1969

The Study of an Attempt to Improve Motor Abilities of Kindergarten Children in the Pasco Public Schools

Elaine Keller Banks
Central Washington University

THE STUDY OF AN ATTEMPT TO IMPROVE MOTOR ABILITIES OF KINDERGARTEN CHILDREN IN THE PASCO PUBLIC SCHOOLS

A Thesis

Presented to

the Graduate Faculty

Central Washington State College

In Partial Fulfillment

of the Requirements for the Degree

Master of Education

---

by

Elaine Keller Banks

August, 1969

APPROVED FOR THE GRADUATE FACULTY

_____

William G. Gaskell, COMMITTEE CHAIRMAN

_____

John E. Davis

_____

Charles Romine

ACKNOWLEDGMENTS

A very grateful acknowledgment is extended to the chairman of my committee, Dr. William Gaskell, for his encouragement and patient guidance; to Dr. John Davis for his advice and helpful assistance in even the small details; to Dr. Charles Romine for his direction and, especially, for showing me the humorous side of the task.

The writer wishes to express her indebtedness to all those persons in the Pasco School District who so generously contributed their time and effort in making this study possible.

A special thank you to my husband, Dick, and two daughters for their understanding, patience, and inspiration throughout this project.

TABLE OF CONTENTS

CHAPTER PAGE

LIST OF TABLES

CHAPTER I

PROBLEM AND NEED FOR STUDY

In a recent message to school administrators and physical education teachers, President Johnson said:

> In my first experience as a school teacher, serving as principal of a small school at Cotulla, Texas, I learned by first-hand observation a fact now well established by thorough research: mental fitness begins with physical fitness (31:1).

The Kraus-Weber Report to the White House Conference on Physical Fitness informed the nation that 58.6 per cent of the children in the United States are unable to pass muscular-fitness tests and that 44.3 per cent of the nation's children are lacking in flexibility. It has been established that at six years of age twenty per cent of the children have mixed dominance. It has been stated that forty per cent of the children have visual skills below the level required for good school work. It is suggested that thirty-three per cent of all children are not successful in school (43:13).

Most children come to school able to walk and to move from one place to another in what appears to be an appropriate fashion. No general instructions on movement or locomotion has been given the child since learning to walk. Physical exercise has generally been left to the child except in those general areas where specific outcomes have been desired by the parent; such as teaching the child a skill; for example, throwing or batting a ball.

Physical development of the child should no more be left to chance than learning to read or write. Too many children have learned movement patterns as skills, and consequently, their responses are stereotyped, rigid, and may or may not be purposeful. Some children have not learned to generalize these patterns so as to be able to adapt easily to a wide variety of situations.

The school must accept the responsibility for helping children to generalize their physical movement patterns so as to be able to adapt easily to a wide variety of situations. The school must not emphasize high levels of proficiency, but rather higher levels of plasticity of functioning within the ordinary limits of an ever-changing world.

I. STATEMENT OF THE PROBLEM AND THE PURPOSE OF STUDY

There is a need to improve the child's basic motor ability through an exercise program developed around the growth and developmental patterns of children in the motor stage.

The purpose of this study was to compare two groups of kindergarten children--experimental and control--in motor ability. The experimental group did participate in a prescribed exercise program for four days a week for a duration of twenty weeks. The fifth day was left to the teacher's discretion but to follow the Washington State Manual for Physical Education.

The control group was left to their teacher's resources as far as any physical education program.

All the children were tested with the Pasco Survey of Motor Abilities at the beginning and termination of the twenty week program.

For the purpose of this study the null hypothesis was assumed: There would be no significant difference in motor abilities between the two groups after the twenty week training program.

II. IMPORTANCE OF THE STUDY

Early recognition of the causes of academic difficulty is the goal of every educator. People in education are finding that too many children are experiencing difficulty with the formal education process. These children seem to have the necessary intellect but do not attain their expected potential. Many of these children become low-geared learners in the classroom (27:16).

Radler and Kephart (40:29) have stated that motor activity of some kind underlies all behavior, including higher thought processes. In fact, any behavior in which you indulge can function no better than do the basic motor abilities upon which it is based.

