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Perceptual Motor Match: Impact of Two Motor Training Programs

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PERCEPTUAL MOTOR MATCH: IMPACT OF TWO MOTOR TRAINING PROGRAMS

A Dissertation

Presented to

the Faculty of the Department of Education

East Tennessee State University

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Education

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by

Jo Beatrice Cleek

August 1976

APPROVAL

This is to certify that the Advanced Graduate Committee of

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met on the

4th day of August, 19 76.

The committee read and examined her dissertation, supervised her defense of it in an oral examination, and decided to recommend that her study be submitted to the Graduate Council and the Dean of the School of Graduate Studies in partial fulfillment of the requirements for the degree Doctor of Education.

Chairman, Advanced Graduate Committee

Dean, School of Graduate Studies

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An Abstract

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M. S., The University of Tennessee, December 1967.
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PERCEPTUAL MOTOR MATCH: IMPACT OF TWO MOTOR TRAINING PROGRAMS

Purpose. The purpose of the study was to compare the impact of two motor training programs upon a selected perceptual motor task, verbal intelligence and motivation of kindergarten children.

Method. The study was a field experiment conducted to determine the impact of two motor training programs. The subjects were randomly chosen from four public school kindergarten classrooms. Two classrooms were located in each of two schools in rural Wise County, Virginia. The sample of forty children (20 boys; 20 girls) were randomly assigned to treatment according to school. Twenty children (10 boys; 10 girls) served as the experimental group and an identical number served as controls.

The four classroom teachers volunteered to participate in the study. The two groups were pretested by the experimenter on the Anton-Brenner Gestalt Test, the Peabody Picture Vocabulary Test and the Gumpgookies Test. Two classroom teachers conducted a movement education motor training program for the experimental group and two classroom teachers conducted a traditional kindergarten motor training program for the control group. The duration for the training programs was eight weeks in late fall. The Anton-Brenner, PPVT and Gumpgookie were immediately administered as a posttest. All testing occurred in isolated areas of each school which the subjects attended. The research hypotheses was that neither training program would have a more significant impact upon a specified perceptual motor task; and that neither motor training program would have a greater effect on cognition and motivation. The research design was a classic 2 x 2 with 10 subjects in each treatment cell. A descriptive analysis and an analysis of covariance was performed on the data.

Summary. Results of the study indicated that the movement education program was more effective in the attempts to improve perceptual skills and had a more profound effect upon male subjects than upon female subjects. The variable showing the greatest change was the perceptual-motor ability of the experimental group. Both male and female subject scores increased significantly. The impact of motor training on verbal intelligence was significant for experimental males and was less effective for females. The positive effect of movement education for

males was also exhibited in the test for motivation. Changes in female scores did not yield significance; however, the descriptive analysis indicated improvement.

Conclusions. The results of the present study indicated the importance of movement for young children and were supportive of the learning theories of Piaget, Langer and Werner. The increases in scores among low scorers in both treatment groups gave credence to Singer's hypothesis that skilled movement is learned. The findings of the study are supplementary to Kephart's findings concerning low achievers and underscored the need for early training.

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Dissertation prepared under the guidance of Dr. Nancy Hamblen Acuff, Dr. A. Keith Turkett, Dr. Gem Kate Greninger, Dr. William L. Evernden, and Dr. John B. Tallent.

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Chapter 1

Introduction and Statement of the Problem

Prior to the research of the sixties, motor training programs for young children were based on the assumption that motor coordination was a result of maturation (Kephart, 1960; Frostig and Horne, 1964). In many public school kindergartens, periods of physical activity were planned to avoid monotony and provide a balance between quiet and active learning experiences. Some schools provided elaborate equipment; others could not afford or did not have the physical space for such elaborate facilities. Motor training programs were usually child centered. Teachers believed children could use equipment and space provided by the school. Teacher intervention occurred whenever safe use of the equipment was threatened.

The publication of Newell Kephart's The Slow Learner in the Classroom (1960) raised questions concerning children with learning problems. Many slow learners appeared to be normal as defined by educators. Cultural and economic deprivation were viewed as causal factors for the inability to learn. Kephart believed cognitive development was inhibited whenever interaction with the environment was prevented. He thought lack of coordinated movement created learning difficulties which inhibited cognition. Marianne Frostig and David Horne (1964) concurred with Kephart's thesis. They stated that rigid curricula and restrictive space failed to provide opportunity to develop coordinated movement. Programs were subsequently devised to enhance movement skills of young children.

Some schools revised motor training programs as a result of Kephart's and Frostig's and Horne's research. Others made no changes. The present

study compared the effects of a movement training program and a traditional motor training program.

Problem

Statement of the Problem

The problem was to determine the impact of two motor training programs upon perceptual motor skills. The implications from the study suggested a rationale to curriculum planners and teachers for enhancing the total educative process.

Sub-problems. The sub-problems were (1) to determine which program had a greater effect upon a designated area of verbal intelligence; (2) to determine which program had a greater motivational effect.

Purpose of the Study

The purpose of this study was to compare the impact of a traditional motor training program with the impact of a movement education program. The explicit focus was upon the perceptual motor ability related to eye-hand coordination of young children enrolled in selected public school kindergartens.

Exposition of the Problem Statement

Definition of Terms

Definitions were necessary to limit meaning within the constraints of the study. Explicit definitions of those terms follow.

1. Impact - effect upon eye-hand coordination, verbal intelligence and motivation.

2. Cognition - the verbal intelligence of non-reading children as determined by the Peabody Picture Vocabulary Test (PPVT).

3. Motivation - the stimulated interest in school which resulted from the specified motor training program.

4. Traditional motor training program - the large and small muscle activities which kindergarten teachers have traditionally incorporated into the teaching program.

5. Movement education program - a non-competitive program of space and body in space exploration based on Piagetian theory.

6. Perceptual motor match - the eye directing the hand in a complex task of coordinated movement (Kephart, 1960).

7. Normal - individuals perceived as being free from disabilities which would be identified in routine classroom screening procedures.

Parameter of the Study

The study focused upon five year old kindergarten children in public school classrooms located in rural Southwest Virginia. The study was limited to the determination of the effectiveness of two methods of motor training directed by public school kindergarten teachers. The teachers had similar educational and experiential backgrounds. All four had baccalaureate degrees and three or four years teaching experience. The sample was confined to 40 five year old kindergarten children with no perceived disabilities. The selected perceptual task was the reproduction of a picture of dots and words and an original drawing of a boy or girl from the Anton-Brenner Gestalt Test of School Readiness.

The duration of the motor training programs was limited to an eight-week period in late autumn. The study was limited to changes in standardized test scores following the eight-week instructional period. The factors analyzed were perceptual-motor skills, verbal intelligence and motivation. The main effects were type of motor training program and sex of the child.

Delimitations

The study was limited to five year old kindergarten children and did not attempt to analyze older or younger children. Medical records were not used as a criterion for the children's inclusion in the study. No attempt was made to evaluate teacher-student interactions or methods of instruction. The research analysis did not include an evaluation of achievement test scores of the children.

Home interviews and questionnaires were not a part of the study.

Basic Assumptions

Those assumptions unique to the study were as follows:

1. Motor training could effect perceptual motor coordination (Singer, 1968).

2. Maturation of subjects could be controlled by limiting the training period (Gesell, 1940).

3. Ability of five-year-old-children to use a pencil in a copying task was similar to the ability of six year olds (Gesell, 1940).

4. The willingness of teachers to participate in an investigation would probably promote a positive attitude among the young respondents (Kennedy and Cormier, 1970).

5. All participating teachers were aware that the motor training program was being evaluated; therefore, the Hawthorne effect would be minimized (Shultz, 1969).

Theory Base

The study represented several theoretical systems concerning the development of complex, multifaceted motor abilities. These theoretical systems include maturation, movement, hierarchic integration, perceptual

motor match, sex differences, motivation and cognition which were among those variables considered necessary to skilled motor behaviors.

Maturation

Theories of child development have suggested a maturational viewpoint for four decades. Chronological age was suggested as a determinant of behavior and age specific charts devised to predict the appearance of certain motor abilities (Gesell, 1940). Very early motor behaviors were described as reflexes. The child was not viewed as the controller of the jerky movements which were labeled as responsive movement. Motor performance became more refined with biological maturity. Heinz Werner (1948) labeled this process genetic spirality. He defined genetic spirality as a reorganization of behavioral functioning. This definition did not imply an age-stage developmental process; it indicated progressive levels of functioning in which primitive stages are primary sources of advanced behavior.

Movement

Movement theory is a more recent emphasis. Relationships between body and space were learned as the child explored space. The child used the ability to move to determine spatial associations. Uses of independent body parts were also discovered and subsequently coordinated (Kephart, 1960). The effect of inhibited movement on coordination was illustrated in the animal research of Robert Held and Alan Hein (1963). Kittens reared in darkness until age 12 weeks exhibited a disparity of self-produced movement when tested on a visual cliff.

Hierarchic Integration

In the theories of hierarchic integration advanced systems controlled less developed systems. Jonas Langer (1970) and Werner (1957) were in

concurrence in their belief that the organism must alter some global behaviorisms and preserve certain other structures and functions. Langer (1970) stated that sophisticated sensory and motor systems resulted from the organization of rudimentary systems. He believed such organization was a major developmental accomplishment. Developmental change resulted from directed alteration, not unlawful flux.

Perceptual Motor Match

Perceptual motor match was the term used by Kephart (1960) to indicate the eye was directing the hand in a complicated task of coordinated movement. Motor match was considered a refined skill which occurred in sequential stages. The first was hand-eye (Gesell, 1940). The hand explored and directed the eye in observation of hand movement. The second sequence was eye-hand. The eye commanded movement of the hand. Finally the eye explored and when necessary the hand duplicated visual information. Thus the complex skill of perceptual motor match was established.

Sex

The importance of sex as an isolated variable in motor coordination was noted in the research of the 1930's. Beth Wellman's (1937) study of motor achievement of young children indicated females were superior in some motor activities such as hopping, skipping and balance in walking. Male and female subjects achieved similar scores in ball toss and catch tasks. Certain motoric activities believed to be feminine in nature (skipping) required rhythmic body functioning. Males frequently avoided such activities. According to the Fels growth studies achievement motivation is not the same for boys and girls (Kagan and Moss, 1962).

Motivation

Research in motivation has been long standing, intensive and has changed its focus and theoretical constructs. Early learning research in the 1940's and 1950's indicated rewards were a motivating factor for animals to learn mazes. Interesting environmental stimuli created the desire in children to explore their surroundings (Langer, 1970). Clark Hull (1943) hypothesized learning could be motivated by an educational environment which provided both quiet and active learning experiences. He cautioned too much stress on either type of learning experience could result in regression. Recent studies by J. McVicker Hunt (1969), indicated motivation is intrinsic and is phenomenologically released. He stated,

> It would appear that emerging recognition can make objects, persons and places attractive. Later it is a novelty which is attractive. The full range of the various kinds of standards that emerge in the course of a child's informational interaction with his circumstances during the process of psychological development has never been described. (Hunt, 1969, p. 31)

Cognition

The developmental psychologist Jean Piaget (1952) labeled early intellectual functioning sensorimotor. Sensorimotor inferred use of the five senses and movement. Thus, the young child learned by sensory exploration and perceptual interpretation of the environment. Intellectual development was also sequential (Piaget, 1952). Sequential development did not imply step by step or chronologically determined mental functioning. It did imply simple to complex mental stages which

appeared in a similar order of succession. More complex stages of intellectual functioning followed as early concepts were expanded. Piaget's theory, therefore, parallels Werner's theory of genetic spirality.

