pre-Reading Behavior," Dissertation Abstracts, XXVII (3-A, 1968), pp. 2552-2553.

group followed prescribed visual-motor training procedures, while the control groups were given the traditional kindergarten program. Groups were compared for intelligence and readiness at the end of one school year. The results showed no significant differences among groups; they suggest that additional research is necessary before a visual-motor training program becomes a part of the general kindergarten curriculum.[26]

First and Second Grade Studies.--A follow-up on achievement test scores of first grade students after visual-perceptual training in kindergarten was undertaken by Shirley Linn. By pre- and post-testing on the Metropolitan Readiness Test, she found subjects who participated in a concentrated three months' Frostig program to be two to four months ahead of the control group in achievement.[27] In a study by James Cowles, an experimental group received nine weeks of visual-perceptual training using part of the Frostig program, an instructional control group received listening activities for the same amount of time, and a control group received no specific treatment. As measured

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[26]Richard P. Keim, "Visual-Motor Training, Readiness, and Intelligence of Kindergarten Children," Journal of Learning Disabilities, III (May, 1970), pp. 256-259.

[27]Shirley Linn, "A Follow-up: Achievement Report of First Grade Students After Visual-Perceptual Training in Kindergarten," Academic Therapy, III (Spring, 1968), pp. 179-180.

by the Metropolitan Readiness Test, significant differences on test scores were obtained favoring the experimental group.[28]

Carl Rosen failed to find significant results for groups who had received a twenty-nine day adaptation of the Frostig program for the development of visual-perception.[29] A study of the effects of a visual-perceptual training program upon school achievement, I.Q., and visual-perception was conducted by Roger Bennett. He administered the Frostig program for eighty consecutive school days to middle and lower class second grade children. Significant differences on achievement test scores, as measured by the California Achievement Tests, were not found between the middle and lower class groups.[30]

A correlational study by Ella Mae Trussel dealt with the relation of performance of selected physical skills to perceptual aspects of reading readiness in first and second grade children. The results did not support the use

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[28]James Cowles, "An Experimental Study of Visual-Perceptual Training and Readiness Scores with Certain First-Grade Children," Dissertation Abstracts, XXIX (4-A, 1969), pp. 3518-3519.

[29]Carl L. Rosen, "An Investigation of Perceptual Training and Reading Achievement in First Grade," American Journal of Optometry and Archives of American Academy of Optometry, XLV (May, 1968), pp. 322-332.

[30]Roger M. Bennett, "A Study of the Effects of a Visual-Perception Training Program upon School Achievement, I.Q., and Visual-Perception," Dissertation Abstracts, XXIX (5-A, 1969), p. 3864.

of perceptual-motor evaluation as a diagnostic tool to identify pupils with basic reading difficulties.[31] A correlational study by Harry Fullwood investigated a follow-up of children selected by the Frostig Developmental Test of Visual Perception for a relation to their success or failure in reading and arithmetic at the end of second grade. He found that children who had been selected by the Frostig test as having a high perceptual quotient in first grade achieved significantly better in reading and arithmetic at the end of second grade than did those children who were grouped together because they had obtained a low perceptual quotient.[32]

One of the first studies dealing with visual-perceptual abilities and academic achievement was conducted by Jean Goins. For a ten week period an experimental group of first graders received tachistoscopic form training. Results indicated no significant difference for the experimental group as measured by pre- and post-testing on

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[31]Ella May Trussel, "The Relation of Performance of Selected Physical Skills to Perceptual Aspects of Reading Readiness in Elementary School Children," Dissertation Abstracts, XXVIII (1-A, 1967), pp. 134-135.

[32]Harry Fullwood, "A Follow-up Study of Children Selected by the Frostig Developmental Test of Visual Perception in Relation to their Success or Failure in Reading and Arithmetic at the End of Second Grade," Dissertation Abstracts, XXIX (3-A, 1969), p. 2035.

Chicago Reading Tests.[33] Another study involving visual-form training for first grade subjects was done by Molly Gorelick. Experimental groups received a pre-reading training program in visual-perceptual discrimination of either abstract or meaningful symbols. Gorelick did not find any significant differences in word recognition ability between the experimental groups and the control groups.[34]

A study by Marion Faustman attempted investigation of effects of perceptual training on kindergarten and first grade success in reading achievement. First grade findings indicated significant differences as measured by the Gates Word Survey favoring the experimental group.[35] In a study of the effect of perceptual training on reading achievement in disadvantaged children by David Elkind, two groups of second grade, inner city, Negro children were matched for reading achievement and perceptual ability. The experimental group was trained with a series of non-verbal, perceptual exercises for one-half hour three times

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[33]Jean T. Goins, "Visual-Perceptual Abilities and Early Reading Progress," Supplementary Educational Monographs, Number 87, (February, 1958), pp. 96-102.

[34]Molly C. Gorelick, "The Effectiveness of Visual Form Training in a Pre-Reading Program," The Journal of Educational Research, LVIII (March, 1965), pp. 315-318.

[35]Marion Faustman, "Some Effects of Perception Training in Kindergarten on First Grade Success in Reading," Dissertation Abstracts, XXVII (2-A, 1966), p. 951.

a week for fifteen weeks. Twenty-nine control subjects met for a comparable amount of time but were trained with a commercial reading program, The Bank Street Readers. Results showed that the experimental group made significantly greater improvement on word form and word recognition than the control group.[36]

Delacato Method

In the late 1950's a controversial theory which placed much emphasis on gross motor training was developed by Carl Delacato. Delacato holds that all problems of communication originate in inadequate neurological organization and failure of the human organism to develop unilaterality. He considers unilaterality to be "that dynamic aspect of neurological organization which distinguishes man from lower animals."[37] Delacato is concerned with the ontogenetic recapitulation of phylogenetic development. The human organism, he says, represents the highest neurological development yet achieved. Man has added a final state of laterality. The basic difference between man and the animal world is that man has achieved cortical dominance wherein one side of the cortex controls the skills in which man outdistances lower forms of animals.

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[36]David Elkind and Jo A. Deblinger, "Perceptual Training and Reading Achievement in Disadvantaged Children," Child Development, XL (March, 1969), pp. 11-19.

[37]C. H. Delacato, The Treatment and Prevention of Reading Problems (Springfield, Ill.: Charles C. Thomas, 1959), p. 34.

Training for the child, according to Delacato, involves passive manipulation and reflex movement patterns, patterning of sleep positions, crawling, training of eye dominance, handedness and feetedness. The curriculum advocated by Delacato requires the elimination of all tonal experience, dietary restrictions to limit fluid intake, sometimes breathing into plastic bags for short periods to raise the level of carbon dioxide in the blood, and other techniques generally considered by educators and medical personnel to be unorthodox.[38]

The Delacato approach has met with sharp criticism and much diversity of opinion, although it did put a focus on gross motor training and has had some limited success with neurologically handicapped children.

Several studies have negated the validity of the Delacato method. A kindergarten study done by Mark Stone and N. L. Pielstick found no significant difference in reading achievement with an experimental group participating in a Delacato Method Program for one-half hour a day periods for eighteen weeks.[39] A similar study at the first grade

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[38]Miriam S. Magdol, "An Historical Perspective to Physiological Education," Academic Therapy Quarterly, IV (Spring, 1968), p. 168.

[39]Mark Stone and N. L. Pielstick, "Effectiveness of Delacato Treatment with Kindergarten Children," Psychology in the Schools, VI (January, 1969), pp. 63-68.

level by Irving Millstein did not provide support for Delacato's theory.[40]

A study by James Foster suggested that the program recommended by Delacato was not associated with gains in reading or scores in intelligence for fourth and fifth grade boys with mixed dominance.[41] The empirical evidence indicates that Delacato's theory is apparently unsound.

Special Education Studies

In the area of special education, specifically in regard to educable mentally handicapped (EMH) children, several studies have been concerned with research into visual-motor and/or visual-perceptual training regarding enhancement of cognitive abilities. A study by Norman Chansky demonstrated that mentally retarded children trained to make discriminations, to organize, to orient themselves from left to right, and to make inferences improved in measured achievement and intelligence.[42] A study by Lloyd McClanahan measured the effects of thirty-five hours

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[40]Irving J. Millstein, "An Empirical Study of the Delcato Theory and Training Procedures," Dissertation Abstracts, XXVIII (4-B, 1968), p. 4323.

[41]James M. Foster, "Effect of Mobility Training upon Reading Achievement and Intelligence," Dissertation Abstracts, XXVI (4-A, 1966), p. 3779.

[42]Norman M. Chansky and Margaret Taylor, "Perceptual Training with Young Mental Retardates," American Journal of Mental Deficiency, LXVII (May, 1964), pp. 460-468.

of visual-perceptual training on reading performances of "slow learning" first grade children and children enrolled in classes for the educable mentally handicapped. Significant results were obtained in reading on the California Achievement Test that favored the experimental group of the slow learners but not the experimental group of the EMH subjects.[43] Stanley Narramore conducted a correlational study of visual-perceptual development and academic achievement with educable mentally handicapped children. He found a correlation coefficient of .731 between visual perception and achievement as measured by the Stanford Achievement Tests.[44]

Summary

A review of the literature relating to visual-perceptual studies at the kindergarten, first and second grade levels was presented in the final section of Chapter II. Delacato method studies and special education studies also were reviewed. Figure 2.2 provides an overview of the specific studies reviewed.

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[43]Lloyd J. McClanahan, "The Effectiveness of Perceptual Training for Slow Learners," Dissertation Abstracts, XXVIII (3-A, 1968), p. 2560.

[44]Stanley B. Narramore, "Correlates of Visual-Perceptual Development and Academic Achievement in Educable Mentally Retarded Children," Dissertation Abstracts, XXX (4-A, 1970), p. 3796.

Investigator	Length of Treatment	Disposition of Results
Kindergarten (visual-perceptual) Studies		
1. Jacobs	One school year	No sig. gains in reading readiness
2. Jacobs	One school year	No sig. gains in reading readiness
3. Alley and Snider	One school year	Sig. gains in reading readiness
4. Ritz	8 weeks	No sig. difference between methodologies
5. Bosworth	8 weeks	Sig. gains in word discrimination
6. DiMeo	Correlational	High correlation between word discrimination and perceptual measures
7. Keim	8 weeks	No sig. gains in reading readiness
First and Second Grade (visual-perceptual) Studies		
1. Lynn	3 months	Sig. gains in achievement
2. Cowles	6 weeks	Sig. gains in reading readiness
3. Rosen	6 weeks	No sig. gains in reading readiness
4. Bennett	15 weeks	No sig. gains in achievement
5. Trussell	Correlational	Low correlation between achievement and perceptual measures
6. Fullwood	Correlational	High correlation between achievement and perceptual measures
7. Goins	10 weeks	No sig. gains in reading achievement
8. Gorelick	8 weeks	No sig. gains in reading achievement
9. Faustman	One school year	Sig. gains in word recognition
10. Elkind	15 weeks	Sig. gains in word recognition
Delacato Method Studies		
1. Stone and Pielstick	18 weeks	No sig. gains in reading readiness
2. Millstein	12 weeks	No sig. gains in reading achievement
3. Foster	10 weeks	No sig. gains in achievement
Special Education Studies		
1. Chansky and Taylor	10 weeks	Sig. gains in Achievement
2. McClanahan	14 weeks	Sig. gains in achievement only for slow learners
3. Narramore	Correlational	High correlation between achievement and perceptual measures

FIGURE 2.2.--Overview of Research Pertaining to Related Theories.

Generally, perceptual-motor training programs have had more success than visual-perceptual programs in obtaining gains in academic achievement. Also, perceptual-motor training programs at the kindergarten level have shown greater gains relating to academic achievement than perceptual-motor training programs at the first or second grade levels. Sex differences were not found to be significant in relation to achievement gains through perceptual-motor and/or visual-motor training. However, more significant gains generally were seen for underachievers and children with below average intelligence than for children of high intelligence. Correlational studies suggest that the relation between perceptual-motor variables and verbal materials appears to be greater in early childhood, with achievement becoming more task-specific as the child matures.[45]

This investigation, then, is an attempt to make a further contribution to the literature pertraining to perceptual-motor development training programs at the kindergarten level in relation to gains in academic achievement, controlling for differential treatment given the experimental group.

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[45]R. N. Singer and J. W. Brunk, "Relation of Perceptual-Motor Ability and Intellectual Ability in Elementary School Children," Perceptual and Motor Skills, XXIV (June, 1967), pp. 967-970.

CHAPTER III

DESIGN OF THE STUDY

The purpose of this study was to determine whether participation in a sequential perceptual-motor development program would enhance school readiness for kindergarten children. The study has been designed to provide for differential treatment given the experimental group. Thus, the basic difference between the experimental and control groups involved the type of instruction received.

Sample Selection for the Study

The sample for this study was taken from seventy kindergarten children which comprised the entire kindergarten class at Highland Elementary School, Skokie, Illinois. These seventy children were first randomly assigned by a table of random numbers to either a control or experimental group in either the morning or the afternoon session, depending upon whether the child had already been assigned by the school to morning or afternoon kindergarten.