Educators agree that the first school years are most important to a child if the child is to reach his potential.

An individual must reach a certain developmental level before formal learning takes place. This is called readiness for learning. A large difference in readiness in school beginners has long been recognized (19:2).

Readiness consists of an orderly buildup of generalizations which allows the child to deal increasingly effectively with his environment.

Many experts in child development emphasize the importance of early motor learnings as fundamental building blocks for later, more complex perceptual and cognitive development.

Therefore, the motor aspect of learning is perhaps the most crucial one in the course of a child's early development for insofar as it is missing or distorted, the child's future learnings will suffer. There are many thousands of children in our schools who are not achieving up to the level of their capacities because of readiness difficulties. Educators have tried many different techniques and methods to help children attain their potential but poor school achievers stay with us.

Today, early childhood education is receiving considerable attention. The helping of the culturally disadvantaged in Head Start programs is an example. Failures in learning are hoped to be overcome for this type of child. Certainly experiences in motor activity at this level seem vital and must not be ignored.

Today, as never before, has there been greater emphasis and need for developing the potential of each individual. Our nation is being challenged by other nations who seek to enslave the mind and hearts of men. We must meet this challenge by strengthening and utilizing the full capabilities of each individual. The individual is a better producing and contented citizen when he feels satisfied with his own achievements.

Educators must meet the challenge to educate each individual to the fullest.

III. DEFINITION OF TERMS

For the purpose of this study the following definitions were used:

Motor ability. A complex, coordinated sequence of patterns to accomplish a purpose.

Laterality. The internal awareness of the two sides of our body and their differences.

Bilateral. The use of both sides of the body simultaneously.

Unilateral. The use of one side of the body independently from the other side.

Cross-lateral. The initiation of movement in two segments of the body, in different planes, and on opposite sides of the midline.

Circuit training. A modified form of the organizational technique in which different physical tasks are performed at specific locations in the gymnasium for stated time intervals.

Learning circuit. A modified form of the organizational technique called curcuit training.

Low-geared learner. A child who seems to have the necessary intellect but experiences difficulty with the formal educational process and does not attain his expected potential.

Readiness for learning. The point where the buildup of generalization allows the individual to deal increasingly effectively with the environment.

Perceptual-motor. The input and output functions of the organism (27:63).

IV. DELIMITATIONS

The study was limited in number to forty-six kindergarten children from the Pasco School District, Pasco, Washington. The forty-six children included twenty-seven children in the experimental group, who participated in the exercise program, and nineteen children in the control group, who did not participate in the program.

No norms have been established for the survey used in testing the child's motor ability.

CHAPTER II

REVIEW OF THE LITERATURE

Much has been written in regard to physical education, teaching of specific skills, and general theories on learning. However, very limited literature was available as related directly to this study. A brief summary of material related, directly or indirectly, to aspects of this study will here be given.

Eleanor Metheny (29:27-28), of the University of Southern California, made the following statement concerning the contributions of physical education:

> With each new experience in movement, the individual finds more pathways leading to a better relationship of himself, to establish his unique relationship to other human beings, and he makes progress toward becoming a better integrated person--mentally, physically and emotionally healthy. . . . This is the psychosomatic potential which exists in every class of physical education.

Eric C. Pearson (35:17) states that teachers are well aware that such competencies as self-expression, self-control, self-confidence and self-respect are basic to a child's happy participation in society. Skills in these "self" areas can be a natural outcome of a sound physical education program and when used continuously can provide a carry-over value into adult life, just as physical skills can.

A study by Biddulph (2:6) indicated a greater degree of personal and social development for high achievers than

low achievers of motor performance involving strength, speed, and coordination. Biddulph concluded that other things being equal the individual who has developed a high degree of motor skill will be better equipped to meet the problems of personal and social adjustment than will the individual frustrated in the motor control of his body.

Getman (19:III) has stated that the growth and development patterns through which all children move from infancy through childhood set the stage, in large measure, for all childrens' readiness to profit from formal instruction. Children differ one from another as much in the area of physiological readiness to learn as they do in any other area. The development of perceptual skills is related to the levels of coordinations of the body systems, i.e., the better the coordinations of the body parts and body systems, the better the prospects are for developing perception of forms and symbols.