Significance of the Study

Educators continually viewed the educative process as a dynamic process. Whenever research indicated, teaching strategies and educational curricula were changed or modified. The cognitive area of early childhood educational curricula reflected the research of Piaget (1952). David Weikart's (1971) Cognitively Oriented Curriculum exemplified one of several attempts to educate culturally or economically disadvantaged children during the 1960's.

Certain investigators (Kephart, 1960; Singer, 1968) suggested movement training as a means to enhance the learning process for slow learners and young children. Kephart (1960) noted the relationship between skilled movement and systematic exploration of space and objects. He stated that motor activities and perceptual activities cannot be considered as separate entities and cited the need for programs which would produce the desired interaction between organism and environment. R. N. Singer (1968) emphasized that movement mastery is learned. The ability to coordinate perceptual motor patterns was a highly skilled act. The maturational process did not insure the occurrence of skilled movement. He cautioned that motor skills should not be left to chance and noted the need for opportunities to practice and refine motoric skills.

Piaget (1970) suggested perceptual motor mastery may have an impact on cognition. Intellectual structures developed as the ego-centered

child strived for equilibrium in an object centered world. Piaget believed sensory perceptual coordination aided the child's ability to discover and manipulate the environment.

Educators and curriculum planners have continually sought pedagogical strategies in order to enhance the total educative process. The juxtaposition of cognitive and psychomotor theories appear to offer new modes of instruction. Within the framework of this challenge the present study was attempted.

Review of Related Research

Traditional Motor Training Programs

Research in motor development of young children flourished in the 1930's and focused on age specific motor abilities (Gesell, 1940; Wellman, 1937). Arnold Gesell stressed the importance of active movement to skilled motor abilities. He suggested the ability to draw and write was ontogenetically second only to oral language. Eye-hand coordination was a prerequisite to the act of writing. Academic success depended upon the ability to write. Both Beth Wellman and Arnold Gesell suggested structuring the environment to promote practice of large muscle skills. In their opinion large muscle functioning preceded fine muscle refinement. Sexual differences in certain motor tasks were noted. Females exhibited greater abilities in hopping and skipping; males were superior in throwing and climbing tasks. Wellman's findings indicated inferior motor functioning among children who were labeled as mental retardates.

G. N. Getman (1972) believed large muscle functioning preceded fine muscular skills. He stated eye-hand coordination was extremely complex and required many years to accomplish. His book How to Develop Your Child's Intelligence was written to aid parents who desired to train

their own children. He described movement experiences and suggested household tools (i.e. percolator) which would enhance eye-hand coordination. The first publication of the book appeared in 1952. The seventh edition was published in 1972. He stated,

> Clinical research now provides evidence that a child's ability to discriminate differences in sounds, tones, noises, etc., and his ability to produce more acceptable speech sounds are closely related to his ability to integrate the special movement patterns of the visual-tactual mechanisms. The better his discriminations are in any one combination of processes, the better will be his discriminations in all other processes. (Getman, 1972, p. 25)

Thus according to Getman, integration of eye movement with hand movement provided the foundation for all other perceptual systems.

Ira Gordon (1969) found inhibited movement was detrimental to males ages 0 to 2 years. These young males were subjects in a parent education program in Florida. The program attempted to raise the cognitive level of functioning among economically deprived Southern children. Paraprofessionals trained parents to teach pre-school children in an effort to increase academic abilities when those children entered public school. Many of the learning exercises, such as reading stories and teaching colors and shapes, were sedentary. Females were not adversely affected by the quiet learning experiences. Gordon hypothesized males were more active by nature and thus needed learning opportunities which required action. His hypothesis was not consistent with the results of several longitudinal studies conducted by Nancy Bayley (1970). In a summary of

her studies she suggested a supportive emotional environment facilitated mental growth. Predictions of future mental abilities could not be based upon those abilities characteristic of a specified stage of development.

Movement Education Programs

Success nurtured success as the young child explored his environment. Piaget (1952) believed the child explored the environment by means of sensory perception. As the child progressed through the preoperational period, mental inputs were received from sensory assimilations. Opportunities to move and play resulted in elementary concepts upon which later concrete experiences constructed the child's first abstractions. Knowledge was connected with action by interiorized behavior. Sophisticated mental functions (sequencing and formation of one-to-one relations) followed sensorimotor manipulations such as pushing or pulling. The young child needed practice to separate his egocentric self from the objects and space of his environment (Piaget, 1970). Actions from the sensorimotor stage reappeared in subsequent stages of mental functioning. These actions, however, were no longer primitive but operative. Addition was an example cited as a physical or mental operation.

Kephart (1960) investigated problems encountered by slow learners. Slow learners were children with no perceived disabilities who experienced academic failure or low achievement. Kephart's research indicated such children encountered difficulties with motor coordination, balance and perceptual motor match. These children considered themselves to be failures. They became fearful of academic tasks and did not or could not attend classroom instruction. Kephart designed a program which included various gross motor and fine motor activities. The intent of the program

was to aid the classroom teacher and provide successful learning experiences for children identified as slow learners. Kephart believed the program was both academic and motivational. He stressed the necessity for fine motor coordination in academic tasks and warned teachers and program planners of the negative effects of teaching splinter skills. Teaching kindergarten and first grade children the correct method for holding a pencil or crayon was cited as an example of teaching a simple splinter skill.

Some theoreticians believed movement skills played an important, not preeminent, part in the education of young children. Marianne Frostig (1970) and Bryant Cratty (1970) suggested movement experiences should be an integral part of the total educational process. Frostig, in association with Phyliss Maslow (1970) cited the necessity for physical education training for prospective classroom teachers in order to meet all the needs of the young child. It was not possible to extricate physical, mental and emotional parts from the integrated total human entity called a child. Frostig noted the reciprocity between the success and joy experienced in movement exercises and feelings of emotional well-being which promoted greater use of concentrative powers. Her theory of physical development was similar to Piaget's theory of intellectual development. It occurred in steps or stages; each successive stage built upon and expanded former stages. Both nature and nurture played important roles in the process.

Cratty (1970) noted the necessity for movement programs which required the child to think about the movement. He suggested teaching of spatial direction (up and down; forward and backward) to assist the young child in the attempt to structure space. Movement which required

seriation was useful for remembering things arranged in patterns or series. Cratty believed the immature and retarded child dealt with immediate and obvious concepts. He suggested movement activities to aid the blind, immature or retarded child as the child progressed from simple concepts to complex abstract thought.

Movegenics was the term Ray H. Barsch (1968) used to describe his integrated learning theory. He identified a "sensitivity system" composed of six senses. He stated that the sensitivity system was a dynamically functioning system which was operative rather than transmissive in nature. The components of the sensitivity system were designated as the visual, auditory, kinesthetic, tactual, olfactory and gustatory modes. Each mode processed information which the individual organized and used to meet the demands of daily life. This theory was in concurrence with Piaget's and Frostig's theory of orderly sequential development. Mature mental processes were expansions of early physical movement and sensory experiences. Guidelines were formulated for an effective curriculum. The proposed curriculum utilized the six perceptual modes for information gathering. Barsch stated arrival at kindergarten or subsequent grade levels did not insure efficiency in information processing. It was the responsibility of program planners and teachers to provide a wide spectrum of activities to promote movement efficiency.

Keturah E. Whitehurst (1971) agreed with Barsch's theory. She stated movement to the young child meant life and self-discovery. Through movement the child achieved and maintained spatial orientation. It was the responsibility of the teacher to provide opportunity for purposeful execution of body movement and plan a safe environmental setting which nurtured contact and communication. Robert Wickstrom (1970) also believed

the environment enhanced or restricted movement skills. He stated two basic motor development tasks of infancy and early childhood were prehension and upright locomotion. Adults considered these acts commonplace and frequently took them for granted. Both, however, were complex skills and products of maturation and learning. These basic skills provided a foundation for refined motor skills such as eye-hand coordination. His studies of young children indicated maturation played the lesser role in movement refinement. The child learned to manipulate pencils and crayons; the child learned to turn the pages of a book.

Successful sensory motor programs have emphasized sequential, active, integrated, and sensory based modes of instruction. The child's abilities in spatial orientation and perceptual motor match were enhanced by those types of learning experiences.

Studies of Motor Training Programs

Many researchers investigated motor abilities or compared effects of various motor training programs. Hans Kraus and R. P. Hirschland (1954) compared European and American school children's strength and flexibility in those body parts upon which daily living demands were focused. Subjects' Kraus-Weber Test scores indicated poor motor functioning among 57.9 percent of the Americans as opposed to 8.7 percent of the Europeans. The experimenters hypothesized lack of training and the high degree of American mechanization as causal factors for the poor American showing.

In an attempt to predict academic competencies of pre-school children William Meyer (1966) used the Purdue Perceptual Motor Survey to test 4 and 5 year old middle class nursery school children. The study identified problems encountered in scoring the test, such as rater agreement and lack of specificity about what some of the tests were actually measuring.

The test was found to be unsuccessful when used with children younger than six. The Purdue Perceptual Motor Survey (PPMS), developed by Newell Kephart and Eugene Roach (1966), established norms for children ages 6 to 10 years. The PPMS has been successfully used to identify perceptual problems among poor readers in the early primary grade levels. Some program planners devised reading programs based on Kephart's research to aid maladriot readers (Bush & Giles, 1969).

The Winter Haven Form Copying Visuals I and Ocular Motility Test were used as predictive instruments by Beulah Murray (1966). Two hundred prospective first grade pupils were tested to predict rank in reading ability at the end of their first grade year. The 25 percent scoring lowest on the perceptual development scale seemed to be clustered in the lowest third of first graders on word recognition skills.

A successful longitudinal study by the Portland, Oregon Public Schools (1968) resulted in the publication of an individualized perceptual motor training program. Balance, body-image and eye-hand coordination activities for kindergarten children had a positive effect on reading ability of children in grades one, two and three in the Portland schools.

Children with severe reading deficits were subjects of Howard Coleman's (1968) investigation to determine whether visual perceptual problems effected reading and language arts skills. The ninety subjects were from low to middle socioeconomic backgrounds. Findings indicated 49.5 percent of the subjects had visual perceptual problems sufficiently severe to handicap learning abilities. The study also revealed a significantly higher ratio of males in the early grades (1st to 4th) with visual perceptual problems that caused reading difficulties. Coleman found visual testing of most school children was through routine

refractive procedures sometimes administered by amateurs. He suggested the use of more thorough visual perceptual analysis such as the Purdue Perceptual Motor Survey.