After the post-testing was completed in April, 1971, ten of the seventy children were randomly assigned out for

research purposes.[1] The result provided four groups of fifteen children in each group who had received both the pre- and post-testing. Table 3.1 shows the characteristics of the research groups.

TABLE 3.1.--Characteristics of the Research Groups.

Group	Mean Age	Boys	Girls	N
AM Experimental	5-3	8	7	15
AM Control	5-4	7	8	15
PM Experimental	5-1	6	9	15
PM Control	5-2	5	10	15

Highland School is one of four elementary schools in School District #68, Skokie, Illinois. It draws its enrollment from a predominantly middle to upper class area. Skokie, Illinois, is a northern suburb of Chicago and is the largest village in the United States. This community, with a population of 68,000, ranks very high in the nation in terms of family income, employment, and the number of years of residents' education. School District #68 is one of five autonomous elementary school districts in Skokie with its own Board of Education and

[1] By providing equal groups, the assumption of homogeneity of variance within groups could be avoided.

superintendent. The district covers an area of about four square miles and serves about 4,000 pupils. The average student I.Q., based on Lorge-Thorndike Intelligence Tests, is about 114.

Method of Data Collection

The Stanford Early School Achievement Test and the Boehm Test of Basic Concepts were administered to the kindergarten children in October, 1970, and again in April, 1971. They were administered by the school psychologist with the help of one of the kindergarten teachers. Both tests were presented in groups of fifteen children with the testing sessions lasting for 15 minutes in the Fall and 30 minutes in the Spring.

The Motor Facilitation Skill Survey was also administered in October, 1970, and April, 1971. It was carried out by six parent volunteers under the supervision of the school principal. Six stations were established in the gymnasium. At each station a child was tested individually in one section of the Motor Facilitation Skill Survey. This procedure was used for both Fall and Spring administrations of this test.

The Metropolitan Readiness Test was administered only in April, 1971. This test was presented by both the kindergarten teachers. Groups of fifteen children were given testing sessions lasting one-half hour.

Measures Used in the Study

The measures used for collecting the data in this research were: Stanford Early School Achievement Test, (SESAT), Boehm Test of Basic Concepts, (BTBC), Matching and Copying Subtests of the Metropolitan Readiness Test, and an adaptation of the Wheeling Motor Facilitation Skills Survey.

Stanford Early School Achievement Test

The Stanford Early School Achievement Test, devised by Richard Madden and Eric F. Gardner[2] and published in 1969, is composed of the following four subtests: The Environment, Mathematics, Letters and Sounds, and Aural Comprehension. The Environment items are taken almost equally from the social and natural environments, social sciences and natural sciences. This subtest capitalizes upon knowledge of the environment that is absorbed by children from many sources, including parents, brothers and sisters, neighbors, trips, television, books, and just contact with things. The Mathematics subtest emphasizes items which have concepts that can be learned from general experience rather than from direct intervention. School

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[2]Richard Madden and Eric F. Gardner, Stanford Early School Achievement Test: Directions for Administering (New York: Brace and World, Inc., 1969), pp. 12, 19, 20.

mathematics concerns concepts in the following areas: conservation of numbers, space and volume; counting; measurement; numeration, classification, and simple operations. The items in the Letters and Sounds subtest measure both the ability to recognize upper and lower case letters and the auditory perception of beginning sounds. The items of the Aural Comprehension subtest require the abilities to pay attention to, organize, interpret, infer, and retain what has been heard. This subtest requires the highest level of thinking of any of the four subtests. Most of the items involve some degree of interpretation; all require attention.

Standardization of the SESAT consisted of a norm sample involving 8,310 pupils in kindergarten and 11,106 pupils in grade one. The school systems participating in this standardization program were selected to give appropriate representation in three variables: geographic region, size of city, and socio-economic level. Two socio-economic variables were also considered in selecting the standardized population: median family income and median years of school completed by persons age 25 and older.

The reliability data for the SESAT include split-half (odd-even) reliability coefficients corrected by the Spearman-Brown Prophecy Formula and Standard Errors of Measurement. These reliability coefficients concern the homogeneity of content or internal consistency of each

subtest of the total test. They range from .76 to .89 for both beginning kindergarten and beginning first grade administrations. Intercorrelations among part and total scores for both beginning kindergarten and beginning first grade test administrations range from .79 to .90.

Boehm Test of Basic Concepts

The Boehm Test of Basic Concepts (BTBC), devised by Ann E. Boehm, was published in 1970.[3] This test was designed to measure children's mastery of concepts considered necessary for achievement in the first years of school. The fifty items comprising Form A of the BTBC were developed by a multi-stage process. First, a comprehensive selection of preschool and primary-grade curriculum materials in the areas of reading, arithmetic, and science was reviewed. From the directions and other portions of these materials, terms were selected which (a) occurred with considerable frequency; (b) were seldom explicitly defined or were defined in their simple forms but subsequently used in complex forms without adequate transition; and (c) represented relatively abstract basic concepts or ideas. Once chosen, the concepts fulfilling these criteria were translated into pictorial multiple-choice items; these items were

[3]Ann E. Boehm, Boehm Test of Basic Concepts Manual (New York: The Psychological Corporation, 1970), pp. 14-17.

tried out twice on appropriate groups. There are four categories of concepts: space, quantity, time, and miscellaneous.

The BTBC was designed as a teaching and screening instrument rather than for predictive administrative purposes. Consequently, Ann Boehm considered it unnecessary to select standardization samples representative of children in kindergarten and the first and second grades in the nation as a whole. The standardization sample which served as the basis for beginning-of-year norms consisted of children enrolled in kindergarten and first and second grades in each of sixteen cities located across the United States. The sample for the mid-year norms included children from schools in five cities. School officials in each cooperating city were asked to provide classroom groups from schools with a fairly wide range of socio-economic background. Thus, norms are presented for low, middle, and high social economic levels.

Reliability coefficients for the BTBC total score range from .68 to .90. Both the reliability coefficients and the standard error of measurement were computed for the mid-year norms.

Validity for the Boehm Test of Basic Concepts is that of the content type. The items were selected from relative curriculum materials. They represent concepts basic to understanding directions and other oral

communications from teachers at the preschool and primary-grade level.

Metropolitan Readiness Test

For this research, two subtests of the 1965 edition of the Metropolitan Readiness Test were used. The Metropolitan Readiness Tests were devised to measure the extent to which school beginners had developed in the several skills and abilities that contribute to readiness for first-grade instuction. The authors believe that among the major factors that contribute to readiness for beginning school work are linguistic attainments and aptitudes, visual and auditory perception, muscular coordination and motor skills, number knowledge, and the ability to follow directions and to pay attention in group work.[4] The two subtests used for this research were the Matching and Copying subtests. Specifically, the Matching subtest is a test of visual perception involving the recognition of similarities. The pupil marks that one of three pictures which matches a given picture. The Copying subtest measures a combination of visual-perception and motor control. On this test, the pupil must copy given designs and figures.

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[4]Gertrude H. Hildreth, Nellie L. Griffiths, Mary E. McGauvren, Manual of Directions Metropolitan Readiness Tests (New York: Harcourt, Brace and World, Inc., 1965), pp. 3, 11-15.

This edition of the Metropolitan Readiness Test is a revision of the edition comprising Forms R-S published in 1949. The standardization of the Form A of the Revised Metropolitan Readiness Test was obtained in the Fall of 1964 by a sample of approximately 15,000 pupils in some 65 school systems. Data on socio-economic characteristics of the community were available from most of the participating schools. These data were analyzed in relation to comparable data for the country as a whole.

Data on reliability for the Metropolitan Readiness Test consist of three independent instruments of odd-even reliability coefficients for subtest and total scores, based on samples of pupils from three of the school systems taking part in the standardization program. Standard errors of measurement of the total score were provided for each of the three samples. Reliability coefficients for the Matching subtest range from .82 to .86 for the three independent estimates. For the Copying subtests, the reliability coefficients range from .91 to .94 and the standard error of measurement of total score is from 3.1 to 3.3 for the three independent estimates.

The authors of the Metropolitan Readiness Test have attempted to deal with several forms of validity. In terms of content, the validity of the Matching subtest, they believe that this test consistently has correlated well

with beginning reading skills. Inter-correlations for the Matching subtest range from .42 to .60. Inter-correlations for the Copying subtest range from .39 to .53. Congruent validity was attempted by correlating the Metropolitan Readiness subtests and total scores for the Murphy-Durrell Reading Readiness Analysis and the Pintner-Cunningham Primary Mental Ability Test. Correlations range from .30 to .59 for the Matching subtest and from .27 to .56 for the Copying subtest. Predictive validity was attempted by correlations with three experimental forms of the Metropolitan Readiness Test and the Metropolitan Achievement Test in first grade. Correlations for the Matching subtest ranged from .43 to .49 and correlations for the Copying subtest ranged from .38 to .41.

Motor Facilitation Skill Survey

The Motor Facilitation Skill Survey is an adaptation of a motor skill survey designed in 1967 for the kindergarten children in School District #21, Wheeling, Illinois.[5] The Wheeling Skill Survey is itself an adaptation of parts of the Purdue Perceptual-Motor Survey. It is primarily a diagnostic test. The Motor Facilitation Skill Survey used in District #68 tested children on body-image and spatial-concepts in addition to ability to walk in different

[5]Donna Obrecht, Op. cit., pp. 53-78.

directions on a balance beam, jump, hop, skip, and carry out trunk movements. This survey is basically a sampling of gross motor movement ability for the kindergarten age child.

Some norms were established for the Wheeling Skill Survey in 1967 when it was administered to 320 boys and 329 girls in the Wheeling, Illinois, school system. Fifty-three kindergarten children (25 boys and 28 girls) randomly selected from School District #36, Wheaton, Illinois, were given the Wheeling Skill Survey. For additional normalization and comparison data, the Wheeling Skill Survey was administered to 369 boys and 391 girls in the Wheeling school system in 1968. Although reliability coefficients were not computed, the results for 1968 in general were similar to those of the previous year.

Experimental Procedures

This study may be described as an experimental, pre-test post-test control group design, where subjects were randomly assigned to the control and experimental groups. This design adequately controls for such internal sources of contamination as maturation, testing, instrumentation, regression, selection, mortality, and any interactions of the above.[6] A possible external source of contamination

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[6]Donald T. Campbell and Julian C. Stanley, Experimental and Quasi-Experimental Designs for Research (Chicago: Rand McNally and Company, 1963), pp. 13-22.

would be the interaction of the subjects and the testing. This sensitizing effect becomes of less importance, however, when it is considered that tests given the subjects were standardized, given in a routine, and certainly could be described as a regular phenomenon for kindergarten children.

Treatment

The pre-testing measures were administered in October, 1970. They included the Stanford Early School Achievement Test, the Boehm Test of Basic Concepts, and an adaptation of the Wheeling Motor Skills Survey. During six months of treatment, the experimental group was given a structured, sequential program of perceptual-motor development skills in the gymnasium, and the Frostig Program for the Development of Visual-Perception in the kindergarten classroom; meanwhile, the control group was given low organized activities in the gymnasium and a kindergarten readiness workbook in the classroom. The post-testing measures were given in April, 1971. These included the three tests previously mentioned in addition to the matching and copying subtests of the Metropolitan Readiness Tests.

Each of the experimental and control groups included children from both morning and afternoon kindergarten sessions. Each of the experimental and control

groups, both morning and afternoon, spent two half-hours per week in the gymnasium part of the perceptual-motor development program and two half-hours per week in the classroom part of the perceptual-motor development program. When the experimental group worked in the gymnasium, the control group worked in the kindergarten classroom in its part of the research design, and vice-versa.

Teacher Variable

The kindergarten teaching group consisted of a master teacher, an associate teacher, and an aide. All three adults worked with forty children in the morning session and thirty children in the afternoon session. The associate teacher and the aide conducted the actual activities that were part of the research design for the control and experimental groups. In the gymnasium, all the groups were supervised by the elementary school principal. The programs for the experimental and control groups were conducted by members of one group of parent volunteers. Similarly, the programs for the afternoon experimental and control groups were conducted by a second group of parent volunteers. Thus, teacher variables were essentially the same for both experimental and control groups. The pupil-teacher ratio was the same during the treatment periods for

all experimental and control groups, but the pupil-teacher ratio during the remainder of the kindergarten day was larger for the morning session than for the afternoon session.

Prior to the initial testing, the parent volunteers underwent a course of instruction in training procedures. The training session for volunteers was conducted by the Highland School principal, who had been a physical education teacher and who previously had participated in a training program for the development of motor facilitation programs.[8]

Experimental Method

The primary purpose of the kindergarten perceptual-motor development program was to help each child develop perceptual-motor abilities. This was a two-part program; all the children in the experimental group participated in a series of motor activities in the gymnasium and used the Frostig visual-perceptual materials in the kindergarten classroom. The gross motor activities followed a general principle that involved the total process of the internalization of self-control and the concentration of attention on the movements being made. The internalization process was patterned on the analysis formulated by Alexander Luria.[9]

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[8]Donna Obrecht, Op. cit., Appendices B and E.