Piaget tells us that normal sensorimotor development is a prerequisite to orderly symbolic functioning. Piaget conceives intellectual development as a continual process of organization and reorganization of structure, each new organization integrating the previous one into itself (37:15-49).

Research done by Frostig (13:297) tends to confirm Piaget's theory that perception is the major developmental

task of the child between the ages of three and approximately seven and one-half years of age, the time when the child first enters school and begins to be faced with academic tasks. Frostig states that from a developmental point of view, the child entering kindergarten or first grade is expected to be age adequate in sensory-motor abilities, language, and perception, and to be able to exhibit a sufficient degree of social adjustment and emotional control to be able to learn in a group situation. However, Frostig says that her research has shown that a great many children have difficulties in their visual perceptual development with a consequent inability to adjust to both a behavioral and the academic demands of school in the early grades.

Getman (18:50), in discussing the importance of developing a child's motor abilities to the fullest, has aptly stated: "The ultimate in mental ability is the result of the ultimate in motor ability."

William Rapp (41) in his presentation at the ASCD Fourth National Curriculum Conference stated:

> It is generally agreed that children grow and develop neurologically in definite recognizable sequential pattern. Most of our instruments used to assess intellectual development at infancy and in young children are based on developmental inventories which sample the neuromotor areas of development and the early perceptive abilities of the child. Each state of neuromotor development serves as a base for further developments. As the child explores the relationship of his perceptions--auditory, visual, tactile, and kinesthetic--a coordinated development takes place in his neuromotor system. The

> awareness, skills, and information are carried over from one developmental level to another and are further developed and utilized in the next stage of development. When there is an ommission or an interruption in development, the next level of neuromotor organization will be affected. There is some evidence that many of the learning problems in children can be traced to this developmental ommission or interruption (27:15).

Newell C. Kephart (27:15) for many years directed a program of research at Purdue University that inquired into the relationship of sensorimotor constructions to intellectual performance. Kephart had expressed the premise that our modern civilization demands more of the child than ever before and its demands are increasing daily. However, the very civilization which is increasing its demands is decreasing the opportunity which it offers the child for the very necessary experimentation with basic skills.

Leonard A. Cohen (36:100) brought out an interesting point as he participated in the Perceptual-Motor Symposium, Washington, D.C., May 8-10, 1968. During an open discussion panel, he said that a person can perform a task very well, but the physiological stress that he has to exert in order to perform the task can be damaging and it will not show up in the particular task that is causing this. He can perform well because he is sacrificing something else for that.

Motor learnings follow a sequence. Practice enables individuals to keep checking his kinesthetic perceptions

against his visual ones to correct the errors his muscles make at first (30:198-199).

Initial movements in the infant are bilaterally symmetrical. What he does on one side he does on the other side also. These movements do not have within themselves any right-left consideration but total symmetrical patterns involving the organism as a whole and not differentiating the two sides. The child has to learn the differentiation (27:23).

Kephart (27:22) observes that the child must learn how to innervate the muscles of one arm without innervating in a similar fashion the muscles of the other arm. He must differentiate the activities of one side of the body from the activities of the other.

Getman (19:4) expresses the relationship between bilaterality to writing skills when he stated that "the freedom and skills of the pencil hand are dependent upon the other hand which holds the paper and supports the body in a posture conducive to good writing."

In relation to handwriting, Arena (1:6) has said that handwriting skill has not been seen as a part of the whole child. He states that we need to "train the child's sensory and motor functions to respond in a more controlled and efficient manner."

Using the record of approximately 1500 children from the first three grades of the public schools of Winter Haven, Florida, a significant relationship between the perceptual ability and school achievement was found (45:2).

> When better coordination of the body parts is achieved and is led by visual steering, the child is ready to squeeze maximum meaning out of his learning environment by using these specialized movements. The activities . . . improve both attention span and span of recognition of symbols, thereby developing the very skills required to read fluently (19:5).