Jerry Thomas, Thomas Chissom and Lynn Booker (1974) compared perceptual motor and academic readiness abilities of pre-school children identified as learning disabled with same age children labeled as normal. The Shape-O-Ball Test and stabliometer were used to determine perceptual scores. The academic readiness tests were the Slosson Intelligence Test and the Peabody Picture Vocabulary Test. Results from the study showed a high correlation between academic readiness and perceptual scores for the learning disabled. No significant correlation was found with perceptual and readiness scores of children labeled as normal. Thomas and Chissom in cooperation with Brad Stewart and Charlene and Francis Shelley (1975) designed a perceptual motor training program for kindergarten children in Northern Florida. The effects of the motor training program were compared with the effects of a free play period. Significant differences favoring the perceptual motor program were found in perceptual motor skills and self-concept scores. Thomas and Marjorie Knutson (in progress) devised a perceptual motor training program for Fairfax County Virginia Public Schools. The program was attempted in order to refine remedial training procedures and improve perceptual and cognitive skills.[1]

Summary

A summary analysis of the research reviewed for the present study indicated emphasis in age specific abilities, sex differences, and sensory

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[1]Personal correspondence with Marjorie Knutson, January 21, 1976.

perception. Programmers emphasized movement and spatial orientation as a precursor of successful schooling.

Many early research studies of motor development attempted to determine age specific abilities. Others indicated sexual differences among children of early ages; Wellman and Gesell suggested structuring the environment to develop large muscle skills which would nurture fine muscular skills. Both Gesell and Getman stressed integration of hand movement with eye movement providing a foundation for all other perceptual systems.

From his intensive studies, Gordon hypothesized males were more active than females by nature and needed learning opportunities which required action. Coleman, Gordon, and Wellman found significantly different scores for boys on verbal behavior and visual perception. Piaget theorized the child explored the environment by means of sensory perception. Opportunities to move and play resulted in elementary concepts upon which later concrete experiences constructed the child's first abstraction.

Frostig, Horne, Cratty, Barsch and Kephart concluded that movement played a considerable role in the educative process. Their research and that of Piaget indicated the responsibility of program planners to provide a wide spectrum of multi-sensory activities to promote movement efficiency.

In the studies of motor training programs Kraus and Hirschland stated that lack of training and the high degree of American mechanization served as causal factors for muscular weakness among American school children. Following Kephart's research identifying perceptual problems among poor readers, curriculum specialists devised programs to assist maladroit readers. Several studies, Murray, and Portland Public School plan, and

Thomas emphasized individualized perceptual motor training programs for kindergarten children. Those programs were attempted to promote more effective training procedures and to enhance perceptual and cognitive skills.

Chapter 2

Methods and Procedures

Class of the Inquiry

The problem of the study was to determine the impact of two motor training programs upon perceptual motor skills. The study was a field experiment. The setting for the experiment was selected public school classrooms. Treatment was randomly assigned to randomly selected subjects who were perceived as normal. The inferential population for the experiment was normal white Southern Appalachian five year old children. Such a study could provide research feedback in motor training which classroom teachers could apply to their instructional modes.

Procedures

The study compared the impact of two motor training programs upon a specified perceptual motor task. The perceptual task selected was the perceptual motor portion of the Anton-Brenner Gestalt Test of School Readiness. The pretest, which required the subject to reproduce a picture of dots; a picture of words; and draw a picture of a boy or girl, was administered individually. The posttest was administered following the eight-week motor training programs directed by the classroom teacher.

Sub-problems of the study were: (a) to determine which program had a greater impact on verbal intelligence and (b) to determine which program had a greater motivating effect. The Peabody Picture Vocabulary Test was the instrument used to determine verbal intelligence. The PPVT

Form B[2] was used as a pretest and Form A as the posttest. The Gumpgookie was administered as a test for motivational impact. It was used in the pretesting and posttesting situations.

Four classroom teachers, from two schools, volunteered to participate in the study. Motor training texts and necessary equipment were provided for both programs. The experimenter conferred with each group of teachers weekly. Weekly training sessions occurred during the conferences. The teachers directed the program in accordance with their individual teaching methods. The teachers were told that the motor training program was being evaluated. No attempt was made to evaluate instructional modes since the four classroom teachers volunteered to participate in the study. It was therefore necessary to recognize certain biases in the sample. Highly motivated teachers may have exhibited competency and nurtured competency in their young students (Kennedy and Cormier, 1970).

Treatment was randomly assigned to two schools; two teachers in each school directed the same motor training program. A random sample of 40 subjects (20 girls, 20 boys) was selected from four kindergarten classrooms by using a table of random numbers. Five boys and five girls were selected from each classroom. School and parental permission for the study were obtained prior to program implementation.

Pretesting of subjects followed an initial visit to the school to acquaint the young subjects with the experimenter. All testing occurred in an isolated area of each school which was familiar to the young subjects. The experimenter checked on the progress of the training programs on a weekly basis. Posttests were administered after the

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[2]The authors of the PPVT recommend that Form B be used as the pretest.

eight-weeks' training period. The degree of change was statistically analyzed. An analysis of covariance was performed on the test data.

Internal and External Validity and Control

Control was maintained by random selection of subjects and random assignment to treatment using a table of random numbers. In order to select subjects randomly it was necessary to involve four classrooms since the school system limited pupil enrollment to twenty per class. Ten (5 boys; 5 girls) subjects with no perceived handicaps were selected from each of two classrooms in two separate schools. The schools were located approximately forty miles apart. Two teachers in each school directed the same type of motor training program. The experimenter visited each of the schools at least once per week to confer with the classroom teachers. All tests were administered by the investigator in isolated areas of each school which were familiar to the subjects.

The study was designed to control for sex, age, and cultural and geographic backgrounds. Developmental changes and time lapse were controlled by restriction of the experiment to eight weeks.

No form of instruction concerning any of the tests was a part of the subjects' educational experience. The tests, used for the experiment, had not previously been administered to the children. The hypotheses were unknown to the classroom teachers (Campbell & Stanley, 1963).

The subjects participated in a similar academic kindergarten program. The program was devised by Wise County teachers and supervisory personnel. Academic materials for the classrooms were identical.

Hypotheses

Hypotheses for the study were stated in the null, as follows:

Hypothesis #1

Children who participated in movement education programs would not achieve more significant gains in eye-hand coordination than children who participated in a traditional kindergarten motor training program.

Sub-hypothesis #1

There would be no significant difference between male and female participants on eye-hand coordination achievement scores.

Hypothesis #2

Participants in the movement education program would not achieve more significant increases in verbal intelligence scores than participants in the traditional motor training program.

Sub-hypothesis #2

There would be no significant difference between male and female participants on verbal intelligence score increases/decreases.

Hypothesis #3

Effects of motivation on subjects who participated in the movement education program would not be significantly different from subjects who participated in the traditional motor training program.

Sub-hypothesis #3

There would be no significant difference between male and female change in scores on the test of motivation.

Research Design

The study was comparative in nature. The basic research design was a classic 2 x 2 factorial (Kerlinger, 1964). Subjects were randomly assigned to treatment. Pretests and posttests were administered for all measures. The variables analyzed were type of treatment, sex, and change in test scores on three instruments. The treatment consisted of a

movement education program and a traditional kindergarten motor training program. There were four treatment cells. One was 10 male subjects in the movement education program; one was 10 male subjects in the traditional motor program. A third treatment cell contained 10 female subjects in the movement education program. The other treatment cell contained 10 female subjects in the traditional motor training program. An analysis of covariance was performed upon the change scores from the three instruments.

Queries

The study was comparative in nature and classified as a field experiment (Kerlinger, 1964). The primary question was would movement education have a greater impact upon perceptual motor-match than a traditional kindergarten motor training program. The study also attempted to determine whether the motor training programs effected cognition and motivation of five year old children.

Comparative Statistical Hypotheses

The experiment required a 2 x 2 matrix, a non-additive model associated with a multiple factor randomized design. An analysis of covariance (Winer, 1962) was performed on the data at the computer center of the University of Virginia on an IBM 370 computer. The null hypothesis was tested at the 5 percent level of confidence.

The sources of variance included a specified perceptual motor skill, verbal intelligence and motivation. The main effects were type of treatment and sex of subjects.

Population and Sample

The subjects selected for the study came from a rural Southern Appalachian background. Rural Southern Appalachian background did not imply economic deprivation. It did, however, indicate an economic

background based on fortunes or failures of a coal mining industry. Economic conditions were improving as a result of world wide energy crisis. The children were well dressed; exhibited few, if any, characteristics of malnourishment; and appeared to possess many current toys. The randomly selected sample of 20 boys and 20 girls contained an all white population since there were no black or oriental students in the four participating classrooms. The subjects were representative of the total population which contained less than 3 percent black and less than 1 percent oriental inhabitants. The two ethnic groups lived in pockets of the more densely populated sections of the area.

The children lived in an area characterized by mountainous highways which historically prevented inhabitants of the area opportunities to interact with a variety of people from different cultural backgrounds. Travel to metropolitan areas required two to three hours driving time.

The cultural patterns and values of the residents inhibited their seeking outside influences because of (1) their innate shyness and (2) resistance to change. These factors were historically characteristic of the rural Southern Appalachian region. The specific area, Wise County, Virginia, had a traditional folk history kept alive by energetic community leaders.

Description of Instruments

Anton-Brenner Developmental Gestalt Test of School Readiness and the Peabody Picture Vocabulary Test were used to determine perceptual skills and verbal intelligence. The Anton-Brenner Gestalt Test of School Readiness was first published in 1954 after extensive research at the Merrill Palmer Institute in Detroit, Michigan. It was used to determine perceptual and conceptual differentiating ability of pre-school children

and children with developmental disabilities. The test-retest reliability for the BDGT ranged from .55 to .80; and internal consistency between .80 and .90. It was a predictive test of reading and number readiness. Test items included manipulative half-inch cubes, number recognition forms and draw-a-man test.

The PPVT was designed to test the verbal intelligence of the non-reader. It contained a test battery of 150 plates. The plates were arranged in empirically-determined order of difficulty. Each plate consisted of four illustrations which required a forced-choice response. Plate categories included man-made objects, animals, plants, articles of clothing, house wares and human actions. Reliability coefficients for the PPVT were calculated at .73 for five-year-olds; its correlation with the Stanford Binet was .86. It was used extensively with pre-school children as a testing instrument for published research since publication in 1959.

The Gumpgookies Test was used to test motivation. The test required a forced-choice response by choosing a "Gumpgookie" whose likes/dislikes were the same as those of the respondent. The "Gumpgookies" were simple cookie shaped figures involved in various childlike situations. Internal consistency for this test was calculated at .70; test-retest reliability ranged from .55 to .78. The test was developed at the University of Hawaii by Dorothy Adkins and Bonnie Balliff. It contained 75 items and was published in 1970. Prior to publication the test was validated by testing approximately 1,400 Head Start children in Hawaii.

Motor Training Programs

Traditional Motor Training Program

Teachers traditionally based motor training programs on the precept

that large motor coordination preceded fine muscle coordination (Hendrick, 1975). They structured the environment with a variety of indoor and outdoor equipment designed to foster motor development. Children were permitted to use the equipment as they desired. Restrictions occurred only as a result of the individual's inability or the teacher's concern for safety. Many private kindergartens still adhere to the above philosophy for motor training. Some public school systems lacked space and/or funds to provide a great variety of motor training equipment. Teachers adjusted their programs accordingly. Rhythm records and indoor and outdoor games served as substitutes for elaborate climbing apparatus, large tumbling mats and balance equipment.