[9]Alexander Luria, The Role of Speech in the Regulation of Normal and Abnormal Behavior (New York: Liveright Publishing, 1961), pp. 38-42.

At first the child was directed to each exercise, and each movement was made only upon a direct command from the instructor. At a later stage the child directed his own series of movements by verbalizing the commands aloud. At a still later stage he directed himself in a series of movements, silently making the commands. The criterion for progression was the child's own fluency in each of the series of movements. As the child became skillful in any given exercise, complexities were added in order to keep his attention aroused and focussed on the movements.

Another general principle of the training involved the notion that the symptoms of hyperactivity and distractibility, commonly seen in many children, are a function of failure to develop adequate inhibitory processes.[10] Motor development training itself was centered on the following categories: body parts and body image, position in space, directionality, eye-hand coordination, and balance beam exercises.[11]

The classroom segment of the treatment with the experimental group involved visual-motor development training for two half-hour periods per week. The Frostig materials

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[10]Sam D. Clements, "The Child with Minimal Brain Dysfunction: A Profile," Children with Minimal Brain Injury: A Symposium (Chicago: National Society for Crippled Children and Adults, 1965), p. 12.

[11]See Appendix F for detailed lesson plans for the experimental group.

as programmed in the beginning and intermediate books of Pictures and Patterns were used.[12] The Frostig work sheets for the development of visual-perception focussed on the five visual-perceptual abilities that Frostig considers to have the greatest relevance to academic development. The five areas are: visual-motor coordination; figure-ground perception; perceptual constancy; position in space; and spatial relationships. The Frostig program was chosen for this research because of its structure and sequence. It should be noted, however, that this research is not attempting to base analysis of results on the theoretical claims of the Frostig visual-perceptual theory. That is, the Frostig program was selected for use on its curriculum merits rather than on its theoretical merits.

Control Method

The control group received essentially the same amount of individual attention as the experimental group, in terms of adult-pupil ratios. To prevent a public relations problem of parental concern that those children placed in a control group might not receive extra instruction, the gymnasium segment of the control group was disguised as a different curricular approach to perceptual-motor

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

development. Thus, the names of lessons coincide with the names of the experimental group lessons. For part of the gymnasium time of the control group, the children met in a large circle arrangement. Volunteer mothers took turns as leaders for the group while the other mothers interacted with the children in the circle. The remainder of the time in the gymnasium was spent in a game activity, such as a relay or broadjump. The kindergarten classroom time of the control group experience consisted of very generalized readiness activities such as cutting, pasting, and copying, from a workbook entitled Advantage.[14]

Testable Hypotheses

In this chapter, the null form of the hypotheses will be used for research purposes. The structure of the hypotheses will be similar to the structure as stated in Chapter I. There are four null hypotheses and one research question.

Null Hypotheses:

One. No significant difference will be found in academic achievement, as measured by the Stanford Early School Achievement Test, between kindergarten children participating in a

[14]Raymond Fournier and Vincent Presno, Advantage (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1969).

structured, sequential perceptual-motor development program and kindergarten children participating in a program consisting of low organized gym activities and a readiness workbook;

Two. No significant difference will be found in mastery of basic concepts as measured by the Boehm Test of Basic Concepts between kindergarten children participating in a structured, sequential perceptual-motor development program and kindergarten children participating in a program consisting of low organized gym activities and a readiness workbook;

Three. No significant difference will be found in the mastery of gross motor activities as measured by an adaptation of the Wheeling Motor Facilitation Skill Survey between kindergarten children participating in a structured, sequential perceptual-motor development program and kindergarten children participating in a program consisting of low organized gym activities and a readiness workbook.

Four. No significant difference will be found in visual perception and motor control, as measured by two subtests of the Metropolitan Readiness Test between kindergarten children who participated in a structured, sequential

perceptual-motor development program and kindergarten children participating in a program consisting of low organized gym activities and a readiness workbook;

Research Question:

There will be no significant differences in scores on the SESAT, the BTBC, the MFSS, and the Matching and Copying subtests of the MRT at the end of treatment between morning and afternoon kindergarten sessions for all of the above four hypotheses.

Analysis Used for the Data

To analyze the data collected, several statistical treatments were used for the purposes of testing the hypotheses previously stated.

A three factor analysis of variance procedure, with repeated measures on the third factor, as described by Winer,[15] was used for analyzing the data relevant to the testing of the hypotheses one through three. This statistical treatment was chosen for two reasons. First, the analysis of variance segment of the statistical analysis provided information required in the testing for significant differences between control and experimental groups as well as

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[15]B. J. Winer, Statistical Principles in Experimental Design (New York: McGraw-Hill Book Company, 1962), pp. 338-343.

between morning and afternoon sessions. This analysis also provided for the testing of interaction effects resulting from any combination of the three factors tested. Second, the repeated measures aspect of the procedure furnished information on gains in test scores; it also served as a correction of pre-test scores concerning any differences that might have existed between groups. This type of statistical analysis also offered the opportunity to profile the test data for each one of the first three hypotheses. Thus, this was a very sensitive analysis procedure for testing differences between groups.

Also, a simple effects analysis procedure, as described by Winer,[16] was used, when appropriate, for the four hypotheses. Simple effects analysis was used to further define specifically the nature of significant interaction effects that occurred through the analysis of variance procedures used.

To test the fourth hypothesis, a separate two-way analysis of variance procedure, as suggested by Hays,[17] was used. This procedure provided information required in the testing for significant differences between experimental and control groups as well as between morning and

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[16]B. J. Winer, Op. cit., pp. 310-311.

[17]William L. Hays, Statistics for Psychologists (New York: Holt, Rinehart and Winston, 1963), p. 387.

afternoon sessions. As previously pointed out, the use of the analysis of variance procedure also provided information relevant to the existence of interaction effects of differences apparently caused by the unique combination of treatment and sessions.

Finally, to test whether the items in the tests used were fairly homogeneous in terms of how the individuals responded to the items, a Kuder-Richardson coefficient was used as a measure of reliability. The formula used was the one suggested by Hoyt.[18] This reliability coefficient was computed for each one of the three tests that were given in the pre-testing observations: the Stanford Early School Achievement Test, the Boehm Test of Basic Concepts, and the Motor Facilitation Skill Survey.

Summary

The basic hypothesis for this study stated: a kindergarten curriculum containing a structured, sequential perceptual-motor development program would improve academic achievement and mastery of basic concepts. To test this hypothesis, sixty children from the kindergarten class at Highland Elementary School, Skokie, Illinois, were randomly

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[18] C. Hoyt, "Test Reliability Obtained by Analysis of Variance," Psychometrika, VI (March, 1941), pp. 153-160.

assigned to experimental and control groups. Teacher variables were held constant and all treatment groups had the same pupil-teacher ratio.

The experimental groups were given a structured, sequential program of perceptual-motor development skills. A physical education program based on low organized activities and a kindergarten readiness program was given to the control groups. Each group received a total of two hours of differential treatment per week. For an overview of Treatment Procedures, see Figure 3.1.

Observations in Oct., 1970	Six Months of	Observations in April, 1971
Experimental Group		Experimental Group
1. Motor Facilitation Skill Survey	1. Structured, Perceptual Motor Development in Gymnasium	1. Motor Facilitation Skill Survey
2. Boehm Test of Basic Concepts	2. Perceptual Development Program in Kindergarten classroom (Frostig materials)	2. Boehm Test of Basic Concepts
3. Stanford Early School Achievement Test		3. Stanford Early School Achievement Test
		4. Metropolitan Readiness Test (Matching and Copying subtests)
Control Group		Control Group
1. Motor Facilitation Skill Survey	1. Low Organized Activities Program in Gymnasium	1. Motor Facilitation Skill Survey
2. Boehm Test of Basic Concepts	2. Kindergarten Readiness Workbook (Advantage)	2. Boehm Test of Basic Concepts
3. Stanford Early School Achievement Test		3. Stanford Early School Achievement Test
		4. Metropolitan Readiness Test (Matching and Copying Subtests)

FIGURE 3.1--Overview of Treatment Procedures.

CHAPTER IV

ANALYSIS OF RESULTS

Data generated by the pre- and post-testing of this study are presented according to the order of hypotheses stated in Chapter I. The null hypothesis is restated and the results are described. Analyses of variance tables are presented along with figures that graph results of pre- and post-testing for each of the first three hypotheses. A discussion of the results of the study concludes Chapter IV.

Validation of Hypothesis One

The first hypothesis dealt with the effects of the experimental method on the total score of the Stanford Early School Achievement Test. In its null form it was stated as follows:

> No significant difference will be found in academic achievement as measured by the Stanford Early School Achievement Test between kindergarten children participating in a structured, sequential perceptual-motor development program and kindergarten children participating in a program consisting of low organized gym activities and a readiness workbook.

The research question concerning the effects of the experimental method on morning and afternoon sessions in its relationship to Hypothesis One was stated in null form as follows:

> No significant difference will be found between morning and afternoon kindergarten sessions with respect to the total score on the SESAT.

As shown in Table 4.1, there was no significant difference on the SESAT between scores of the children who experienced the experimental method of instruction and those of children in the control group. Thus, the results fail to reject null Hypothesis One. There was, however, a difference at the .05 level of significance between morning and afternoon sessions. The results, then, lead to the rejection of the null hypothesis for the research question pertaining to Hypothesis One, favoring the morning session. Table 4.1 also reveals significance, at the .01 level, favoring improvement on the SESAT in the post-testing situation over the pre-testing situation. Significant improvement on this variable was expected and relates to assumption five stated in Chapter I rather than to an hypothesis. Also shown on Table 4.1 is a significant interaction at the .05 level of confidence between sessions and observations.

TABLE 4.1.--Analysis of Variance on Stanford Early School Achievement Test.

Source of Variation	df.	Mean Square	F	P
Between Subjects				
Treatment	1	1.63	<1.00	NS
Sessions	1	2,842.13	6.71	.05
Sessions by Treatment	1	86.71	<1.00	NS
Error A	56	423.50		
Within Subjects				
Observations	1	13,953.63	365.95	.01
Treatment by Observations	1	48.14	1.26	NS
Sessions by Observations	1	158.71	4.16	.05
Treatment by Sessions by Observations	1	8.52	<1.00	NS
Error B	56	38.13		

The results of analysis for the interaction between sessions and observations are presented in Table 4.2. There was a significant difference between morning and afternoon sessions at the .01 level of confidence, favoring the morning session on the pre-testing of the SESAT. However, as can be seen from Table 4.2, the significant difference between morning and afternoon sessions no longer existed on the post-testing of the SESAT.

TABLE 4.2.--Simple Effects Analysis on Significant Interaction (Sessions by Observations) of the SESAT.

Source of Variation	df.	Mean Square	F	P
Pre-test Observation	1	2,172.02	9.41	.01
Post-test Observation	1	828.82	3.59	NS
Error	56	230.81		

On Figure 4.1, the performance level of the experimental and control groups on the SESAT for morning and afternoon sessions in both pre- and post-testing situations is plotted. The morning experimental group, the afternoon experimental group, and the afternoon control group all show a similar growth rate. Only the morning control group did not show improvement commensurate with that shown by the other three groups.