The establishment of laterality in children is important before they can benefit from reading, states Kephart:

> Consider the problem of laterality. If laterality is not established in the child and if directionality resulting from laterality has not been developed, then certain relationships in space will be meaningless. Consider the situation of this child if we attempt to teach him to read. In the first place, many of the letters which are shown him will have no basis for differentiation. Without laterality, there is no difference between a b and a d. It is not that the child is confused; it is not that he has not learned the difference; it is not that he reverses the letter. The fact is that for this child, no difference exists at all between these two letters. . . . It is fruitless to attempt to teach this child the complex activities involved in reading as long as he continues to lack this basic skill (27:32).

Painter (34:115) found that after children had participated in a seven week training program of motor development, the experimental group mean gain in motor encoding on the Illinois Test for Psycholinguistic Abilities was 27.2 months. The control group mean gain was 3.4 months.

In a study by Chansky (7:33-41) of third and fourth grade underachievers who were given ten weeks of perceptual training, it was found that the good readers improved in word accuracy and reading comprehension. He concluded that perceptual training may be a promising technique to rehabilitate elementary school underachievers.

Using multiple and partial regression correlation tests of visual perception when used in combination with reading understanding and general intelligence was found to have high predictability and diagnostic powers at the junior high level (15:280-282).

To develop an effective program children must ". . . explore and develop their body parts and the coordinations of head, arms, torso, and legs to gain greater freedom of skill of movement" (19:3).

The motor bases for perceptual development are stated to be posture, directionality and laterality, and awareness of position of body in space (11:50).

The gross movements of the body produced by the larger muscles develop in advance of the more precise movements produced by the smaller muscles (4:115-116).

This developmental sequence is far from complete when the child enters first grade. Therefore, the first grade program must take this into consideration and provide

activities that will assure the maximum development of the motor system for each child (47:87).

> Time was when organized physical education required less attention than it does today. . . . Muscle building chores were the rule. Carrying wood and water, chasing the sheep and the cows. . . . Today, people do less strenuous physical work. Urbanization, technological advance, changed social conditions, and improvement in transportation and communication often leave boys and girls robbed of activities that once were their blessing. . . . There are many thoughtful persons who sincerely believe that there is a relationship between the lack of consistent "big muscle activity" and the apparent increase in certain degenerative diseases, bad posture, digestive disturbance, . . . mental breakdown (22:407).

There is ample evidence to suggest that elementary schools should plan and organize physical education programs to meet the needs of children (22:407).

The studies mentioned above indicate the need to orient the child to his own whole body. The child should not have to be concerned with how to do an activity in the classroom but have the freedom to attend to the purpose or goals of the activity.

For this reason the author has conducted the present study to explore the possibility of improving the child's basic motor abilities.

In conclusion, a quote from Jerome Bruner (5:171), ". . . what is needed is the daring and freshness of hypotheses that do not take for granted as true what has merely become habitual."

CHAPTER III

DESIGN OF THE STUDY

The study was conducted during the school year 1968-1969 at Pasco, Washington. The purpose of the study was to compare the motor abilities of two groups of kindergarten children after one group had participated in a prescribed exercise program for twenty weeks.

For the purpose of the study the null hypothesis was used: There will be no significant difference in motor abilities between the two groups after the twenty week training program.

The pupils who participated were from two kindergarten classes of the Pasco School District #1. These two classes were chosen randomly from the fifteen kindergarten classes in the school district. One kindergarten class was designated the control group and the other kindergarten class was designated the experimental group. The experimental group was so chosen because of the teacher's interest and desire to participate in the exercise program.

At the beginning of the study, there were twenty-five children in the control group and twenty-eight in the experimental group. However, six in the control group and one in the experimental group were eliminated during the course of the school year because of transfers out of the

district, extended illnesses during the program, or lengthy absences during the final testing. The experimental group includes nineteen children in the control group and twenty-seven children in the experimental group.

All children in both classrooms were given a survey of motor abilities in November before the study began and at the close of the program in May.

Since no test or survey of motor abilities could be found which screened children in specific controlled movements, coordinations, body awareness, flexibility, and dominance, the author devised the Pasco Survey of Motor Abilities in conjunction with the Director of Physical Education for the Pasco School District, Phillip Brownlee, after much research, reading, observations, and experimentation. The survey appeared to give the specifics needed with a minimum amount of time spent in testing.