The traditional motor training program for this study was devised to compensate for lack of indoor space. Indoor training occurred within the classroom, which contained appropriate equipment necessary for the total kindergarten educational program. Rhythm records were used for such activities as marching, skipping and simple folk dancing. Indoor games included relays, balancing activities, ball toss and bounce and simple exercises.

The traditional program was devised from activities developed by Harry Edgren and Joseph Gruber (1963). (See Appendix A.)

Movement Education Program

Movement education originated in Great Britain and was planned for young children in kindergarten and early elementary grades. The underlying purpose of the program was to promote body awareness and enhance perceptual skills, not simply to develop motor skills (Frostig & Maslow, 1970). Inexpensive materials were used by the classroom teacher in the limited space of the classroom. These materials included bean bags,

jump ropes, elastic bands, teacher designed obstacle courses and the child's own body. The program did not require competition among class members; it challenged the participant to compete with himself. Movement education was also devised to create a positive attitude toward school. The safe, simple exercises provided creative opportunities for both teacher and child to discover various uses of the equipment. The movement education program was devised from activities developed by Glen Kirchner, Jean Cunningham and Eileen Warrell (1970). (See Appendix B.)

Summary

The methods and procedures for the study were described in Chapter 2. The experiment was a field study which was conducted to determine the impact of two motor training programs. The subjects were randomly chosen from four public school kindergarten classrooms. Two classrooms were located in each of two schools in rural Wise County, Virginia. The sample of forty children (20 boys; 20 girls) was randomly assigned to treatment according to school. Twenty children (10 boys; 10 girls) served as the experimental group and an identical number served as controls.

The four classroom teachers volunteered to participate in the study. The two groups were pretested by the experimenter on the Anton-Brenner Gestalt Test, the Peabody Picture Vocabulary Test and the Gumpgookies Test. Two classroom teachers conducted a movement education motor training program for the experimental group and two classroom teachers conducted a traditional kindergarten motor training program for the control group. The duration for the training programs was eight weeks in late fall. The Anton-Brenner, PPVT and Gumpgookie were immediately administered as a posttest. All testing occurred in isolated areas of each school which the subjects attended. The research hypotheses were

that neither training program would have a more significant impact upon a specified perceptual motor task; and that neither motor training program would have a greater effect on cognition and motivation. The research design was a classic 2 x 2 with 10 subjects in each treatment cell. The testing instruments and motor training programs were described.

Chapter 3

Findings and Discussion

The purpose of the experiment was to compare the impact of two motor training programs upon a selected perceptual motor task. The motor training programs were conducted by public school kindergarten teachers. It was hypothesized that there would be no significant difference in the impact of the movement education program as opposed to the impact of a traditional motor training program for kindergarten children. It was also hypothesized that neither motor training program would have a greater effect upon cognition and motivation. The sample was a randomly selected group of five-year-old subjects representative of rural Southern Appalachia. The investigation was based on theoretical constructs discussed in Chapter 1. The results of the study would be applicable to instructional strategies.

Findings

In order to test the three hypotheses it was necessary to administer three tests. For purposes of clarity the findings were reported according to each of the tests.

Anton-Brenner Gestalt Test

The Anton-Brenner Gestalt Test was administered to determine the effects of the motor training programs upon a specified motor task. The data were analyzed by descriptive means. The pretest means, ranges and standard deviations for both treatment groups are presented in Table 1, page 30.

Table 1

Means, Ranges and Standard Deviations for the ABGT Perceptual Motor Task (Pretest)

Variable	Mean	Range	σ	σ^2
Experimental	49.6	32-67	12.71	161.72
Control	52.8	31-65	12.26	150.48
Experimental-Males	48.5	32-63	12.39	153.61
Experimental-Females	50.7	32-67	13.60	185.12
Control-Males	50.8	31-63	11.98	143.51
Control-Females	54.8	31-65	12.85	165.29

The means and range of pretest scores were similar which indicated that the randomly selected groups showed an equality of perceptual motor skills.

The posttest for the ABGT was analyzed by descriptive means. These findings were presented in Table 2, page 31. Raw scores for each of the tests are reported in Appendix C.

All posttest means and ranges increased; however, the experimental scores exhibited greater changes. The most notable increases in the groups were the lowest scores. The low scores in the experimental group increased 16 points; the control group low scores showed an eleven-point increase. Males receiving movement education training exhibited the greatest increase.

The means of the Anton-Brenner pretest and posttest are contrasted in Figure 1, page 32.

Table 2

Means, Ranges and Standard Deviations for the AGBT Perceptual Motor Task (Posttest)

Variable	Mean	Range	σ	σ^2
Experimental	63.4	48-75	9.55	91.31
Control	57.5	42-68	6.85	47.00
Experimental-Males	63.2	52-75	7.92	62.84
Experimental-Females	63.7	48-74	11.39	129.78
Control-Males	57.4	47-64	5.71	32.71
Control-Females	57.6	42-68	8.15	66.49

The means of the experimental group increased sixteen points while that of the control group showed an eleven point increase.

The pretest and posttest means for the Anton-Brenner are compared to sex in Figure 2, page 33.

Males receiving movement education exhibited an increase of 14.7 points in mean score which was the greatest change in all groups. The experimental females increased 13 points in mean score. Control group males increased 6.6 points in mean scores while control group females increased only 2.8 points in mean scores.

To test the effects of movement education and traditional motor training an analysis of covariance was performed on the posttest data (see Table 3, page 34).

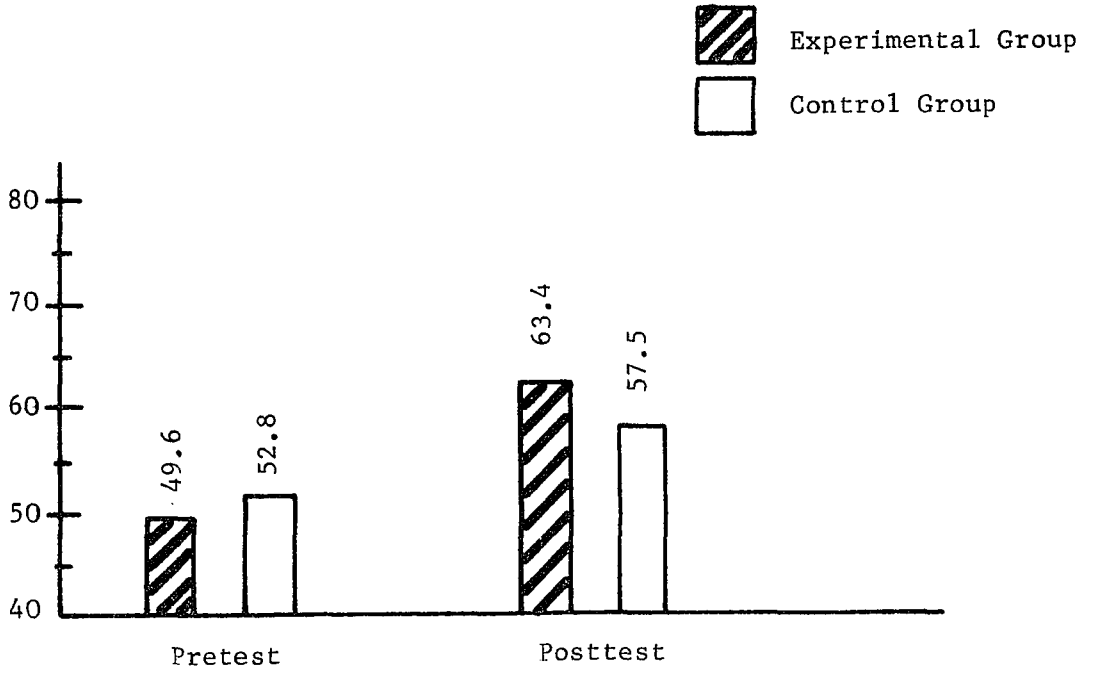

Figure 1. Comparison of mean scores of perceptual motor abilities by treatment groups (ABGT).

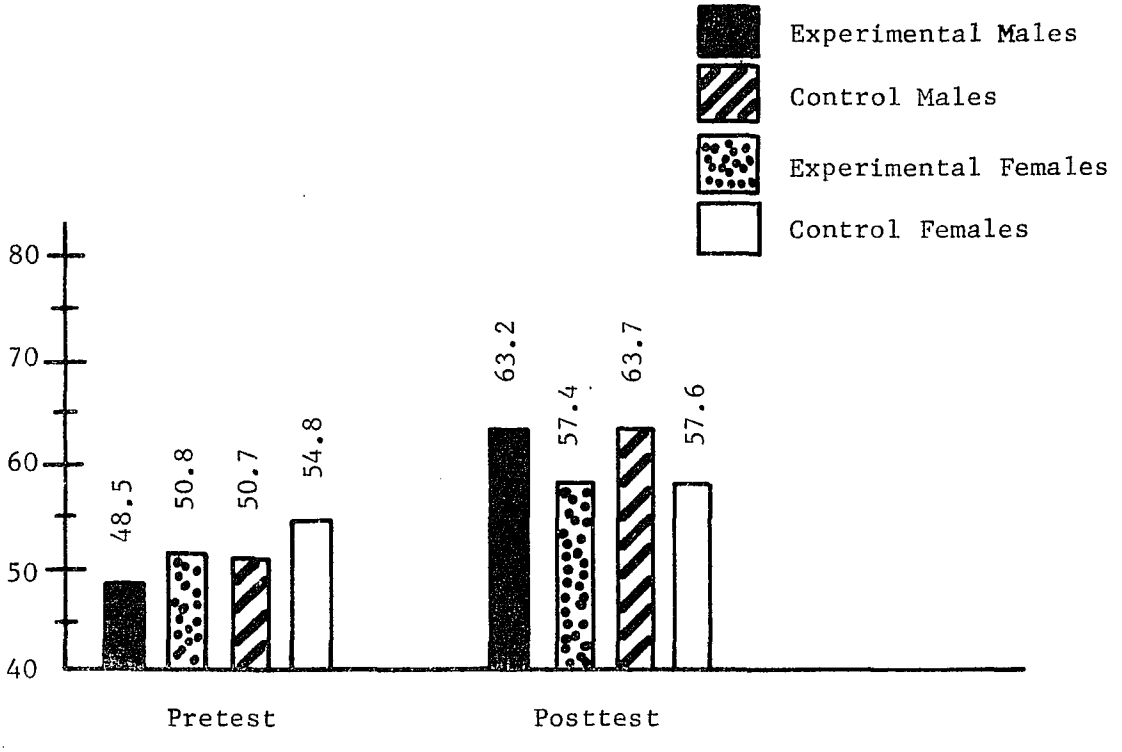

Figure 2. Comparison of mean scores of perceptual motor abilities by sex variable (ABGT).