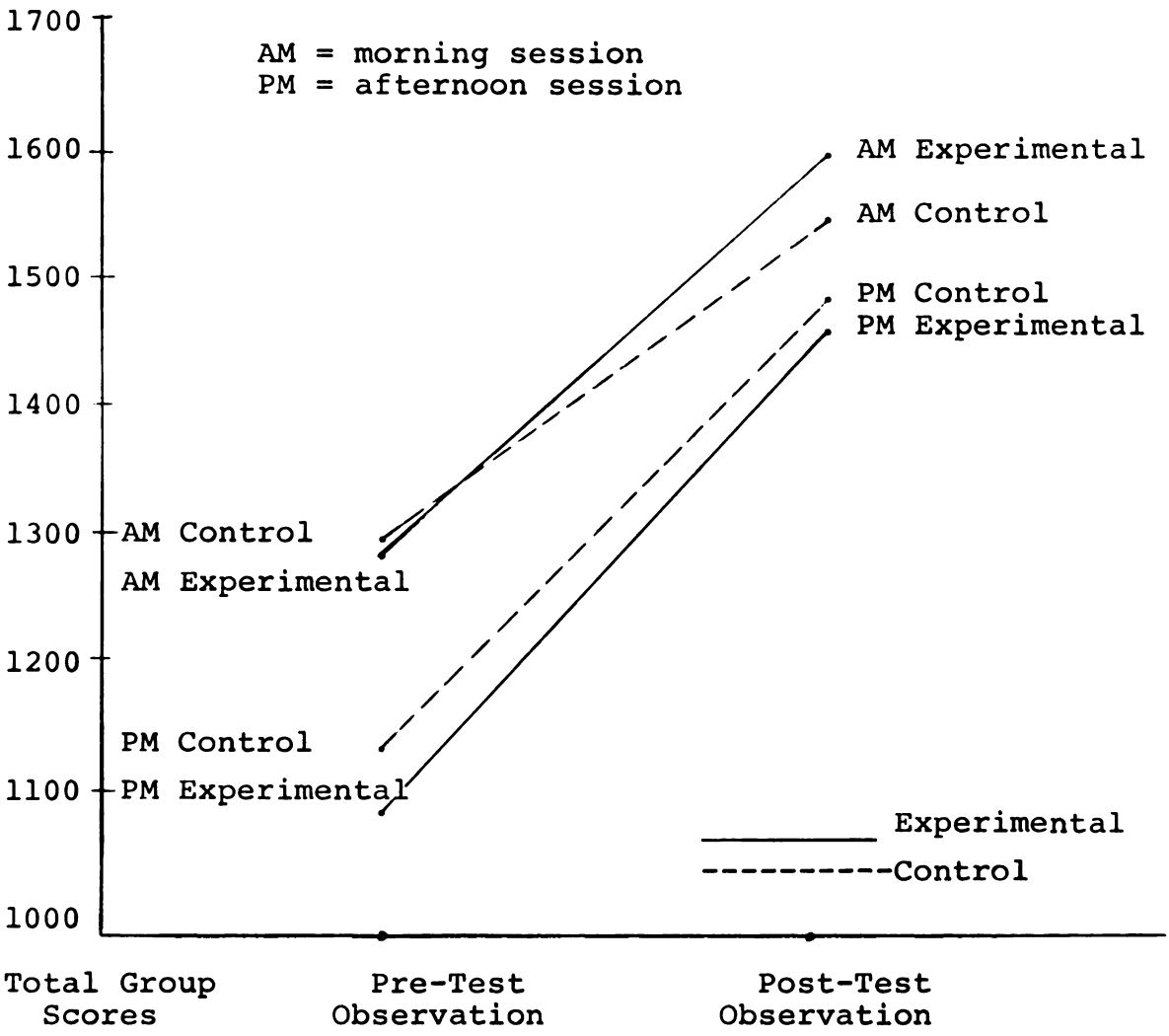

FIGURE 4.1.--Profile of Test Performance for Stanford Early School Achievement Test.

Validation of Hypothesis Two

The second hypothesis dealt with the effects of the experimental method on the Boehm Test of Basic Concepts. In its null form it was stated as follows:

> No significant difference will be found in mastery of basic concepts as measured by the Boehm Test of Basic Concepts between kindergarten children participating in a structured, sequential perceptual-motor development program and kindergarten children participating in a program consisting of low organized gym activities and a readiness workbook.

The research question concerning the effects of the experimental method on morning and afternoon sessions in its relationship to Hypothesis Two was stated in null form as follows:

> No significant difference will be found between morning and afternoon kindergarten sessions with respect to the total score on the BTBC.

As shown in Table 4.3, there was no significant difference on the BTBC between scores of the children who experienced the experimental method of instruction and those of children in the control group. Thus, the results fail to reject the null Hypothesis Two. However, there was a significant difference at the .01 level of confidence between morning and afternoon sessions, favoring the morning session. The results then lead to the rejection of the null hypothesis of the research question pertaining to Hypothesis Two. There was also a significant difference at the .01 level between pre- and post-test performance on the BTBC, favoring the post-testing situation. The

TABLE 4.3.--Analysis of Variance on Boehm Test of Basic Concepts.

Source of Variation	df.	Mean Square	F	P
Between Subjects				
Treatment	1	.41	<1.00	NS
Sessions	1	407.01	28.17	.01
Sessions by Treatment	1	49.40	3.42	NS
Error A	56	14.45		
Within Subjects				
Observations	1	2,142.07	36.13	.01
Treatment by Observations	1	18.41	<1.00	NS
Sessions by Observations	1	75.21	1.27	NS
Treatment by Sessions by Observations	1	16.88	<1.00	NS
Error B	56	59.28		

significant difference on this variable was expected, however, and relates to assumption five stated in Chapter I rather than to an hypothesis. No significant interactions are noted for the analysis of variance on the BTBC.

On Figure 4.2, the performance level of the BTBC is plotted for experimental and control groups for morning and afternoon sessions in both pre- and post-testing situations. The morning experimental group, the afternoon group, and the afternoon control group show a similar pattern of growth. Only the morning control group shows a different growth rate.

Validation of Hypothesis Three

The third hypothesis dealt with the effects of the experimental method on the Motor Facilitation Skill Survey. In its null form it was stated as follows:

> No significant difference will be found in the mastery of gross motor activities as measured by an adaptation of the Wheeling Motor Facilitation Skill Survey between kindergarten children participating in a structured, sequential perceptual-motor development program and kindergarten children participating in a program consisting of low organized gym activities and a readiness workbook.

The research question concerning the effects of the experimental method on morning and afternoon sessions in its relationship to Hypothesis Three was stated in null form as follows:

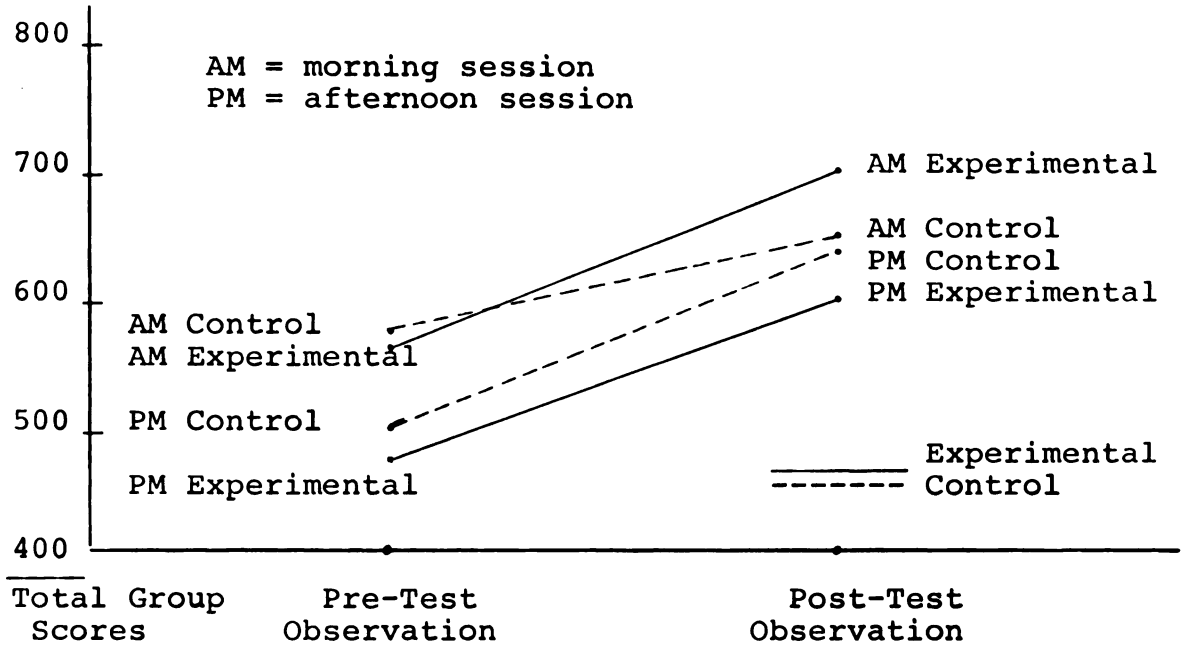

FIGURE 4.2.--Profile of Test Performance for Boehm Test of Basic Concepts.

No significant difference will be found between morning and afternoon kindergarten sessions with respect to the total score on the MFSS.

As shown in Table 4.4, there was no significant difference on the MFSS between the children who experienced the experimental method of instruction and those who were in the control group. Nor was there any significant difference which could be attributed to either morning or afternoon sessions. Thus, the results fail to reject either the null hypothesis or the null form of the research question pertaining to Hypothesis Three. There was a significant difference at the .01 level of confidence between pre- and post-testing observations, favoring the post-testing observation. This difference, however, was expected and relates to assumption five stated in Chapter I rather than to a specific hypothesis. No significant interactions were noted for the analysis of variance on the MFSS.

On Figure 4.3 is plotted the performance level on the MFSS for experimental and control groups in morning and afternoon sessions on both pre- and post-testing situations. The morning and afternoon experimental groups and the morning control group show a similar performance growth rate. The afternoon control group, however, shows a lower growth rate than any of the other three groups.

TABLE 4.4.--Analysis of Variance on Motor Facilitation Skill Survey.

Source of Variation	df.	Mean Square	F	P
Between Subjects				
Treatment	1	14.70	3.99	NS
Sessions	1	7.50	2.04	NS
Sessions by Treatment	1	6.54	1.78	NS
Error A	56	3.68		
Within Subjects				
Observations	1	120.00	92.31	.01
Treatment by Observations	1	4.04	3.12	NS
Sessions by Observations	1	1.64	1.26	NS
Treatment by Sessions by Observations	1	4.78	3.68	NS
Error B	56	1.30		

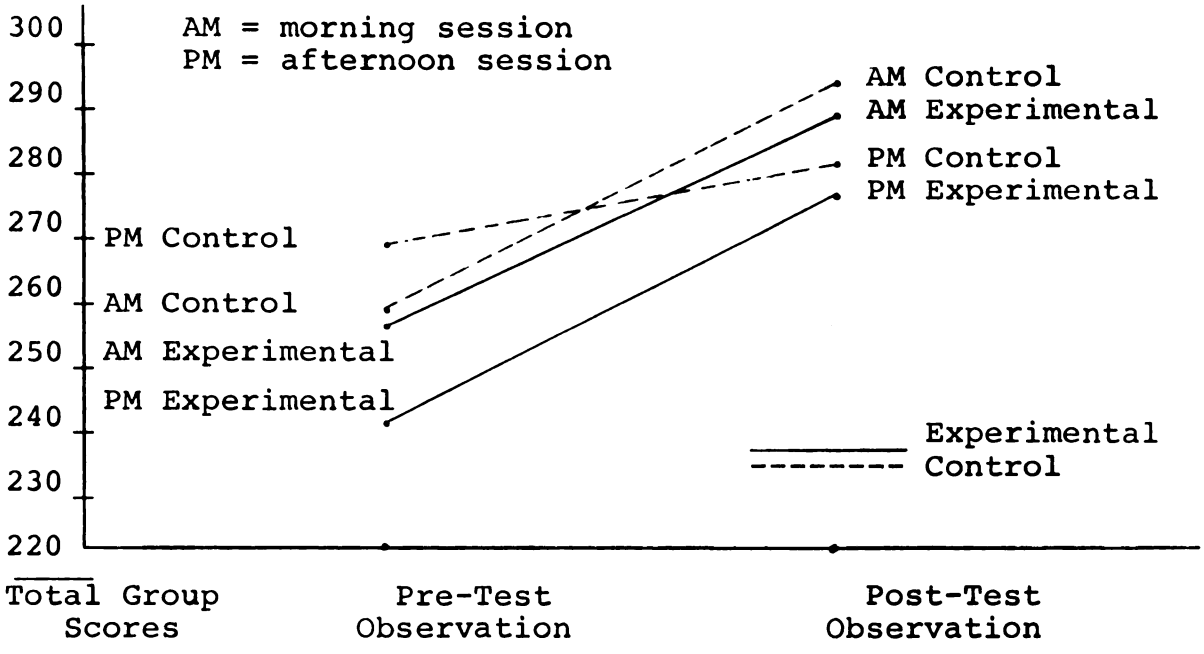

FIGURE 4.3.--Profile of Test Performance for Motor Facilitation Skill Survey.

Validation of Hypothesis Four

The fourth hypothesis dealt with the effects of the experimental method on the combined score of the Matching and Copying subtests of the Metropolitan Readiness Test. In its null form it was stated as follows:

> No significant difference will be found in visual perception and motor control as measured by two subtests of the Metropolitan Readiness Test between kindergarten children who participated in a structured sequential perceptual-motor development program and kindergarten children participating in a program consisting of low organized gym activities and a readiness workbook.

The research question concerning the effects of the experimental method on morning and afternoon sessions in its relationship to Hypothesis Four was stated in null form as follows:

> No significant difference will be found between morning and afternoon kindergarten sessions with respect to the combined score of the Matching and Copying subtests of the Metropolitan Readiness Test.

As shown in Table 4.5, there was no significant difference on the subtests of the Metropolitan Readiness Test that were used in this study between scores of the children who experienced the experimental method of instruction and scores of those who were in the control group. Nor was there any significant difference which could be attributed to morning or afternoon sessions. Thus, the results fail to reject either the null hypothesis

or the null form of the research question pertaining to Hypothesis Four. Interaction between treatment and sessions also was not significant.

TABLE 4.5.--Analysis of Variance on Metropolitan Readiness Test (combined score of Matching and Copying subtests).