The resulting Pasco Survey of Motor Abilities was not a test but a survey which includes six tasks for the child to perform. The first task involved shoulder flexibility which was taken from the Washington Physical Fitness Test Manual for Secondary Schools (32:15). The second task was item four and five of the Kraus Weber Test of Physical Fitness (28:178-188) which measures general postural and gross motor coordination. Task number three was recognition of body parts. The fourth task involved laterality. The fifth

task was concerned with the extent of the child's eye control. The final task surveyed dominance of eye, hand, and foot. This is a brief outline of the Pasco Survey of Motor Abilities; but, the entire survey, explanation for administering, equipment needed, and scoring procedures is in the Appendix.

The children in the experimental group participated in a twenty week exercise program for four days each week. The exercise program followed the general pattern of bilateral, unilateral, cross-lateral and mixed activities.

The individual scores of the children on the Survey were compiled on the pre-test and the post-test. These scores were used in computing the obtained mean for both the experimental and control group in the pre-test and post-test. The t test was applied to determine if statistically significant differences existed. The .01 level of confidence was accepted.

The .01 level of confidence means that an investigator could expect to be wrong in his references one per cent of the time due to chance fluctuations in sampling.

CHAPTER IV

DEVELOPMENT OF THE EXERCISE PROGRAM

The activities of the exercise program were organized in a sequential manner based on the development of movement patterns in children from birth through their pre-school years.

In following the development of children's movement patterns, the initial movements of the infant are bilateral in function. Whatever the child does on one side he does on the other side, also. These movements are total symmetrical patterns involving the child as a whole and not differentiating the two sides.

From continous experimentation the child begins to sort out those movements which are pertinent to the right side and those which are pertinent to the left side. The child might experiment by comparing right and left-hand movements with each other and with symmetrical movements. These movements are unilateral in function in that one side of the body is involved in the activity at one time.

When the child gains strength and begins to creep, crawl, and eventually walk, another more refined type of movement presents itself. Here the child must be able to initiate movement in two segments of the body, in different planes, and opposite sides of the midline. In walking, for

example, the left arm and right leg work as a unit and the right arm and left leg work as a unit when the right leg is forward, the left arm is forward and when the left leg is forward, the right arm is forward. This type of activity is cross-lateral in function.

When the development of movement patterns reaches this stage, the child has merely been introduced to the types of movement he will live with the rest of his life. Continual practice is needed for refining the actions in these movement patterns.

The experimental program consisted of bilateral activities, unilateral activities, cross-lateral activities, and mixed pattern activities. The first three follow the progression of the previous discussion. The mixed pattern activities provided refined practice and recall of the three above mentioned activities. An example of bilateral activity would be "angels in the snow," a movement in which the child uses both sides of his body as a unit. An unilateral exercise is an exercise in which the child uses one side of the body at a time; such as arm and leg raise, right side only. An example of the cross-lateral exercise is one in which the child touches the right toe with the left hand.

The four activity classifications were presented in four or six week units. Each week constituted four days, the fifth day was left for other physical education

endeavors. The activities within the classifications were changed at two week intervals. For example:

1. Bilateral Activity Unit

   a. One set of prescribed exercises was used for eight days.

   b. Another set of prescribed exercises was used for the next eight days.

2. Unilateral Activity Unit

   a. One set of exercises stressing right side of the body was used for eight days.

   b. Another set of exercises stressing left side of the body was used for eight following days.

   c. Then another set of exercises was used which interchanged right and left sides for another eight days.

3. Cross-lateral Activity Unit

   a. One set of exercises which used right arm and left leg as a unit for eight days.

   b. One set of exercises which used left arm and right leg as a unit for the next eight days.

   c. For the following eight days, one set of exercises was used which interchanged right arm and left leg activities with the left arm and the right leg activities.

4. Mixed Activity

   In the following weeks there was an interchange of the above activities or types of activities each day for recall and more precise practice. Individual children's needs received the major emphasis.