Table 3

Analysis of Covariance of Change in Perceptual Motor Skills Due to Motor Training Program (ABGT)

Source	df	Sum of Squares	Mean Square	F 0.05
A. Treatment	1	585.60	585.60	24.47*
B. Sex	1	18.30	18.30	0.74*
AB. Treatment and Sex	2	4.20	4.20	0.17
Error	35	2981.97	23.95	

* $p > 0.05$

The results indicated a significant increase at the 0.05 level in the experimental group scores when compared with scores of the control group. The comparison of male and female posttest scores indicated a significant increase for males at the 0.05 level of confidence. According to the change factor, movement education was the more meaningful type of motor training. A significant difference was found for male subjects in the experimental group. A trend toward significance was found for female subjects in the experimental group.

Peabody Picture Vocabulary Test

The test instrument used to determine the impact upon cognition was the PPVT. Pretest and posttest data were analyzed by descriptive means. The respective means, ranges and standard deviations are reported in Tables 4 and 5, page 35.

Table 4

Means, Ranges and Standard Deviations for

PPVT Cognition (Pretest)

Variable	Mean	Range	O^{-}	O^{-2}
Experimental	52.9	47-63	5.93	35.20
Control	53.7	47-75	6.89	47.56
Experimental-Males	52.7	47-63	6.58	43.34
Experimental-Females	53.2	47-61	5.55	30.84
Control-Males	52.3	47-63	4.83	23.34
Control-Females	55.2	47-75	8.50	72.40

Table 5

Means, Ranges and Standard Deviations for

PPVT Cognition (Posttest)

Variable	Mean	Range	O^{-}	O^{-2}
Experimental	64.8	55-72	5.50	30.25
Control	58.4	49-75	6.86	47.10
Experimental-Males	63.7	55-72	5.57	31.12
Experimental-Females	65.5	55-70	5.56	30.94
Control-Males	59.4	51-71	7.09	50.26
Control-Females	57.5	51-75	6.86	47.16

The range of the pretest scores was similar with the exception of one female (see Appendix C) in the control group whose score was extremely high. The mean scores were similar for all groups (see Table 4, page 35). Note that low scores were identical for all groups but the range indicated the highest score among the control group. An individual female scored 75 points on the pretest.

The posttest means and ranges exhibited an increase for each of the two groups. The experimental group scores showed the greatest increase. There were two decreases in individual scores among the control females and two individual scores remained unchanged. One score decreased among the experimental males and one score remained unchanged within the control male group. (See Appendix C.)

The means of the PPVT pretest and posttest are compared in Figure 3, page 37, according to treatment group.

The experimental group increased 11.9 mean points. The control group increased 4.7 mean points in verbal ability on the PPVT.

The PPVT pretest and posttest means are contrasted according to sex in Figure 4, page 38.

The pretest mean scores of verbal ability as indicated by the PPVT were similar. The posttest mean scores showed a marked increase for experimental males and females. (See Appendix C.)

The pretest and posttest means for the Anton-Brenner and PPVT are presented in Figure 5, page 39. The scores for both treatment groups increased; however, the increase in scores of the experimental group were more notable.

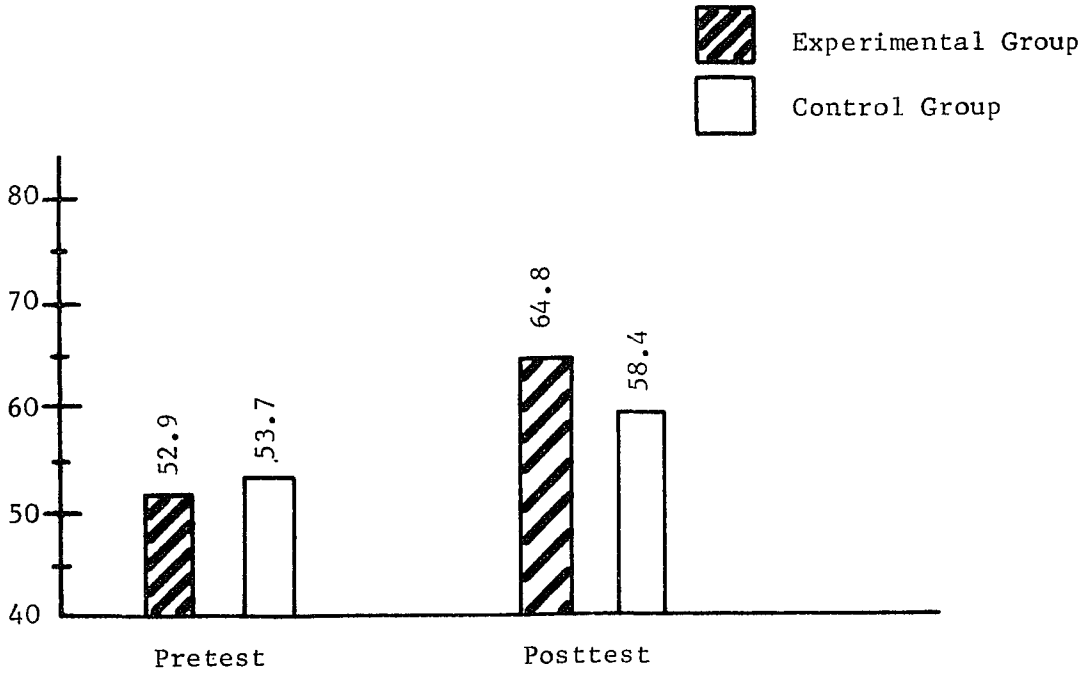

Figure 3. Comparison of mean scores of verbal intelligence according to treatment group (PPVT).

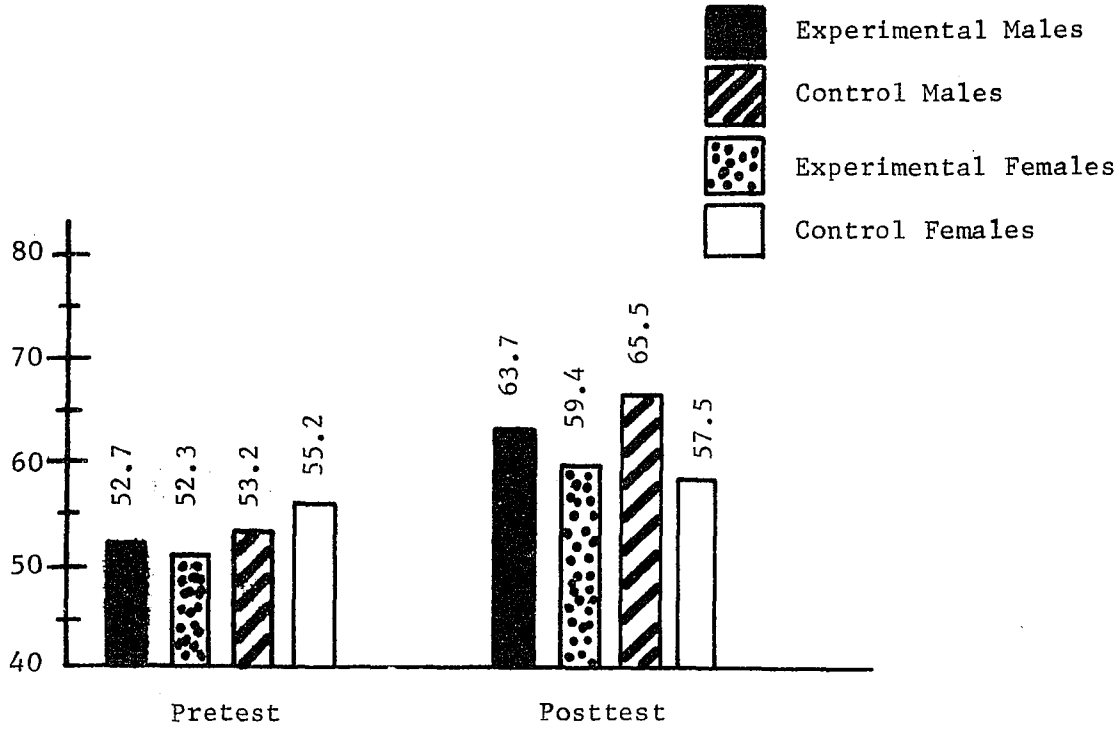

Figure 4. Comparison of mean scores of verbal intelligence according to sex variable (PPVT).

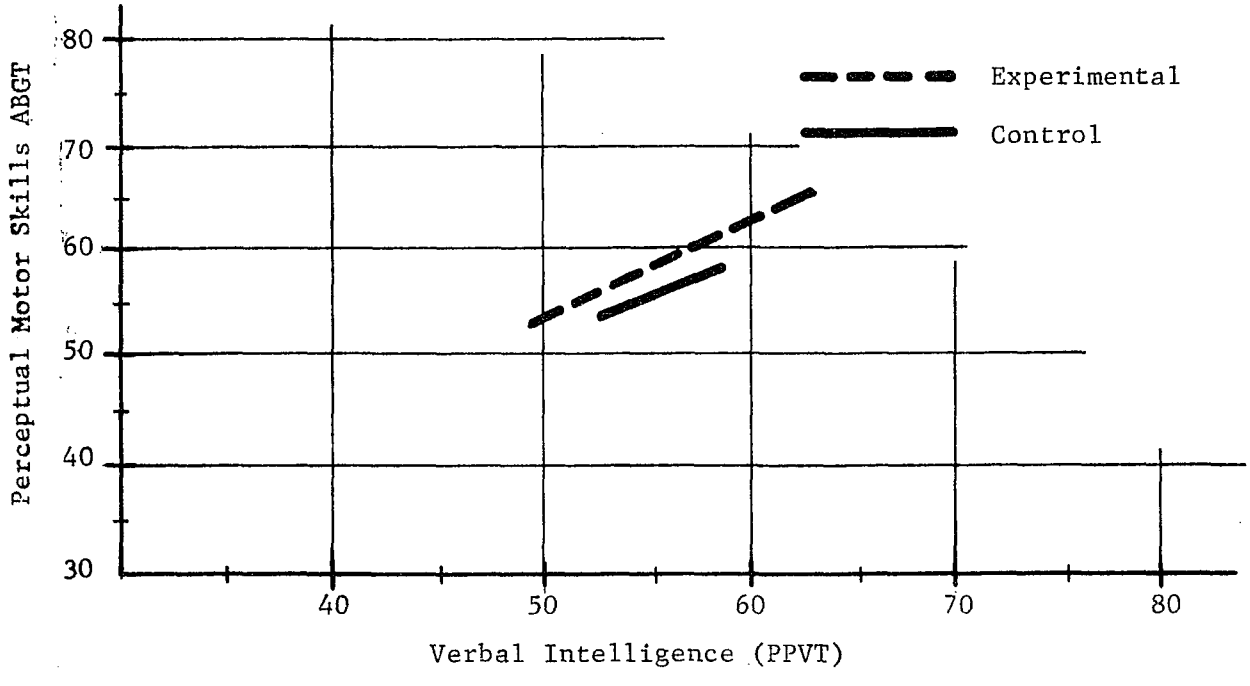

Figure 5. Comparison of mean scores perceptual motor abilities (ABGT) and verbal intelligence (PPVT).

The raw scores from both the ABGT and PPVT showed an increase in both experimental and control groups. The experimental group which was exposed to movement education showed the greater increase in scores.

An analysis of covariance was performed on the posttest data to determine the impact of motor training on cognition (see Table 6).