Source of Variation	df.	Mean Square	F	P
Treatment	1	5.40	<1.00	NS
Sessions	1	3.26	<1.00	NS
Treatment of Sessions	1	.27	<1.00	NS
Error	56	24.57		

Reliability of Pre-Test Measures

The Kuder-Richardson-Hoyt formula was used to compute reliability coefficients for the three pre-test measures used in this study. As can be seen from Table 4.6, the coefficients are high for both the Stanford Early School Achievement Test and the Boehm Test of Basic Concepts. The coefficient for the Motor Facilitation Skill Survey, however, is somewhat lower than desirable for test reliability.

Discussion of the Results

As can be seen from Table 4.7, the analysis of results indicate failure to reject all four of the null hypotheses. The first two hypotheses dealt specifically

TABLE 4.6.--Reliability Coefficients for Pre-Test Measures.

Name of Measures	Kuder-Richardson Coefficient*
Stanford Early School Achievement Test	$r_{tt} = .93$
Boehm Test of Basic Concepts	$r_{tt} = .89$
Motor Facilitation Skill Survey	$r_{tt} = .56$

*based on total raw scores for each measure.

TABLE 4.7.--Summary of Analysis of Variance for Treatment Variable.

Name of Measure	F	P
Stanford Early School Achievement Test	<1.00	NS
Boehm Test of Basic Concepts	<1.00	NS
Motor Facilitation Skill Survey	3.99	NS
Metropolitan Readiness Test (combined score of Matching and Copying subtests)	<1.00	NS

with the major purpose of this study in attempting to see whether a structured perceptual-motor development program would increase cognitive development at the kindergarten level as measured by the Stanford Early School Achievement Test and the Boehm Test of Basic Concepts. The review of literature, in Chapter II, is basically inconclusive in providing a specific direction for this type of hypothesis. Studies previously cited by Lazroe, Rutherford, and

Zirbel and Thompson,[1] indicated significant gains at the kindergarten level in reading readiness. All of these studies, however, did not control for the differential treatment given the experimental group, which was a variable that was carefully controlled for in this study. It is possible, then, to draw the conclusion that the previous studies may have achieved some significant differences primarily on the basis of the extra individual attention that the children received in the experimental group.

The third and fourth hypotheses which dealt with gains in gross and fine motor development also were unsupported. These results may also have been influenced by differential treatment given to both groups. However, perhaps they were more likely to have been influenced by the fact that the children in the control groups were given an opportunity to develop fine and gross motor abilities although not in a highly structured and sequential manner. Children in the control group could develop fine motor skills through their activities of writing, drawing, cutting, and pasting, and could develop gross motor skills by gymnasium exercises such as running, hopping, skipping, and jumping. This fact suggests that, with the exception of specific cases of children with severe gross or fine motor difficulties, the chance for development of fine and gross motor skills without structure and sequence is sufficient to provide for maturation of these abilities.

[1]See Figure 2.1, Chapter II.

Results on all four hypotheses of this study may also have been influenced by the fact that the study was done in an economically and culturally advantaged area; in this area a high percentage of the children attend nursery schools and may have had ample opportunity to develop perceptual motor skills before entering kindergarten. There is some support for this rationale in a previously reviewed study by Enno Lietz. He sought to determine if the perceptual-motor ability of the advantaged kindergarten child was different from that of a kindergarten child who comes from an economically disadvantaged home. The results of his study indicated that the advantaged children, as a group, scored significantly higher on tests of perceptual-motor development. He drew the conclusion that it appears that the overall perceptual ability of the advantaged child appears to be superior to that of the disadvantaged child.[2]

Although the four research hypotheses were unsupported, some support was seen for the research question concerning differences in gains for morning and afternoon sessions. (See Table 4.8). Specifically, support for the research question is seen as it relates to the first two hypotheses. There are several explanations for the significant differences noted in Table 4.8. First of all, the morning children came from a slightly

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[2]See earlier Chapter II citation to the Lietz study, Enno Lietz, Op. cit., p. 3530.

more advantaged economic area than did the afternoon group. That is, the statistical differences noted may have been influenced by a geographic and cultural variable. Secondly, the morning group was, on the average, slightly older than the afternoon group,[3] suggesting a maturational variable that could have influenced the statistical differences noted. And finally, since randomization did not include either random assignment to morning or afternoon kindergarten sessions, randomization limitations could also have affected the differences noted between morning and afternoon kindergarten sessions.

Reference to Table 4.9 shows that there was a significant interaction between sessions and observations on the Stanford Early School Achievement Test. Also indicated is the fact that this significance involved a difference at the .01 level of confidence between morning and afternoon groups in the pre-testing situation but the difference no longer existed in the post-testing situation. This analysis indicates that the afternoon groups improved considerably over the morning groups in terms of rate of growth on the Stanford Early School Achievement Test. Also, as indicated by Figures 4.1 and 4.2, on which the results of the analysis for both the SESAT and the BTBC are graphed, the afternoon control group showed a growth rate commensurate with that of the experimental group. These observations suggest that

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[3]See Table 3.1, Chapter III.

TABLE 4.8.--Summary of Analysis of Variance for Sessions Variable.

Name of Measure	F	P
Stanford Early School Achievement Test	6.71	.05
Boehm Test of Basic Concepts	28.17	.01
Motor Facilitation Skill Survey	2.04	NS
Metropolitan Readiness Test (Combined score of Matching and Copying subtests)	<1.00	NS

TABLE 4.9.--Summary of Analysis of Variance for the Sessions by Observations Interaction on the Stanford Early School Achievement Test.

Source of Variation	F	P
Sessions by Observations	4.16	.05
Pre-Test Observation	9.41	.01
Post-Test Observation	3.59	NS

there might have been a variable operating in the afternoon groups that was not operating in the morning groups which may have equalized gains of the afternoon groups. This variable may well have been the fact that the pupil-teacher ratio for the afternoon kindergarten session, other than during the experimental and control group treatments, was smaller than for the morning kindergarten session. As explained in Chapter III,[4] all of the kindergarten children were taught by a master teacher, the associate teacher, and the teacher's aide. However, these three persons dealt with forty kindergarten children in the morning, whereas they dealt with only thirty kindergarten children in the afternoon. Thus, the lower teacher-pupil ratio in the afternoon may have been an important variable to account for (1) the fact that the control group showed a growth rate commensurate with that of the experimental group, and (2) the fact that on the Stanford Early School Achievement Test, the growth rate for the afternoon groups combined was considerably greater than for the morning groups combined.

Thus, this study does have some implications concerning teacher-pupil ratios. Possibly, if the teacher-pupil ratio is small enough, the adult interaction with the children is sufficient to equalize or improve any academic gains that might be attributed to a remedial or specialized training program.

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[4]See Experimental Procedures, Teacher Variable section in Chapter III.

Summary

This study did not support the use of a structured sequential perceptual-motor development program for the purpose of improving (1) academic achievement, (2) mastery of basic concepts, (3) gross motor skills, and (4) fine motor skills, when all children were given differential treatment as well as an opportunity to develop fine and gross motor skills. Therefore, the perceptual-motor theories that imply that a structured, sequential perceptual-motor development training program will increase school readiness at the kindergarten level were not supported.

The research question regarding differences between the morning and afternoon groups was supported for the first two hypotheses. A significant difference favoring the morning experimental and control groups was seen on total test scores in academic achievement and mastery of basic skills as compared with the afternoon experimental and control groups. With reference to academic achievement, however, the difference between morning groups and afternoon groups was significant only for the pre-testing observation, indicating a marked rate of improvement in achievement test scores for the afternoon groups over the morning groups.

Implications of the finding that the afternoon groups showed a marked rate of improvement in achievement test scores over the morning groups may be attributed to

teacher-pupil ratios. The teacher-pupil ratio for the afternoon kindergarten session, other than during the experimental and control group treatments, was smaller than for the morning kindergarten session. The smaller teacher-pupil ratio may have contributed equally or more effectively in enhancing school readiness as measured by achievement test scores than the structured, sequential perceptual-motor development training program.

CHAPTER V

SUMMARY AND CONCLUSIONS

The primary purpose of this study was to test the implication that perceptual-motor development training will increase school readiness at the kindergarten level. This study was concerned primarily with the implications of the perceptual-motor development theories of Kephart, Barsch and Cratty. Their theories encourage the use of structured perceptual-motor training programs for young children, on the general premise that improvement in motor abilities contributes directly to certain components of classroom learning. This investigation attempted to make a further contribution to the literature pertaining to perceptual-motor development training programs at the kindergarten level in relation to gains in academic achievement. Several studies at the kindergarten level have demonstrated that children participating in a structured perceptual-motor development program have shown significant gains in reading readiness. However, these studies did not control for the differential treatment given the children in the experimental group. Thus, this study was designed to control for differential treatment

given the experimental group. To achieve this end, sixty children from the kindergarten class at Highland Elementary School, Skokie, Illinois, were randomly assigned to experimental and control groups in either the morning or afternoon sessions. Teacher variables were held constant and all experimental and control groups had the same pupil-teacher ratio during the treatment periods.

The experimental groups were given a structured, sequential program of perceptual-motor development skills. A physical education program based on low-organized activities and a kindergarten readiness program were given to the control groups. Each group had a total of two hours of differential treatment per week for twenty-four weeks.

Both pre- and post-measures were administered to all the groups. The pre-test measures included the Stanford Early School Achievement Test, the Boehm Test of Basic Concepts, and the Motor Facilitation Skill Survey. Post-testing measures included these three tests and, in addition, the matching and copying subtests of the Metropolitan Readiness Test. On each measure, the total raw score was used in analysis of the data.

The hypotheses of the study stated that a structured, sequential, perceptual-motor development program would demonstrate significant gains for the experimental groups in (1) academic achievement, (2) mastery of basic skills, (3) gross motor skills, and (4) fine motor skills. All four of the hypotheses were unsupported by the analysis

of results. That is, the analysis failed to reject the null hypothesis for each one of the research hypotheses.

A research question which applied to all four hypotheses was also asked regarding possible differences between the morning groups and the afternoon groups. Results of analysis indicated that the morning groups scored significantly higher than the afternoon groups in academic achievement and mastery of basic skills. However, in academic achievement the afternoon groups demonstrated a greater level of improvement than the morning groups when post-test scores were compared with pre-test scores.

An implication of the finding that the afternoon groups demonstrated a greater level of improvement in academic achievement than the morning groups may possibly relate to teacher-pupil ratio. The teacher-pupil ratio for the afternoon kindergarten groups, other than during the experimental and control group treatments, was smaller than for the morning kindergarten groups. Possibly a small teacher-pupil ratio was equally or more effective in fostering gains for kindergarten children on achievement test scores as compared with a specialized training program such as a structured perceptual-motor development program.

This study, then, suggests that school readiness as measured by gains in achievement test scores might possibly be enhanced for kindergarten children through small teacher-pupil ratios. However, the findings did not support perceptual-motor theories that imply that a

structured, sequential perceptual-motor development training program will increase school readiness at the kindergarten level. Specifically, the results did not support the use of a structured, sequential perceptual-motor development program for the purpose of improving (1) academic achievement, (2) mastery of basic concepts, (3) gross motor skills, and (4) fine motor skills, when all children were given differential treatment as well as an opportunity to develop fine and gross motor skills.

Conclusions

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

1. A structured, sequential perceptual-motor development program did not significantly improve achievement test scores or scores on a test for mastery of basic skills for the kindergarten children in the experimental groups. Thus, this study did not lend support for the perceptual-motor theories that imply that a structured, sequential perceptual-motor development training program will increase school readiness at the kindergarten level.

2. A structured, sequential perceptual-motor development program did not significantly improve either gross or fine motor skills for the kindergarten children in the experimental groups in this study. It should be noted, however, that children in the control groups were also given an opportunity to develop fine and gross motor skills, but not in a highly structured, specific, and sequential manner. This conclusion suggests then that, with the exception of specific cases of children with severe gross or fine motor difficulties, children can develop and mature in fine and gross motor skills without structure and sequence. In other words, the opportunity for the development and acquisition of these skills is more important than the structure and the sequence.
3. On the three tests that were administered in both pre-testing and post-testing situations, (SESAT, BTBC, MFSS), all children made significant gains. These gains were expected, however, since it was assumed that, regardless of the special treatment, all the kindergarten children would show improvement on the same test that was given early in the kindergarten year and late in the kindergarten year.

4. On combined pre- and post-test observations of the Stanford Early School Achievement Test and the Boehm Test of Basic Concepts, the morning groups (combined control and experimental) achieved significantly higher scores than the afternoon groups. The higher scores obtained by the morning groups were probably influenced by geographic, cultural, and maturational variables as well as randomization limitations.
5. On the Stanford Early School Achievement Test, the afternoon groups showed a markedly greater growth rate than the morning groups when post-test scores were compared with pre-test scores. This greater growth rate on achievement test scores for children in the afternoon kindergarten groups may have been influenced by teacher-pupil ratio. The teacher-pupil ratio for the afternoon kindergarten groups, other than during the experimental and control group treatments, was smaller than for the morning kindergarten groups.