The Learning Circuit was the organizational teaching method used. The Learning Circuit is a modified form of an organizational technique used by physical educators called circuit training. The Learning Circuit consisted of six stations which were located within the gymnasium. Each of the six stations had an appropriate distance between them and enough space for the children to perform the exercises at each station. Each station presented a particular type of exercise task for the child. The child moved from station to station around the gymnasium at three minute intervals. The end of any three minute interval was announced by the bell ringing of a timer clock.

The Learning Circuit was used because at least thirty other children participated in the exercise program with the experimental group. The Learning Circuit was an efficient and economical means of providing activity for this large number of children at one time. The Learning Circuit was efficient because the large group of children could be divided quickly into six smaller groups. Also, the Learning Circuit proved economical because no more equipment was needed for the entire group than was needed for one-sixth of the entire group.

The Learning Circuit used in this study was comprised of the following six stations: blackboard, eye control, stepping stones, balance beams, bounce boards, and stunts.

However, additional activities were occasionally included singly or doubly at the individual stations: i.e., rocking boards, twist boards, jug-jogs, jump ropes, hoops, bean bags, balls, wands, or templates.

For the exercise program the children entered the gymnasium with their shoes removed. Each child found a location on the floor and sat down. These locations were predetermined and marked with plastic tape. Each location allowed the child enough room for freedom of movement.

The children participated without their shoes. This eliminated some unnecessary noise but mainly the children were able to feel what they were doing. The children had a tactile experience through the feet.

The first activity was a set of exercises for large group participation which lasted approximately four minutes. This large group of children was then divided as equally as possible into the six smaller groups. Each group was directed to one of the six stations.

Each child spent three minutes at each station per day of the exercise program. Including the large group activities, a total of twenty-two minutes was spent in the activities. The total amount of time from leaving the classroom, participating in the exercise program, and returning to the classroom was a minimum of twenty-five minutes.

The basic equipment used in the exercise program was six balance beams, six bounce boards and sixty feet of blackboard area. The blackboard was painted masonite which was placed with its lower edge fourteen inches from the floor.

The children were encouraged to maintain a slow and easy pace throughout the exercise period. The children were encouraged to concentrate on the movements required by any specific exercise. The teacher or aide helped the individual child and gave encouragement. The program stressed self-improvement and not competition.

At least two aides helped with the conduct of the exercise program. However, it should be noted that the control group, also, had aides available for its physical education undertakings.

This is a brief account of the conduct and organization of the exercise program. The exercise program was organized in a sequential manner built around the growth and developmental patterns of children in the motor stage.

A copy of the sequential exercises and equipment specifications for this exercise program may be obtained by writing Pasco School District #1, 1004 North Mead, Pasco, Washington, 99301.

CHAPTER V

ANALYSIS OF THE DATA

The individual scores of the children in both the control and experimental groups on the Pasco Survey of Motor Abilities were recorded and compiled. Table I shows the mean scores and mean differences between the two kindergarten classes on the pre-test before the children participated in the exercise program.

TABLE I

MEAN DIFFERENCES IN MOTOR ABILITY OF TWO KINDERGARTEN CLASSES PRE-TEST

Group	N	Obtained Mean	σ_M	σ_{DM}	Obtained t	Required t
Control	19	141.95	32.45	9.18	.38	.01 = 2.69
Experimental	27	138.30	26.30			

On Table I, the standard error of the difference between the means for the control and the experimental group was 9.18. From this the obtained t of .38 was derived. The obtained t of .38 did not prove statistically significant when compared to the required t of 2.69 at the .01 level of confidence.

Shown in Table II are relative scores of the control group and the experimental group after the twenty week period. The experimental group had participated in the exercise program and the control group had not.

TABLE II

MEAN DIFFERENCES IN MOTOR ABILITY OF TWO KINDERGARTEN CLASSES POST-TEST

Group	N	Obtained Mean	σ_M	σ_{DM}	Obtained t	Required t
Control	19	151.30	43.40	12.00	5.00	.01 = 2.69
Experimental	27	211.30	34.70			

On the post-test, the standard error of the difference between the means was 12.00. The obtained t of 5.00 which was found to be significant at the .01 level of confidence.