Table 6

Analysis of Change in Cognition (PPVT)

Due to Motor Training Program

Source	df	Sum of Squares	Mean Squares	F 0.05
A. Treatment	1	445.75	445.75	22.48
B. Sex	1	14.09	14.09	0.71*
AB. Treatment and Sex	2	71.44	71.49	3.60
Error	35	694.02	29.82	

* $p > 0.05$

The results yielded no significance at the 0.05 level for factor A (treatment). When compared by sex the change in scores was significant at the 0.05 level for the experimental males. The change factor indicated that the movement education program was meaningful for cognition among male subjects.

Gumpgookies

The Gumpgookies Test was the testing instrument to determine the effect of the motor training programs upon motivation. These data were also analyzed by descriptive means. The pretest means, ranges and standard deviations are presented in Table 7, page 41.

Table 7

Means, Ranges and Standard Deviations for

Motivation (Pretest) (Gumpgookies)

Variable	Mean	Range	O^{-}	O^{-2}
Experimental	55.6	43-64	5.97	35.72
Control	56.4	47-65	5.16	26.67
Experimental-Males	54.2	47-60	5.05	25.51
Experimental-Females	57.0	43-64	6.74	45.55
Control-Males	54.3	47-62	5.03	25.34
Control-Females	58.5	50-65	4.60	21.16

The Gumpgookies pretest mean scores for the experimental and control groups were similar; a difference of 0.8 point favoring the control group was noted. The lowest score was among the experimental females and the highest score among control females. The range of male scores was almost identical.

In Table 8, page 42, the posttest scores for the motivation variable are summarized.

One experimental female was absent from school the day posttests were administered. The posttest sample for this test reflects a mortality of one in the experimental group.

The change resulting between pretest and posttest increased for the total sample. The most striking increase in motivation scores was among the lower scores for both groups with the experimental group exhibiting the greater increase.

In Figure 6, page 43, the motivation pretest and posttest are compared.

Table 8

Means, Ranges and Standard Deviations for Motivation (Posttest) (Gumpgookie Test)

Variable	Mean	Range	O^{-}	O^{-2}
Experimental	70.8	64-74	2.94	8.69
Control	64.1	56-69	3.78	14.30
Experimental-Males	70.5	64-74	3.53	12.50
Experimental-Females	71.2	67-73	2.27	5.19
Control-Males	64.2	56-68	4.46	19.94
Control-Females	64.0	59-69	3.19	10.22

A comparison of pretest and posttest mean scores of the Gumpgookie Test of Motivation indicated an increase for both treatment groups. The greater increase was among the movement education group. The experimental group scores increased 15.2 mean points; the control group scores increased 7.7 mean points.

The pretest and posttest means are contrasted according to sex in Figure 7, page 44.

A plateau of pretest mean scores of motivation was noted for both males and females. There was an increase in mean scores for both sexes from both treatment groups; the marked change of mean scores was in the experimental group.

The pretest and posttest means for perceptual motor match and motivation are presented in Figure 8, page 45. The most striking increase was exhibited by the experimental group.

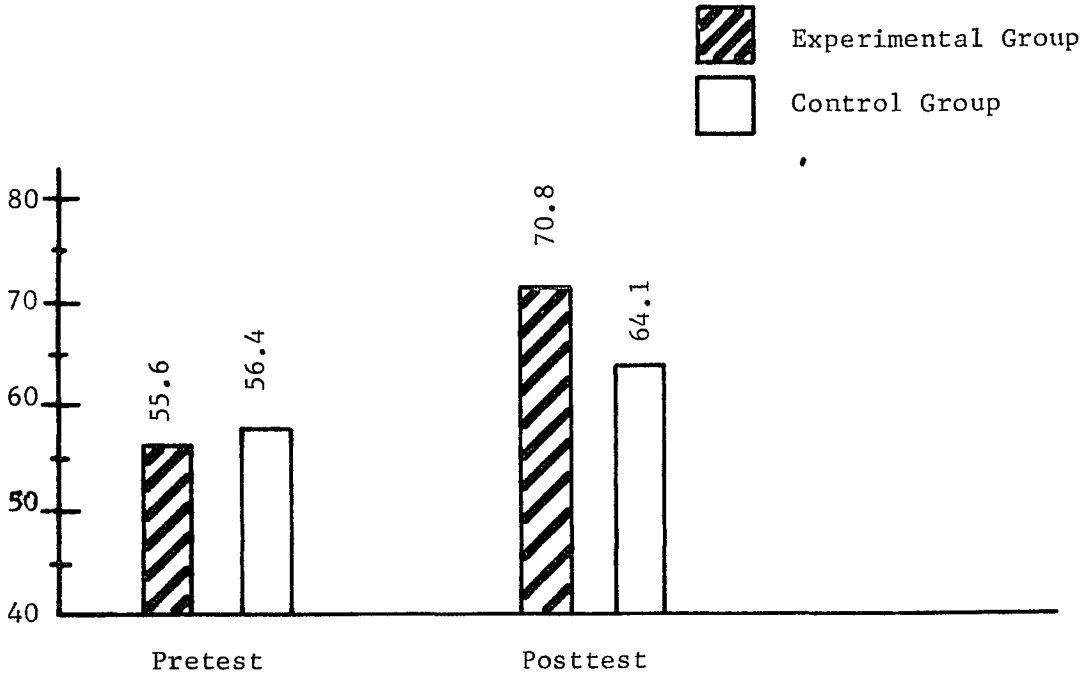

Figure 6. Comparison of mean scores of motivation by treatment group, Gumpgookie Test.

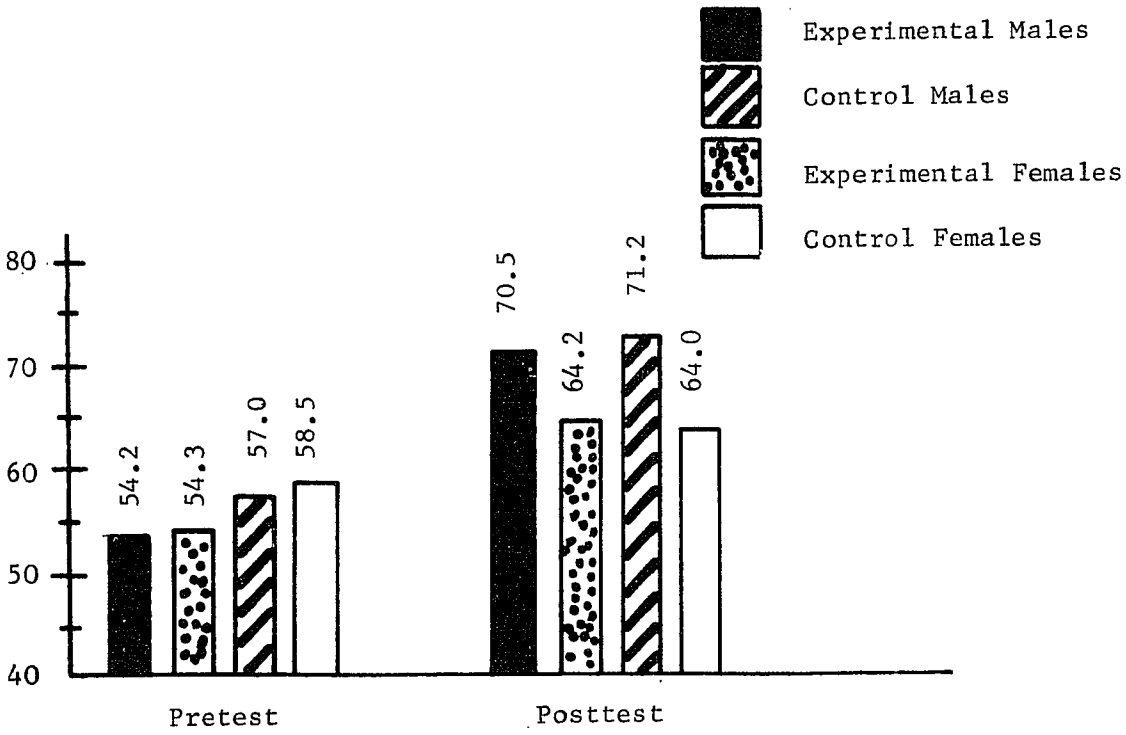

Figure 7. Comparison of mean scores of motivation according to sex variable (Gumpgookie Test).

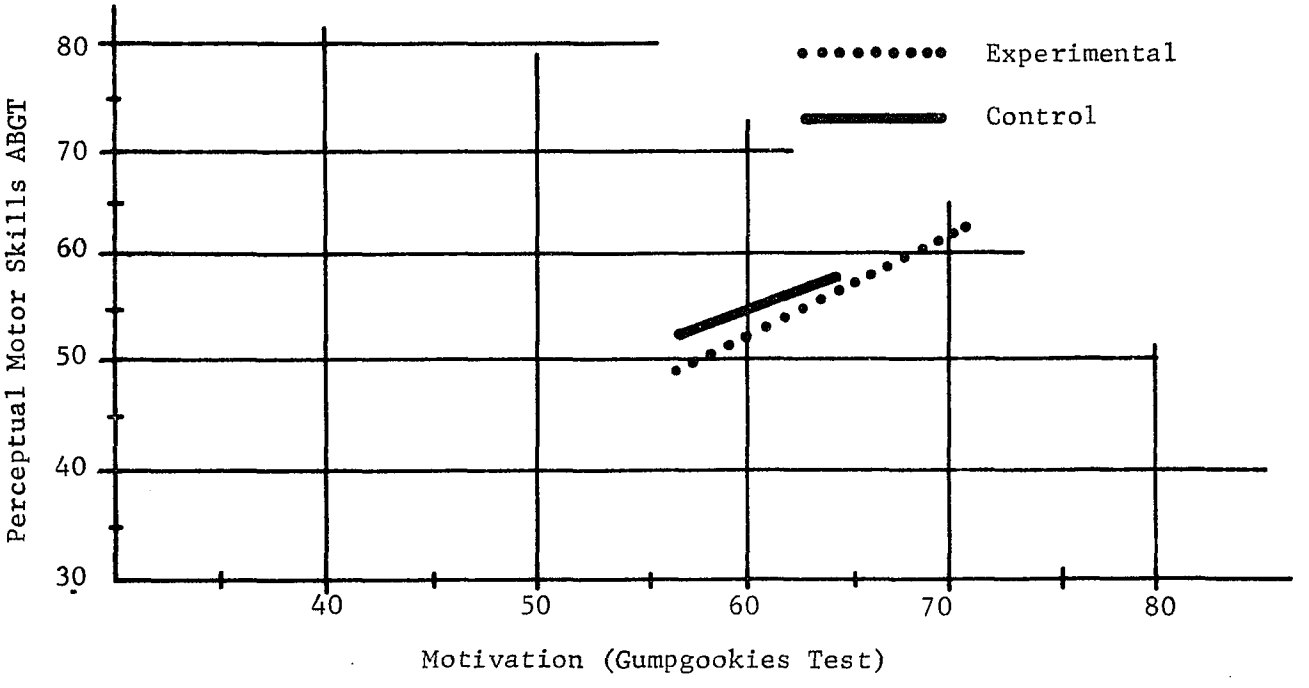

Figure 8. Comparison of mean scores of perceptual motor abilities (ABGT) and motivation (Gumpgookie Test).