6. This research as measured by the SESAT and the BTBC did not support the use of either the curriculum in the experimental group or the curriculum in the control group as a preferred method for an aspect of the kindergarten curriculum in School District #68, Skokie, Illinois. That is, this research as measured failed to support either a structured, sequential perceptual-motor development training program or a readiness program consisting of low organized gym activities and a classroom readiness workbook as a preferred aspect of kindergarten curriculum.

Implications for Future Research

The area of perceptual-motor development programs has been subjected to thorough research as noted in the review of the literature. However, several implications of this study do suggest areas for future research.

Although several perceptual-motor development program studies at the kindergarten level have demonstrated significant gains in reading readiness scores,[1] none of these studies controlled for the differential treatment given the experimental groups. Thus, this study attempted

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[1]See Figure 2.1, Chapter II.

to control for the Hawthorne Effect by providing all treatment groups with differential treatment. However, the breadth of this study could have been increased had it been possible to have had one control group of children who did not receive any differential treatment. A suggestion for future research, then, is to replicate this study with the addition of a control group that receives no extra attention and/or possibly a placebo group that receives differential treatment but in an area unrelated to perceptual-motor development programs.

A comparative study involving a structured, sequential program of perceptual-motor development skills between economically disadvantaged and advantaged children is also suggested. As the Lietz study demonstrated, the overall perceptual-motor ability of the advantaged child appears to be superior to that of the disadvantaged child.[2] Children living in an economically advantaged area simply may be receiving sufficient stimuli and opportunity for development of perceptual-motor skills, whereas, children in an economically disadvantaged area may be lacking in opportunity for adequate development of perceptual-motor skills.

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[2]See earlier Chapter II citation to the Lietz study, Enno Lietz, Op. cit., p. 3530.

This study also offers some implications for research concerning pupil-teacher ratios. Research in education may well not have explored the full implications of a small teacher-pupil ratio in lieu of remedial programs and special skill-building programs such as a structured, sequential perceptual-motor development program. Perhaps a small teacher-ratio at the kindergarten level may be just as or more effective in increasing academic achievement and mastery of basic concepts as a specialized or remedial program. Specifically, as related to this study, a research study could take the form of comparing a group(s) of children in a small teacher-pupil ratio situation who are not receiving any specialized training, with a group(s) of children in a large pupil-teacher ratio situation who are also involved in a structured perceptual-motor development program.

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APPENDICES

APPENDIX A

THE STANFORD EARLY SCHOOL ACHIEVEMENT TEST: EXCERPTS

Stanford Early School Achievement Test—Level I

General Directions for Administering

1. Before attempting to administer the test, study carefully both the test booklet and the *Directions for Administering*.

2. In beginning kindergarten, not more than 6 or 7 children should be tested at one time with one assistant. At the end of kindergarten or beginning of Grade 1, not more than 15 children are recommended for each assistant.

3. Before beginning, the administrator should see that the desks (tables) are cleared and that each child has a crayon or pencil. Crayons will probably be easier for the children to handle. Each child should also be given a marker, a small cardboard approximately 2 × 4 inches.

4. The administrator should have a blank copy of the test booklet for demonstrating, as well as these Directions for Administering.

5. At some time before starting to administer the test, each child's name and other required information should be entered on the title page of his booklet.

6. A relaxed atmosphere should be maintained as much as possible. This should be treated like any other pencil-and-paper exercise. Nowhere in the directions read to the children has this been called a test; rather, a choosing game.

7. Make sure that the children understand what they are to do and how to mark their answers. Pause between items to give children sufficient time to mark their answers.

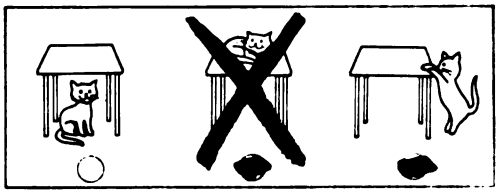
8. During the test, move quietly about the room to see that the children are following instructions.

9. Every effort must be made to prevent children from helping each other. Otherwise, a true picture cannot be obtained of the extent of achievement for each child. Arranging seating so that children cannot copy from each other is far better than reminding them constantly that they are not to look at each other's papers. Some teachers may want to seat the children on the floor in a circle, alternately seating one face in and one face out. The children can mark their booklets easily in this position. This plan is effective in eliminating copying. Children at this age tend to imitate rather than copy.

If you find the testing procedure you use at the first sitting is not satisfactory, try a different method at subsequent sittings.

10. Packaged with the key is a Practice Sheet which can be displayed in front of the class. It contains the first three items from the Practice Page in an enlarged format to facilitate the introduction of the children to marking their answers. If this is not used, sample items from the Practice Page may be reproduced on the chalkboard and referred to.

11. If a child wants to change an answer, he should be instructed to mark a large "X" through the picture of the one he wants to mark out. (See below.)



12. Since the teacher reads the test, all pupils proceed through it at the same rate. The estimated times given are very generous. If you find the children are moving through the test rapidly and are not tired, you may give the test in three or four sittings rather than five. However, do not begin a part unless sufficient time is available to complete it. The *approximate* time needed for each sitting is as follows:

First Sitting—Practice Page and Page 3	25 minutes
Second Sitting—Pages 4 and 5	15 minutes
Third Sitting—Pages 6 and 7	15 minutes
Fourth Sitting—Pages 8 and 9	15 minutes
Fifth Sitting—Pages 10 and 11	20 minutes

Purpose of the Practice Page

The Practice Page is used not only to help familiarize the children with the test procedures but also to help you determine if the children are ready to take the test. As the children are doing the Practice Page, check the following:

1. Do they use their markers correctly and move them only when directed to do so?
2. Are they marking the circle so that it can be read correctly when marked?
3. Are they marking the circles quickly?
4. Are they marking only one circle in each box?
5. What are the children doing if they can't decide on an answer, or if they change their minds after they have marked one answer?
6. Do they understand what to do when they are told to look at the top of the other column on the page or to turn the page?
7. Are the children watching their own papers or trying to look at someone else's paper?

Specific Directions for Administering

Each child's name and other required information should be entered on the title page of a test booklet at some time prior to the first testing.

Before distributing booklets, SAY TO THE CHILDREN:

We are going to play a choosing game. I am going to give each of you a booklet which has many interesting things in it for you to do. Do not open your booklet until I tell you to do so.

Distribute the test booklets, making sure that each child each time gets the booklet with his own name on it. THEN SAY TO THE CHILDREN:

Open your booklet and fold the page back like this.

Demonstrate with a copy of the booklet.

See that all do this correctly. THEN SAY:

I will tell you about the things in each box; then you are to choose the one that I ask you to. If you break your crayon (pencil), hold up your hand and I will give you another. Now listen carefully and I will tell you about the pictures in the first box.

FIRST SITTING

Practice Page

1. **Put your marker under the first box, like this.** (Demonstrate with a copy of the test how the children should use their markers.) **You see two boys. You are to mark the space under the boy who looks happy. This is how you mark.** (Show the children by the way you mark the circle under the happy boy that this does not need to be done too carefully. Pupils need not keep their marks completely within the circles, and all the space within the circles does not have to be covered.)

2. **Right below is another box with two other pictures. Move your marker under this box now. You are to mark the space under the one that seems to be stretching.** (Repeat. Check to be sure that the children are getting the idea. Help any of those who are having difficulty.)

3. **Now slide your marker down under the next box. There are two tools. You mark under the hammer. Be sure that you mark under only one picture in each box. Mark under the hammer.** (Check again to see that the children understand what to do.)

4. **Move your marker down again, under the next box. Mark under the one that is used to make music.** (Repeat the second sentence.)

5. **Move your marker under the next box. You see a cow and a duck. Mark under the one that swims more in the water.** (Repeat the last sentence.)

6. **Move your marker under the next box. There is a barrel and a basket. Mark under the picture of the barrel.** (Repeat the last sentence.)

7. **Move your marker under the next box, the one that starts with a picture of a chair. After the chair there are four letters. Mark under the letter "A." The letter is "A."**

Now you are at the bottom of this column. (Indicate with a copy of the test.) **Next you are to go to the top of the other column on this page. Put your marker under the first box at the top of the other column.** (Show the children with a copy of the test. Check to see that everyone understands.)

8. **In this box there are three pictures of a table and a kitten. You are to mark under the picture where the kitten is on top of the table.** (Repeat the second sentence.)

9. **Move your marker under the next box, the one that starts with a picture of a cup. After the cup there are some dots. You are to mark under the group of two dots.** (Repeat the last two sentences.)

10. **Move your marker under the next box, the one that starts with a picture of a rabbit. After the rabbit are some numerals that stand for numbers. Mark under the numeral three.** (Repeat the last two sentences.)

11. **Move your marker under the next box, the one that starts with a picture of a table. There are some dots after the table. Mark under the group that has the most dots.** (Repeat the last two sentences.)

12. **Move your marker under the next box, the one that starts with a picture of a ball. This time you are to mark under the picture of another word that starts with the same sound as ball. The other pictures are car, gun, and boat. Mark under the one that starts with the same sound as ball.** (Pause.) **Does ball begin like car, gun, or boat?**

13. **Move your marker under the next box. You see a wheel, an oil can, and a bucket of paint. I will tell you a story and then tell you which one to mark under. This is the story:**

> **Jimmy's wagon was hard to pull. One wheel was squeaking just a little bit. "I think we had better fix it right now," said Jimmy's father. He sent Jimmy to get something he could use to fix the wagon.**

Mark under the picture of what Jimmy was sent to get. (Pause; repeat only the story and the task.)

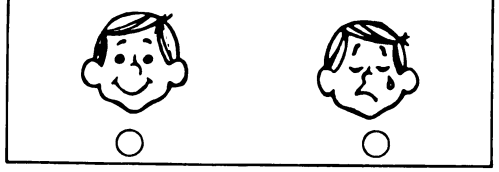
14. **Move your marker under the next box. I will tell you another story and then ask you to mark under one of the pictures. The pictures are a lamp, a magnifying glass, and a flashlight. This is the story:**

> **Joe has a lamp with a big shade on it. He uses it to read. He also has a magnifying glass to make things look larger and a flashlight, which he uses outdoors at night. One day his brother Dave called to Joe, "I've found some tiny shells. There are some very small holes in them that I want to see better."**

Practice Page

Level I

1



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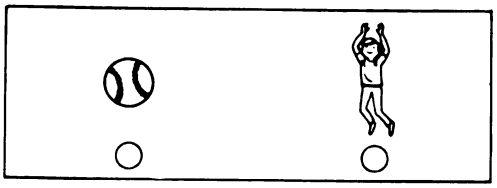

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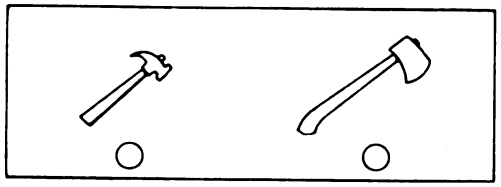

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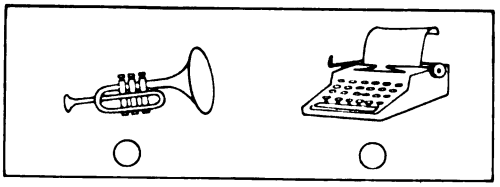

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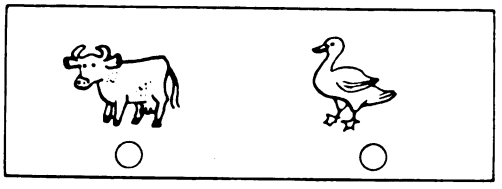

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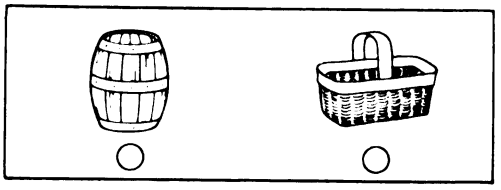

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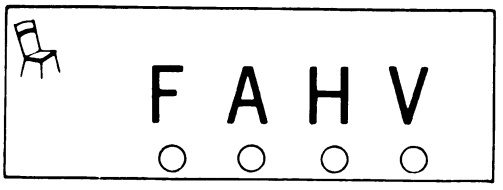

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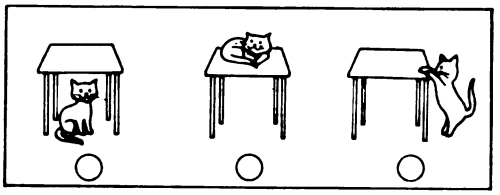

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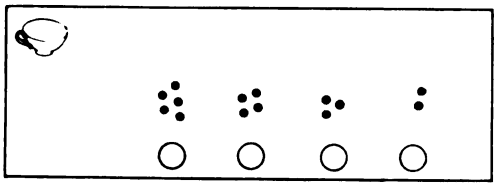