The obtained mean score of the control group was 3.65 greater than the experimental group's mean score on the pre-test. However, on the post-test the experimental group's obtained mean score was 60.00 greater than the control group. Therefore, the obtained t of 5.00 on the post-test was found to be significant at the .01 level of confidence.

The motor abilities of the experimental group appeared to be significantly improved after the twenty week exercise program over the motor abilities of the control group.

CHAPTER VI

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

I. SUMMARY

The study was an attempt to determine if through an exercise program based on the normal growth and developmental patterns of children in the motor stage, the child's basic motor ability could be improved.

In brief:

1. The subjects used for this study were all kindergarten children of the Pasco School District #1, Pasco, Washington.

2. Forty-six kindergarten children concluded the experiment with twenty-seven of the children in the experimental group who engaged in the twenty week exercise program and nineteen children in the control group who did not participate in the exercise program.

3. The Pasco Survey of Motor Abilities was used to test all the children in motor abilities.

4. The test was administered by the author.

5. The test was administered to all the children in November, 1968, and again in May, 1969, at the beginning and termination of the exercise program.

6. The pre-test and post-test were treated statistically to determine the mean scores and mean differences between the two kindergarten classes.

7. The null hypothesis of no significant difference in motor abilities between the two groups after the twenty week exercise program was stated.

After the twenty week program there was a significant difference in the motor abilities of the two groups based on the Pasco Survey of Motor Abilities. The experimental group's motor ability appeared superior to the control group.

II. CONCLUSIONS

The null hypothesis of no significant difference in motor abilities between the two groups after the twenty week training program was rejected. The motor abilities of the experimental group appear to have improved as tested by the Pasco Survey of Motor Abilities.

The results of the study lead to the conclusion that if motor activity of some kind underlies all behavior, including higher thought processes, then educators must be more vigorous in the approach to the physical education programs of children at an early age.

III. RECOMMENDATIONS

The individual tasks of the Pasco Survey of Motor Abilities should be scrutinized closely for reliability and the possibility of norms being established for the Survey.

A similar study should be instituted for a three year period with much larger groups of children. The scholastic achievement of the children should be taken into

consideration. At the end of the three year period, the motor abilities and scholastic achievement of the experimental group could be compared to the control group. Then it should, also, be noted what part maturation plays in the development of motor skills.

Much more study and research needs to be done to establish the relationship between motor abilities and academic achievement.

There needs to be more research and study in the area of physical education to indicate the type of developmental activities which would be most beneficial for young children.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Arena, John I. "Handwriting: Must It Be a Learning and Instructional Enigma?" Academic Therapy, 4:5-6,

2. Biddulph, Lowell G. "Athletic Achievement and the Personal and Social Adjustment of High School Boys," Research Quarterly, 35:1-7, 1954.

3. Bird, John. "When Children Can't Learn," Saturday Evening Post, July 29, 1969, 30 pp.

4. Bowers, Louis. "A Program of Motor Development Activities," Perceptual-Motor Foundations: A Multidisciplinary Concern, 1968, 115-116 pp.

5. Bruner, Jerome S. Toward A Theory of Instruction. New York: W. W. Norton and Co., 1966. 171 pp.

6. Buhler, K. The Mental Development of the Child. London: Routledge and Kegan Paul, 1930.

7. Chansky, Norman M. "Perceptual Training with Elementary School Underachievers," Journal of School Psychology, 1:33-41, 1963.

8. Coghill, G. E. Anatomy and the Problem of Behavior. Cambridge: Cambridge University Press, 1929.

9. de Hirsch, Kathrina. Predicting Reading Failure. New York: Harper and Row, 1966.

10. Delacato, Carl. The Diagnosis and Treatment of Speech and Reading Problems. Springfield: Charles C. Thomas, 1964.

11. Denhoff, Eric. "Motor Development as a Function of Perception," Perceptual-Motor Foundation: A Multi-Disciplinary Concern, 1968, 50 pp.

12. Fernald, G. M. Remedial Techniques in Basic School Subjects. New York: McGraw-Hill, 1943.

13. Frostig, Marianne, and David Horne. "An Approach to the Treatment of Children with Learning Disorders," Learning Disorders, 1965, 297 pp.