The control group showed increases in mean scores on both measures of perceptual motor and motivation. In the experimental group mean scores on both measures increased markedly.

An analysis of covariance was performed to determine the impact of the motor training programs (see Table 9).

Table 9

Analysis of Covariance in Motivation

Due to Motor Training Program

Source	df	Sum of Squares	Mean Squares	F 0.05
A. Treatment	1	488.06	488.06	62.01
B. Sex	1	9.42	9.42	1.19*
AB. Treatment and Sex	2	6.14	6.14	0.78
Error	34	267.57	6.87	

* $p > 0.05$

The results for the treatment factor did not reach the 0.05 level of confidence and were not considered significant for this study. When contrasted according to sex the results yielded significance at the 0.05 level for male subjects. There was a trend toward significance for female subjects.

Discussion

The study compared the results of two motor training programs upon a selected perceptual motor task. The primary hypothesis (stated in the null) was that there would be no significant difference in the effect of a movement education program contrasted with a traditional motor training

program. An analysis of covariance performed on the data indicated significant differences. The change factor due to type of motor training was significant at the 0.05 level of confidence with an F ratio of 24.47 for the group participating in the movement education program. The analysis of covariance also yielded a significant difference at the 0.05 level among male subjects when compared according to the sex variable. All posttest scores increased; however, the most notable increases were among the low scorers for both groups. The experimental males exhibited the greatest gains; their lowest score increased 20 points and their highest increased 12 points (see Appendix C). It was necessary, therefore, to reject both hypothesis #1 and sub-hypothesis #1.

The investigation also attempted to determine which motor training program had a greater effect upon cognition and motivation. The raw pretest and posttest scores of the PPVT were compared. The analysis of covariance performed on the posttest data yielded no significant difference at the 0.05 level of confidence for the two training groups. An analysis of covariance performed for the sex variable yielded significance at the 0.05 level for the males in the experimental group. The findings supported hypothesis #2 which stated there would be no significant difference between the two groups on the test for cognition. The results did not support sub-hypothesis #2 since there was a significant difference between male and female changes in scores on the PPVT. The descriptive analysis of the data indicated a greater increase among the low scorers for the experimental males and females and control males. The posttest score for one female in the control group did not change. It must be noted that her pretest score was extremely high. The test may have lost some novelty for her or she may have been disenchanted

with the investigator who kept the pictures she drew for the Anton-Brenner Gestalt Test. She told her mother the experimenter was not playing games with her but was giving a test. Directions for administering the Anton-Brenner and PPVT suggested asking the subject to play a game with the administrator.

Results of the test for motivation were similar to the results for cognition. Pretest and posttest raw data from the Gumpgookies Test were compared. An analysis of covariance indicated no significant difference at the 0.05 level of confidence in the change factor due to the two treatment groups. The data were also compared according to sex. The analysis of covariance yielded a difference at the 0.05 level of confidence with an F factor of 1.19 among experimental males. The findings supported hypothesis #3 but did not support sub-hypothesis #3. Hypothesis #3 stated there would be no significant difference in motivation between the two treatment groups. It was accepted. The sub-hypothesis was rejected since the changes in male scores were significantly different from the change in scores of females.

The descriptive analysis of the data followed the trend of the Anton-Brenner and PPVT. The greatest increases were exhibited by the low scorers in the experimental group. Male posttest scores from the Gumpgookie Test increased more than female posttest scores. Experimental males score changes were greater. More time was required for administration of the Gumpgookie than the Anton-Brenner and PPVT. The females seemed to enjoy the test more than males. Subjects were permitted to rest if they indicated fatigue. More males than females requested a rest. Thus the continued trend of greater change among male scores was surprising.

Evidence of pressure to achieve was noted in one classroom during the eighth week of the training program. A highly motivated teacher in one of the control classrooms was unexpectedly observed instructing a rhythm activity which was normally included in the second grade curriculum.

In examining the mean scores for the tests of perceptual motor ability, verbal intelligence and motivation, the pretest scores were almost identical for both male and female subjects. This finding is in contrast to long established research evidence in child development which has shown that girls are developmentally 18 months in advance of their male counterparts. The anticipated higher scores for females were not found in the posttest mean scores. The analyses of covariance did not yield significance for the change in scores of the females except on the perceptual motor scale. These findings may be corroborative of the longitudinal studies of Bayley (1970) which indicated that boys were more responsive to environmental input than were girls. The initial pretest plateau of mean scores may be indicative of a culture of control and conformity. The findings of the present study indicated the importance of motor training for young children, especially young males.

Chapter 4

Summary and Conclusions

Summary

The impact of two motor training programs upon a perceptual motor task, cognition and motivation of kindergarten children were compared in the study. The results supported the perceptual theories of Kephart and Frostig. The movement education program was more effective in the attempts to improve perceptual skills and had a more profound effect upon male subjects than upon female subjects.

The impact of motor training upon cognition was less effective for females. The increase in male scores was surprising. The studies of Gesell, Wellman and Coleman suggested males tended to be slower in fine muscle development and activities which required perceptual acuity. Response to the Anton-Brenner and PPVT required perceptual skills which were academic in nature. Administration time of these tests was of short duration and male subjects did not tire during testing sessions. The increase of raw scores on both tests supported the suggestions of Cratty and Frostig that movement training requires respondents to think about the movement process. The changes in male scores were not consistent with Gordon's studies of academic abilities of younger children. The present study and the Gordon study raised questions concerning teaching strategies for young males.

The positive effect of movement education for males was also exhibited in the test for motivation. Changes in female scores did not yield significance; however, the descriptive analysis indicated improvement. Observation of male behavior during administration of the Gumpgookie gave

empirical evidence of the need for a change in long periods of sedentary activities. This aspect of the study is consistent with Gordon's hypothesis that males need an active learning environment.

Conclusion

The results of the present study indicated the importance of movement for young children and were supportive of the learning theories of Piaget, Langer and Werner. The increases in scores among low scorers in both treatment groups gave credence to Singer's hypothesis that skilled movement is learned. The findings of the study are supplementary to Kephart's findings concerning low achievers and underscored the need for early training.

The ineffectiveness of motor training among females and the high scorers was unanticipated. The impact of movement education upon male subjects was also unexpected.

Two of the three test instruments were easily administered. The time required for the Gumpgookie seemed excessive for young males. Subjects rested if they requested a rest. Males stopped working and returned to the test. Females completed the test without interruption.

The subjects for the present study were from a rural Southern Appalachian background with a traditional and conformist orientation. Would the results of an identical study be similar if the subjects' background were diversified (oriental, caucasian and negroid) or urbane?

Further research in the area of movement education is needed. The present study was approached from the viewpoint of early childhood education. A multi-disciplinary approach is recommended, which would also include the expertise of physical educators. The differences in impact of movement education on males and females indicated the need for

further longitudinal investigation. Were the results for females an implication of maturity in comparison to males? Do males require more action in their efforts to learn? These findings could be challenging to program planners and teachers in educational programs for young children.

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Appendixes

Appendix A

Motor Activities for Traditional Motor Training Programs

Motor Activities for Traditional Motor Training Programs

Mother Cat and Kittens

Play by groups. One in group is Mother Cat who leaves room. Others in group hide anywhere in the room. Mother Cat comes in and must find her kittens. Each group has a turn.

Colors

The players decide upon a color and each child takes a turn naming objects of that color in the room. The teacher may give the players from ten to twenty seconds in which to name an object. The same object may not be named twice, and any player who fails to find something within the specified time loses his turn. Forms such as spheres or cylinders may be substituted for colors.

Hot and Cold (Hide the Eraser)

The children hide an eraser after sending one of their number from the room. When the child returns and begins to hunt for the hidden eraser, the others clap, loudly when he is near the hiding place and softly when he is far from it, until he finds it.

A group is sent out instead of one, and a single child is chosen to tell who is hot (near the eraser) or cold (far from it). For instance, he says, "Mary is hot, George is cold." Whenever a child discovers the eraser, he pretends to continue hunting for a few moments to deceive the others, then returns to his place. The others continue to hunt until all have found it. The one who found it first can hide it for the next group to go out.

Red Light (or Slip up the Aisle)

Leader stands in front of room. A child stands at far end of each

aisle. Leader hides face on chalkboard and counts to 5. While he counts, those at end of aisles advance as far as possible. He turns quickly and if he sees a child moving, he orders that child back to starting point. The child who advances and touches blackboard first wins and is new leader.

Mother, May I?

"Mother" site on chair. Children line up equidistant from mother. First child calls, "Mother, may I come?" Mother answers, "Yes, take 2 small steps," or "3 scissor steps" or any kind of forward locomotion. Child does what he is told. Next child asks, "Mother, may I come?" progressing as he is told (hop on one foot, on both feet, on tiptoe, etc.). This continues until one child reaches Mother.

Hand to Hand Race

The players are divided into two equal groups. The teams form in two lines facing each other, and the players stand about a foot apart. Two objects exactly alike are started on a signal at the head of the lines and are passed from hand to hand to the opposite end and back again to the head. The line that finishes first wins.

Squirrel in Tree

Number off by 3's. Numbers one and two make trees--number threes are squirrels in the tree. Leave one squirrel extra. Teacher says, "Squirrels come out to play!" All squirrels dance or hop around. When teacher claps her hands, they run back into a tree. One is left. After a few turns, let number ones by squirrels, then number twos.

Imitate Pets

Have children describe their own pets, indicating age, where they got them, how they are fed, how and where they sleep, and then demonstrate

the actions of the pets.

Follow the Leader

The class follows the movements made by the teacher or by a selected leader. This is a good opportunity to stress the fundamental movements of running, jumping, hopping, skipping, etc.

Dodge Ball

Players: Two teams of from 10 to 15 on a side.

Equipment: Volleyball, or rubber playground ball.

One team forms a circle while the opposing players scatter inside. Players forming the circle throw the ball and attempt to hit the players inside the circle. Players inside the circle may dodge any way they choose but they cannot leave the circle. A player who is hit by the ball is eliminated from the game.

Brownies and Fairies

The players are in two groups; one group is called the Brownies and the other is called the Fairies. Goal lines are marked across both ends of the play area. One team is on its goal line with the players' backs turned toward the other group which, upon a silent signal from the teacher, advances quietly toward the goal line. When the Brownies are advancing, the Fairies are standing on their goal line; the Brownies sneak up very quietly and when they are within approximately ten or fifteen feet of the Fairies, or within a reasonable distance for a good chase, the teacher calls, "The Brownies are coming." This is the signal for the Fairies to turn and chase the Brownies, who run for safety behind their own goal line at the opposite end of the play area. Any Brownie who is tagged by a Fairy before he reaches his goal line becomes a Fairy and goes with the child who tagged him to the other goal line. The game is repeated

with the Fairies sneaking up on the Brownies while they stand on their goal line with their backs turned.

Rag Doll

Have children sit on the floor around the teacher. Teacher holds rag doll with both hands and shows the children how limp it is. She shakes it gently and calls their attention to the way its head, legs, and arms hang loosely. Children shake their hands and arms and let them hang limp. Do the same with their heads and bodies. Play record and have children move around the room as if they were like rag dolls. Have children lie down. Go around to each one and lift their arms and legs and let them drop gently, saying: "Feel like a rag doll. Make your arms and legs heavy and floppy."