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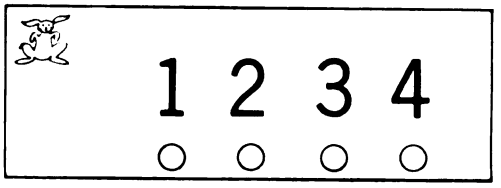

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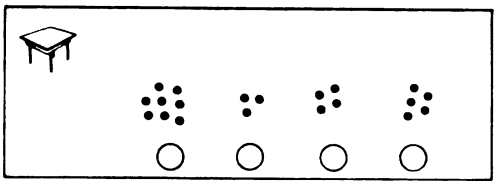

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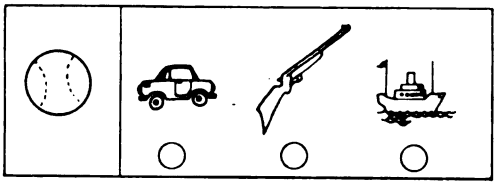

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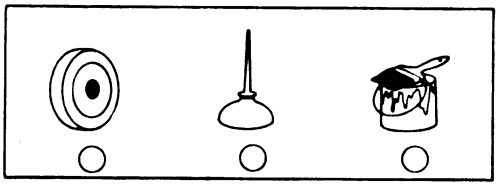

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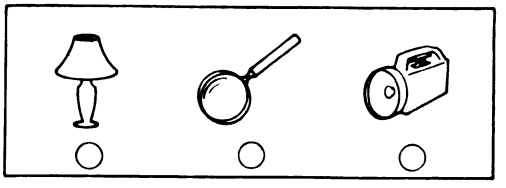


APPENDIX B

THE BOEHM TEST OF BASIC CONCEPTS: EXCERPTS

Table 1. Classification of BTBC Concepts[a]

	Concept	Context Category			
		Space	Quantity	Time	Miscellaneous
1	Top	**x**			
2	Through	**x**			
3	Away from	**x**			
4	Next to	**x**		x	
5	Inside	**x**			
6	Some, not many		**x**		
7	Middle	**x**		x	
8	Few		**x**		
9	Farthest	**x**		x	
10	Around	**x**			
11	Over	**x**			
12	Widest		**x**		
13	Most		**x**		
14	Between	**x**		x	
15	Whole		**x**		
16	Nearest	**x**		x	
17	Second	x	**x**	x	
18	Corner	**x**			
19	Several		**x**		
20	Behind	**x**			
21	Row	**x**			
22	Different				**x**
23	After	x		**x**	
24	Almost		**x**		
25	Half		**x**		
26	Center	**x**			
27	As many		**x**		
28	Side	**x**			
29	Beginning	x		**x**	
30	Other				**x**
31	Alike				**x**
32	Not first or last	x	**x**	x	
33	Never			**x**	
34	Below	**x**			
35	Matches				**x**
36	Always			**x**	
37	Medium-sized		**x**		
38	Right	**x**			
39	Forward	**x**			
40	Zero		**x**		
41	Above	**x**			
42	Every		**x**		
43	Separated	**x**		x	
44	Left	**x**			
45	Pair		**x**		
46	Skip				**x**
47	Equal		**x**		
48	In order	**x**			
49	Third	x	**x**	x	
50	Least		**x**		

[a] Marks in boldface type indicate the context category of each item as it is tested by the *BTBC;* other marks indicate additional contexts in which the items may be employed. For example, the concept of *beginning* (item 29) is used in the context of time on the *BTBC*, but it may also be used to express relationships involving space.

Detailed directions are provided below for each booklet. These should be followed exactly, with the **boldface** portions being read aloud to the children. The key phrases in each item are read *twice*, with emphasis on the ***italicized*** words.

Allow the children enough time to respond to each question before going on to the next. With very young children, it may be necessary to help them keep their place by indicating the appropriate set of pictures in the demonstration booklet as each question is read. Be careful, however, not to point to any particular picture within a set.

The children may correct errors on either the sample or the test questions by erasing or by encircling the incorrect answer, and marking the new answer in the regular way.

Detailed Directions: Form A, Booklet 1

When ready to begin testing, say to the children:

"I am going to give each of you a book. Leave it on your desk until I tell you what to do."

Distribute copies of Booklet 1, *face up*. Then say:

"I have given you a book with some pictures in it. We are going to do different kinds of things with the pictures. Listen and do just what I say. First, print your name on the line up here."

Point to the line at the top of the cover of the demonstration copy. (With very young children, it may be necessary to write the names for the children.)

Sample Questions

When the names have been written, say:

"We are going to look at pictures and mark X's on them. This is how you make an X."

Draw a large X on the blackboard. Then say:

"Now find the gray box with the telephone in it. Put your finger on it."

Check to see that every child has found the gray box. Assist those who are having trouble. When each pupil has his finger on the box, start reading the sample questions. Remember to emphasize the italicized words. Begin by saying:

"Now take your finger off the gray box and pick up your pencil (or crayon).

"Now look at the shoe, the hat, and the sock. Mark an X on the *hat*. . . . Mark an X right on the *hat*."

Wait until all of the children have responded. Then say:

"Now look at the things to ride in. Mark an X on the *boat*. . . . Mark the *boat*.

"Look at the fruit. Mark the *banana*. . . . Mark the *banana*.

"Very good. Now put down your pencils (or crayons). I will look at your books. Do *not* turn the page. If you make a mistake or want to change an answer, make a circle around it like this (demonstrate on the blackboard) **and then make the new mark."**

Make certain that each child has written his name correctly and has put X's on the hat, the boat, and the banana. Correct the child's name where necessary. If anyone has marked a wrong item, point out the error and have the child correct it. If any child's X's are not *directly* on the hat, the boat, or the banana, ask him to make these corrections also.

When all work has been checked, start to read the Test Questions.

Test Questions

Say:

"Now open your books."

Assist the children if necessary. Then point to the gray box on the left-hand page of the demonstration booklet and say:

"Look for the gray box like this one on your page. Put your finger on the gray box with the book in it."

Check to see that each child has found the proper box. Then start reading the test questions. (Do *not* read the question numbers.)

1. **"Now take your finger off the box and pick up your pencil (or crayon). Look at the pictures of writing paper with stars. Mark the paper with the star at the *top*. . . . Mark the paper with the star at the *top*.**
2. **"Look at the beads and strings. Mark the bead that has a string *through* it. . . . Mark the bead that has a string *through* it.**
3. **"Look at the table and the boxes. Mark the box that is *away from* the table. . . . Mark the box that is *away from* the table.**
4. **"Look at the toys. Mark the toy that is *next to* the truck. . . . Mark the toy that is *next to* the truck."**

Then point to the gray box on the right-hand page of your demonstration booklet, and say:

"Now put your finger on the gray box with the candle in it."

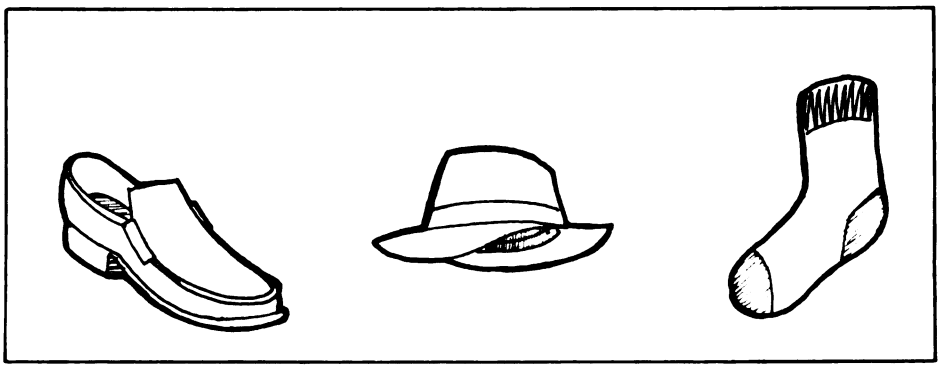
See that everyone has found the proper box. Then say:

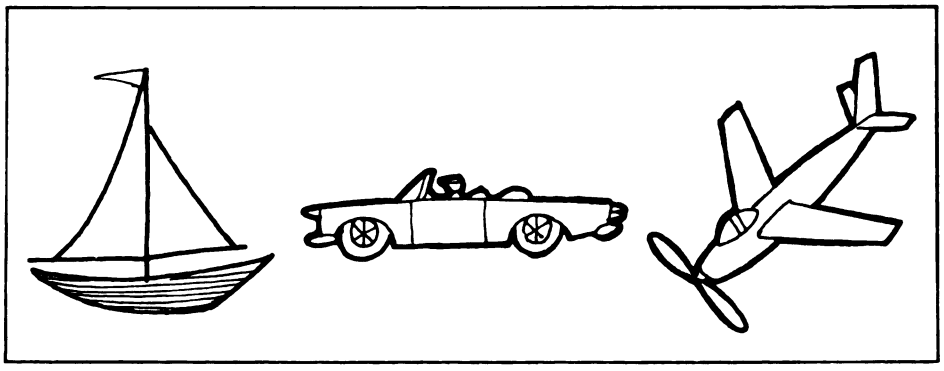
"Now pick up your pencil.

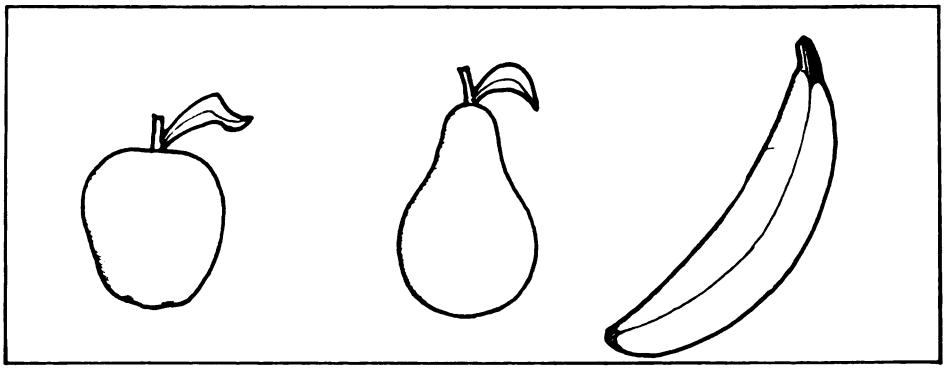
5. **"Look at the pictures of the house and the boy. Mark the house with the boy *inside* it. . . . Mark the house with the boy *inside* it.**
6. **"Look at the boxes and marbles. Mark the box that has *some but not many* marbles. . . . Mark the box that has *some but not many* marbles.**

Form A
Booklet 1

NAME_____







BOEHM TEST of basic concepts

Ann E. Boehm

THE PSYCHOLOGICAL CORPORATION, 304 East 45th Street, New York, N.Y. 10017

Printed in U.S.A.

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APPENDIX C

THE MOTOR FACILITATION SKILL SURVEY

MOTOR SKILL SURVEY

KINDERGARTEN

Name_____ Date_____

Class_____ School Highland

Tests are to be marked in terms of Pass or Fail. If the child is able to accomplish the skill, even though he may need time to think out the necessary elements, that skill should be regarded as Pass. Any skill where the child needs adult assistance; example: walking on the balance beam, should be recorded as a Fail.

1. Body Image
   Touch your head_____; your nose_____; your chest_____; your arm_____; your waist_____; your knee_____; and your ankles_____.

2. Walk forward on the balance beam_____.

3. Walk backward on the balance beam_____.

4. Walk sideward on the balance beam
   Right_____. Left_____.

5. Jump using both feet (stick held 6" off the ground)_____.

6. Hop on the right foot (10')_____.

7. Hop on the left foot (10')_____.

8. Skipping (20')_____.

9. Kraus-Weber (1)_____.

10. Kraus-Weber (2)_____.

11. Spatial concepts:
    Duck under_____; Step over_____; walk between_____.

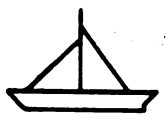
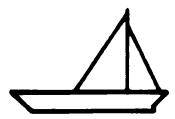
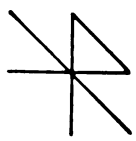
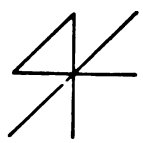
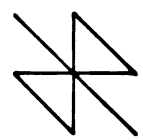
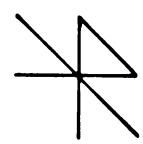
12. Handedness
    _____Hand him a pencil.
    _____Pretend to brush your teeth.

13. Footedness
    _____Step over a stick placed on the floor.
    _____Step on a ball.

APPENDIX D

THE MATCHING AND COPYING SUBTESTS OF THE METROPOLITAN READINESS TEST: EXCERPTS

MATCHING

a				
b	GO	GO	OG	ON
1	WALK	WALK	WAKL	TALK
	STOP	TOPS	STOP	ƧTOP
				
4				
c	drab	bard	darb	drab
	STREET	STREET	TREATS	STREAM

DIRECTIONS FOR SCORING COPYING.

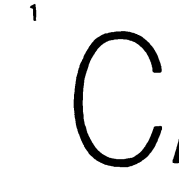
Some judgment is necessarily involved in the scoring of this Copying test.

THE SCORER SHOULD FIRST READ THE GENERAL DIRECTIONS GIVEN AT THE RIGHT, THEN NOTE THE SPECIFIC DIRECTIONS FOR SCORING EACH ITEM.

GENERAL DIRECTIONS FOR SCORING THIS TEST

- If the pupil's reproduction of the figures or letters is clearly similar to the model, even though differing in size, it should be given credit.
- Tracing over any design instead of copying it in the space provided receives no credit.
- If an item is made up of two or more parts, no credit is given if one of the parts is omitted. The pupil must copy the parts in the same order as in the model.
- Filled in drawings are wrong.
- Each drawing must be in the place provided for it in order to receive credit.
- Reversals should be scored wrong.
- Items copied with extra lines which definitely change the figure are incorrect.

1



The letters must be distinct, RECOGNIZABLE as the capital letters called for, and must be completed. If one letter is out of proportion to the other, the drawing should still be considered correct.

2

The letters must be distinct, RECOGNIZABLE as the capital letters called for, and must be completed. If one letter is out of proportion to the others, the drawing should still be considered correct.

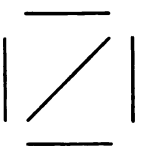
3

The numbers must be distinct, RECOGNIZABLE as the numbers called for, and must be completed. If one number is out of proportion to the other, the drawing should still be considered correct.

4

The letters must be distinct, RECOGNIZABLE as the small letters called for, and must be completed. If one letter is out of proportion to the other, the drawing should still be considered correct.

5



Four outside lines must be those of a square WITHOUT corners. Inner line must be an INCOMPLETE diagonal and in SAME DIRECTION as shown in the model.

APPENDIX E

LETTER AND TRAINING SESSION AGENDAS FOR WORKSHOP VOLUNTEERS

HIGHLAND SCHOOL
SKOKIE, ILLINOIS

June 26, 1970

Dear

The kindergarten motor facilitation program is designed to help each child develop perceptual-motor abilities through participation in motor activities and through various visual-perceptual materials.

In order to provide a small instructor-pupil ratio, this program will need 10-15 volunteers. The basic requirements are:

1. Have a genuine interest in working with young children.

2. Be able to give two hours weekly; one hour on Tuesday and one hour on Thursday during the school year.

The summer workshop sessions are listed below. To have sufficient background to assist in our program we ask you to attend any three of the five scheduled meetings.

PLACE: Highland School - Multi-Purpose Room

Dates	Time
Wednesday, July 8	10:00 - 11:30 AM
Thursday, Jul 16	10:00 - 11:30 AM
Tuesday, July 28	10:00 - 11:30 AM
Thursday, August 6	10:00 - 11:30 AM
Wednesday, August 26	10:00 - 11:30 AM

We look forward to seeing you during the workshop sessions.

Cordially yours,

Gerald W. Gregory
Principal

MOTOR FACILITATION

Instructional Program

1. Small Group - Instructor Ratio - Each instructor works with five-six children. After completing a certain area of perceptual-motor development (example - Body Image) the instructors cooperatively discuss each child and regroup the children according to need.

2. Large Group - Floating Instructors

   In this instructional setting, one teacher takes over the central commands; the entire group of children responding to those commands. The remaining instructors float among the children, assisting where needed.

Each Tuesday and Thursday morning or afternoon, one half of the kindergarten will come to the multi-purpose roam and be taught in Method 1, the second half-hour the remaining children and taught Method 2 (Pink Sheets).

MOTOR FACILITATION
TRAINING SESSION NO. 1
HIGHLAND SCHOOL
July 8, 1970

I. Objectives of leaders working in the MF program

II. Techniques to be used while working with children

III. General teaching points

IV. Behavorial objectives of MF program
  A. Overview
  B. Questions and Answers

V. Motor Skill Survey
  A. Explanation
  B. Demonstration

VI. Supplemental Activities
  A. Dayton Project
  B. Title I Program

MOTOR FACILITATION
WORKSHOP SESSION NO. 2
July 16, 1970

I. Review
  A. Perceptual motor development - overview of problem
  B. Teaching Techniques
  C. Behavorial Objectives
  D. Motor Skill Survey (first week in October)

II. Instructional Program
  A. Organization
  B. Two Concepts: examples - lesson plans

III. Practical Teaching
  A. Body Image
  B. Directionality

IV. Maze Movement

MOTOR FACILITATION
WORKSHOP SESSION NO. 3
July 28, 1970

I. Review
   A. Instructional Program
      1. Small group - instructor ratio
      2. Large group - central and floating instructors

II. Practical Teaching

   1. Directionality - small group
   2. Directionality - large group

III. Audio-Visual Material to aid Instruction

IV. Practical Teaching - Lessons 1-3

MOTOR FACILITATION
TRAINING SESSION NO. 4
HIGHLAND SCHOOL
August 6, 1970

I. Review:
   A. Qualifactions of Adult Leaders
   B. Techniques of teaching

II. Motor Facilitation Skill Survey
   A. Supplement to survey sheet - identification of body parts
   B. Clarification of M.F. terms

III. Practical Teaching

IV. Space Perception
   A. Movement through the maze from different positions in space

APPENDIX F

SAMPLE LESSON PLANS FOR THE EXPERIMENTAL GROUPS

MOTOR FACILITATION PROGRAM

Lesson No. 1

ACTIVITY: Identification of Body Parts

ORGANIZATION: Class faces teacher. Child touches body parts (and verbalizes) as teacher indicates where the parts are on her own body. Cover head, mouth, eyes, ears, arm, hand, fingers, chest, leg and foot.

Place children in different positions: standing, sitting and lying on back. Watch for: hesitation or copying from classmates.

GAME: To re-inforce body identification play "Simon Says." If ability and/or desire warrants, allow several children to take the teacher's place.

ACTIVITY: Arm circles. Begin to develop in children the awareness that arms can move in three ways:

1. While one arm moves the other remains still;

2. Both arms move together;

3. Arms move alternately.

ORGANIZATION: Children put arms out to side, shoulder level, then make big circles; first forward then backward.

If performance is adequate move to single arm circles.

Watch for overflow of muscle action--when right arm is circling the left arm should not move.

MOTOR FACILITATION PROGRAM

Lesson No. 2

ACTIVITY: Identification of Body Parts

ORGANIZATION: Similar to first lesson. Add more body parts: chin, neck, shoulders, elbows, wrist, stomach, hips, knees and ankles.

Change the pace of instruction: instead of touching body part and asking class to do same, insist on more independent thought--example "This is my neck--touch your chest".

Allow time for children to identify body parts on a partner.

Provide for problem solving activities, examples:
Put one hand and two feet on mat;
Put chin and chest against wall.

Again watch for: hesitation in identifying copying from classmates and/or not recognizing body parts on a partner.

ACTIVITY: Directionality--Body identification

ORGANIZATION: Have child lay on right side of body, right arm extended providing a rest support for head (adjust children if necessary).

Ask them to list all the parts of the body touching the floor (right arm, right hip, right leg, etc.). Rotate them to left side and repeat. Stress the right or left concept together with the name of the body part.

MOTOR FACILITATION PROGRAM

Lesson No. 5

ACTIVITY: Balance - Directionality

ORGANIZATION: One tumbling mat per group. Each child works on:

A. Roly-poly
Rocking on back with knees to chest.
If momentum is sufficient, encourage the child to stand up.

B. Log roll
Child lies on back arms straight overhead.
Maintaining this position child rolls first from left to right--then reverse.
If child quickly masters this activity, place a partly deflated ball between his legs and repeat pattern.

C. Animal walks--bear and lame dog.

D. Standing balance. Use these patterns (10 second hold)
1. Stand on tip-toes--eyes open;
2. Stand on top-toes--eyes open, raise arms above head;
3. Stand on tip-toes--eyes closed;
4. Stand on one foot (right first, then left) eyes open, correct child if he is on wrong foot.

When balancing watch for hopping or moving around, peeking at a neighbor to determine right or left foot, and proper spacing of children.

With their hands, draw a "line" <u>up</u> to the ceiling and <u>down</u> to the floor. Emphasize stretch of body and concept of up and down.

By moving the arms away from the body emphasize concept of <u>out</u> (to sides) and <u>in</u> (to chest).

MOTOR FACILITATION PROGRAM

Lesson No. 8

ACTIVITY: Crawling--jumping

ORGANIZATION: Crawling--cross pattern movement should be used. Have children take only one step at a time and only when given the command, "move". On the command, the left knee will move with the right hand and right knee with the left hand. To serve as a reference point, place child so right hand and knee are on a line. Stress listen and think before movement. Be sure child is on his hands and knees and not sitting back on his heels. Eyes should be focused on forward hand.

Watch for correct starting position, simultaneous movement, child moving only after command and copying from neighbors.

Jumping--children stand up, raise and lower heels from the floor. Increase speed so that actual jump takes place.

1. Jump and land on the same spot.
2. Jump over a line.
3. Jump over a stick (3"), forward and backward.

MOTOR FACILITATION PROGRAM

Lesson No. 24

ACTIVITY: Directionality - Eye-hand Coordination

ORGANIZATION: Have the children lie on the floor on their backs with their heads all pointing toward the same wall; on a signal have them get up and run toward the wall to which their head was pointing. Reverse this and have them run to the wall their feet are facing.

Variations:

Same thing from a prone position.

Have children like on back, arms out to side

Run to the wall that their R. hand is facing (or L).

SKILL: Watch in the above activity children who may have difficulty turning their bodies to go in the direction called.

Have a sufficient number of balloons on hand for each child. Use tambourine so child can strike balloon and keep it up in air. Stress following the balloon with the eyes.

APPENDIX G

SAMPLE LESSON PLANS FOR THE CONTROL GROUPS

MOTOR FACILITATION

Alternate Lesson No. 1

ACTIVITY: Body Identification - Body Movement in space.

ORGANIZATION: Entire group of children face instructors. One instructor leads group verbally while others either demonstrate or help individually.

SKILL: Teacher touches various body parts and children respond by touching the same body part.

Teacher calls out a body part - children respond by touching that part.

Use various positions, standing, sitting, kneeling, etc.

Broad Jump Across Floor:

Arrange the children in groups of four. The first child in each line begins to jump (two foot take-off - two-foot land) and counts the number of jumps it takes him to get from one mark to another (18').

MOTOR FACILITATION

Alternate Lesson No. 2

ACTIVITY: Body Identification - Body Movement.

ORGANIZATION: Children form circle and perform various tasks as called by the instructor.

SKILL: Using the circle formation ask children to touch various body parts with eyes opened and then eyes closed.

Describe the two sides of the body (R and L). Remaining in a circle formation have children place right leg in circle. then left. Use same procedure for hands or side of the body.

Animal Walks

Arrange the children in groups of four. Children will move from one mark to another forming a new line after completing their turn.

1. Bear Walk - Bend over from waist and touch hands to floor. Keep legs stiff, plod the feet. Keep head up.

2. All fours - hands and feet moving in alternate patterns.

MOTOR FACILITATION PROGRAM

Alternate Lesson No. 5

ACTIVITY: Directionality - Balance

ORGANIZATION: All children form a large circle. Instructor may ask children to face the circle, place the right or left side of body to circle or have their back to the circle. In these various positions the elements of directionality can be performed.

SKILLS: In any or all of the various positions listed above have children step inside, outside the circle; on, in front of, or behind the line of the circle.

Circle Stoop:

Using a circle formation and providing a rhythm from a tom-tom or hand clap, have children march in good posture until music stops. When this happens, children stoop and touch both hands to ground without losing balance. Watch for the last child to assume this position. Variation - use hopping, fast walk and galloping (one foot remains in front of the other) instead of merely marching.

MOTOR FACILITATION PROGRAM

Alternate Lesson No. 8

ACTIVITY: Coordinated Movements

ORGANIZATION: This lesson will involve the basic motor movements of walking forward and sideward, running, hopping and galloping. An additional element, stopping and holding one's position makes this a most interesting game for children.

SKILL: Freeze

Have children run in single file staying close to the walls. Use standards at corners. Inform children they must move to the outside of each standard. When the whislte blows, they must freeze in whatever position they are in - those that move are "caught." Play for 5-7 minutes. Variations: ask children to walk, hop, gallop, slow run, etc.

Animal walks:

Re-group children into four lines. Work with children on Rabbit Hop, Lame Dog and Crab Walk. Make sure only four children are on floor at one time - one from each team.

MOTOR FACILITATION PROGRAM

Alternate Lesson No. 24

ACTIVITY: Directionality - Eye-Hand Coordination

ORGANIZATION: Have children form a large circle. Cover all major body parts and concepts of right and left. Enable children to identify body parts in a number of positions and with eyes opened and closed.

Provide each child with a ring. Cover concepts of in-out-front-back, etc. Again coordinate this phase of space identification with R & L concepts.

RELAY: Four line formation. First child in each line has a tambourine and a balloon. On start signal child moves down to end of line and back to his team while striking the balloon and keeping it up in the air.