Creative Movement

Ask children to hold hands with partners and skip. If children can't skip, let those who know how hold hands with those who don't. Skipping-like movements are all right. Practice doing the activity in pairs. Let pairs of children hold hands and skip around the room, trying not to bump. Give a scarf to each pair of children to share. Play music and say: "It feels different to move with someone else. Show me how you move with your partner using the scarf." Keep each pair together and comment on movements which indicate a child is aware of the other child's presence: "I like the way you both move so close to each other without touching. That's nice the way your back and arms touch while you move and turn to the music."

Body Awareness

"Do you know what your body is? It's you from head to toe. It's all of you." Tell the children that you and they are going to play a

game. They will touch the part of their body that you name. Work from top to bottom--head, eyes, nose, ears, mouth, chin, neck, shoulders, chest, back, arms, etc. Repeat. Then call parts of body in random order. Ask if anyone would like to be the leader. As the children learn the names for their body parts, they can name the part as they touch it.

Skipping

Ask children to show if they know how to skip. If some can and some cannot, they can all join hands and skip toward you. Those who are learning to skip will receive movement and rhythm cues from those children who can already skip. Children also can do slow step-hop pattern together. If the children have accomplished the skipping pattern, they can go on to explore the various movement possibilities similar to the sections on jumping, hopping, walking and running.

Balance

"Show me how you can walk across the board. Can you walk across touching your heel to your toes? Try walking backwards. Can you walk sideways on the board? Can you go the other way? Show me how you can walk to the middle, turn around, and walk back towards me." Ask what other ways they can get across the board. (Possibilities include jumping and hopping sideways and backwards, or using different body positions such as squatting, stooping.)

Appendix B

Activities for the Movement Education Program

Activities for the Movement Education Program

Activity No. 1

Ask the children to run anywhere in the room without bumping into anyone and to stop quickly and stand very still when you say "stop." Continue for three to four minutes. The purpose of this activity is to establish class control as the children must listen for your voice. Explain that sometimes you will say "stop" loudly while at other times you may speak very softly. Keep the interval between "stop" and "go" short according to how sensibly they run.

Activity No. 2

Ask the children to find a place of their own, and make sure it is big enough for them to lie down without touching anyone. You must look to see that they are well spaced and, if necessary, ask children to move into larger spaces. Next, ask the class to make themselves very long and very thin. Some will stretch their arms above their heads, while others will not. Choose a child who is performing it with arms well extended and ask others to sit up and observe the child's demonstration.

Observe that most of the class will automatically lie on their backs to do this movement. Hence, ask them to try the same movement while on their stomachs. This will lead the class to the next stage which is "Roll on to your side and stay there. Next, roll on to your back, over to the other side, and back on to your tummy." Children enjoy doing this and you can get them to change from tummies to backs as well as introduce left and right side at the same time. Now, allow them to roll across the floor for a very short time. Stop any child before he collides with another. In this instance, it is helpful to stand by two who are about

to collide and ask the others to sit up and look. Ask them what would have happened if you had not said "stop." Can they think what these two should do? Make sure that they do not roll in one direction too long as they will become dizzy.

Activity No. 3

Tell the children to take a friend's hand and sit in a space anywhere in the room. Be quick to spot those who haven't a partner and join them in twos. Now, make four groups in the center allocating four or five pairs to each group according to class size. When in four groups explain that these will be their "section places" or homes for apparatus work and they must remember where their places are and who is in their sections. Give them time to look and see who is in the same group. Then see if they can play the game of "section places." Here they can run, skip or walk anywhere without colliding and when you say "section places" they run to their right places. In kindergarten and grade one this will require practice.

Activity No. 4

Emphasis will be running and stopping, hiding elbows, knees, and noses. Before they start to run tell them which part of them they must hide when you say "stop."

a. Hide your nose this time when I say "stop." Walk around and comment on those whose noses are really hidden.

b. This time I am going to make it more difficult. Noses were easy to hide, but as you run think how you can hide your knees when I say "stop." Again walk around making sure all can do it. If not, select a child who is really hiding knees.

c. This time it is going to be more difficult. I wonder who will

be able to think of a really good way of hiding their elbows when I say "stop."

d. Show me how clever you are; if you can hide all three--elbows, knees, and noses at the same time when I say "stop."

Activity No. 5

Pose the questions below as the children practice log and tucked sideways safety rolls.

1. Is the space large enough for you to lie down and practice the log roll? If not, go into a bigger space and start practicing right away.

2. Show me that you can still remember how to hide your nose, knees and elbows all together. Now can you play the same game as log rolls, that is, jump up and run into a big space before you bump, but this time keep curled up tight into a little ball?

Activity No. 6

Run and stop making different parts high, such as elbows, knees, noses. If you choose knees first, this will help to get them started. Questions that will help to extend their movement experiences are:

1. How can you make your elbows highest if you are lying down? (On tummies or backs and get them to experience both.)

2. How can you make your knees highest when you lie on your backs?

3. Can you do it with your nose too?

4. Now you choose one part of you, not nose, knees or elbows and make that highest and we will guess which part you have chosen.

Activity No. 7

Choose any way you can think of to travel across the floor without using your feet.

Pick out two or three different ideas and get each child to demonstrate,

then allow the whole class to try the ideas. When selecting ideas try to find one child who is wriggling along on his tummy and using his hands. Find one who is on his back or is sitting and wriggling with his feet off the floor. The third should be a child who lies on her side. The teacher should make comments about each movement she observes and wishes to be demonstrated.

Activity No. 8

Individuals lie on carpeted area or individual mats for backward diagonal roll. Set a movement task such as: put weight on feet, seat, shoulders, seat, then feet. This should produce a backward rock. Once they have discovered this, get them to start with a little backward rock, hugging their knees, then a bigger one, and finally a bigger one still.

"Now this time when you do your biggest rock backward can you put both knees by your right ear?" Then repeat doing left ear. Many children will put one knees by each ear. Get a child to demonstrate and point out that both knees are by one ear. Allow several practice turns.

Activity No. 9

Provide a bean bag and hoop for each child. Invent as many different ways as you can of picking up the bean bag with different parts of the body and throwing it into the hoop. Ask each child to invent three different ways and practice until he can do them well.

Activity No. 10

Running keeping on tiptoes, "What other parts of your feet can you use to walk on?" Make up a pattern using three movements such as forward on tiptoes, backward on heels, and sideways crossing one foot over the other and keeping on side. Try to choose a child's idea that shows different ways and have the whole class practice it.

Activity No. 11

Running and stopping. This time they should run with two parts of the body touching the floor (two feet). "Can you now run with four parts on the ground?" "Now try three." Keep turns short as this is tiring, and alternate running with the other two types.

Activity No. 12

Place one hoop for each child on the floor. Ask the children to run freely and then to stop at any hoop. The teacher should explain to the children just before they run which part of their bodies to put into the hoop when she says "stop." Choose easy parts first then progress to the more difficult.

Activity No. 13

Scatter individual mats or bean bags over the floor (one per child). Ask the children to run and stop, and balance on difference parts of their bodies. (Example: 2 feet, 1 foot, hand and one knee, 2 knees, seat, shoulders, tummy, nose and knees, elbows and/or on heels.) Since this is free choice, you will often see headstands and handstands appear from more able students.

Activity No. 14

Children scattered on the floor, each with one bean bag. They should run, stop and freeze without moving their feet. From this position they must reach out to the nearest bean bag; touch it with a part of their body that was selected by the teacher. To prevent children from trying to stop very close to a bean bag and therefore preventing another child from being able to use it, vary the parts, such as head, nose, and ears. The latter are hard to accomplish if they have stopped too close to the bean bag. We often call this type of game "nine lives" so that each

time they are too far from a bean bag and cannot reach and touch the right part of their body they lose a "life."

Activity No. 15

Each child should stand in his own space. Provide a skipping rope for each child to place in a straight line. Give the following directions: Walk along the rope. Jump from side to side along the rope. Do ten jumps before you get to the end. Jump quickly. Jump backward. Make a bridge over your rope. How many different ways can you travel as a bridge over your rope?

Activity No. 16

Play "Siamese Twins" by holding partner's hand and running freely about the room. Remind children about the use of space and to make zigzag patterns as they run over the floor. Next progress to backward, forward and sideways still holding each other.

Activity No. 17

Provide a large rubber band for each child. The band may be cut from discarded inner tubes. Ask each child to make a bridge shape on the floor. Find out how many arches the bridge has, that is, if both hands and feet are on the floor there will be four arches and each arch is large enough for a partner to climb through. Next, direct the children to use their bands and see if they can join together one foot and one hand.

Appendix C

Individual Raw Scores from Tests of Perceptual Motor Skills, Verbal Intelligence, and Motivation

Anton Brenner Gestalt Test

Males			Females		
Subject number	Pretest scores	Posttest scores	Subject number	Pretest scores	Posttest scores
Experimental Group					
1	37	55	11	32	48
2	32	52	12	67	74
3	61	71	13	37	48
4	61	71	14	36	65
5	39	67	15	61	72
6	43	54	16	38	48
7	55	61	17	65	74
8	35	61	18	59	64
9	63	65	19	61	74
10	59	75	20	51	70
Control Group					
21	39	53	31	63	57
22	61	61	32	65	65
23	53	59	33	31	45
24	63	64	34	60	62
25	37	50	35	62	68
26	63	63	36	41	50
27	47	56	37	65	54
28	63	60	38	38	42
29	31	47	39	60	60
30	51	61	40	60	66

Peabody Picture Vocabulary Test

Males			Females		
Subject number	Pretest scores	Posttest scores	Subject number	Pretest scores	Posttest scores
Experimental Group					
1	47	60	11	47	61
2	47	55	12	52	55
3	47	60	13	50	60
4	49	59	14	47	64
5	50	62	15	61	66
6	61	64	16	47	65
7	63	65	17	53	65
8	47	69	18	57	68
9	60	71	19	61	70
10	56	72	20	57	69
Control Group					
21	49	49	31	47	55
22	47	56	32	48	51
23	55	66	33	59	55
24	53	62	34	60	60
25	63	71	35	75	75
26	47	54	36	47	55
27	50	51	37	50	56
28	50	57	38	53	51
29	54	64	39	56	57
30	55	64	40	57	60

Gumpgookie Test

Males			Females		
Subject number	Pretest scores	Posttest scores	Subject number	Pretest scores	Posttest scores
Experimental Group					
1	55	74	11	43	67
2	60	71	12	61	72
3	60	73	13	50	69
4	55	73	14	58	73
5	57	74	15	60	absent
6	47	64	16	51	73
7	56	69	17	62	73
8	45	65	18	62	72
9	51	71	19	64	73
10	56	71	20	59	69
Control Group					
21	59	62	31	60	65
22	52	58	32	60	65
23	54	68	33	51	59
24	51	68	34	65	69
25	62	68	35	61	67
26	47	56	36	60	65
27	58	65	37	59	65
28	59	63	38	50	59
29	48	65	39	58	62
30	53	59	40	61	64