14. _____. The Frostig Program for the Development of Visual Perception. Chicago: Follett and Co., 1964.

15. Fuller, G. B., and R. Ende. "Effectiveness of Visual Perception, Intelligence, and Reading Understanding in Predicting Reading Achievement in Junior High School Children," Journal of Educational Research, 60:280-282, 1967.

16. Gesell, A. Infancy and Human Growth. New York: Macmillan Co., 1928.

17. Gesell, A., F. L. Ilg, and G. E. Bullis. Vision--Its Development in the Infant and Child.

18. Getman, G. N. "The Visuomotor Complex in the Acquisition of Learning Skills," Learning Disorders, 1965, 50 pp.

19. Getman, G. N., and Elmer R. Kane. The Physiology of Readiness. Minneapolis: P.A.S.S., Inc., 1964.

20. Golick, Margaret. "A Parent's Guide to Learning Problems," Journal of Learning Disabilities, 1:24-35, 1968.

21. Goodenough, F. L. The Measurement of Intelligence By Drawings. Yonkers-on-Hudson: World Book Co., 1926.

22. Hall, Vaughn L. "Physical Education: Why Children Need It," Elementary Curriculum, 1964, 407 pp.

23. Hebb, D. O. The Organization of Behavior. New York: John Wiley & Sons, Inc., 1949.

24. Hurlock, E. B. Child Development. New York: McGraw-Hill Co., 1942.

25. Jones, E., E. Morgan, and G. Stevens. Methods and Materials in Elementary Physical Education. Yonkers-on-Hudson: World Book Co., 1957.

26. Kagerer, R. L. "The Relationship Between the Kraus-Weber Test for Minimum Muscular Fitness and School Achievement," Unpublished Masters Thesis, Purdue University, 1958.

27. Kephart, Newell C. Slow Learner in the Classroom. Columbus: Charles C. Merril Books, Inc., 1960.

28. Kraus, H., and Ruth P. Hirschland. "Minimum Muscular Fitness Tests in School Children," Research Quarterly, 25:178-188, 1954.

29. Metheny, Eleanor. "The Third Dimension in Physical Education," Journal of the American Association for Health, P.E., and Recreation, 25:27-28, 1954.

30. Morse, William, and G. Max Wingo. Psychology and Teaching. Chicago: Scott, Foresman and Co., 1962.

31. Musial, Stan. "Getting Children to Work for Physical Fitness," School Briefs, 30:1-2, 1965.

32. Office of Superintendent of Public Instruction. Physical Fitness Test Manual For Secondary Schools. Olympia: Washington State Publication, 1963.

33. Paine, Richmond S. "Organic Neurological Factors Related to Learning Disorders," Learning Disorders, 1965, 9 pp.

34. Painter, Genevieve. "The Effect of a Rhythmic and Sensory Motor Activity Program on Perceptual Motor Spatial Abilities of Kindergarten Children," Exceptional Children, 1966, 113-116.

35. Pearson, Eric C. A Classroom Teacher's Guide to Physical Education. New York: Teacher's College of Columbia University, 1958.

36. Perceptual Motor Symposium. Perceptual-Motor Foundations: A Multidisciplinary Concern. Washington, D.C.: American Association for Health, Physical Education, and Recreation, 1969.

37. Phillips, John L., Jr. The Origins of Intellect: Piaget's Theory. San Francisco: W. H. Freeman and Co., 1969.

38. Piaget, Jean. The Origins of Intelligence in Children. New York: International Universities Press, 1952.

39. _____, and B. Inhelder. The Child's Conception of Space. London: Routledge and Kegan Paul, 1956.

40. Radler, D. H., and N. C. Kephart. Success Through Play. New York: Harper and Row, 1960.

41. Rapp, William E. Presentation at the ASCD Fourth National Curriculum Conference, New York, December 2, 1966.

42. Roach, Eugene G., and Newell C. Kephart. Purdue Perceptual-Motor Survey. Columbus: Charles E. Merril Books, Inc., 1966.

43. Rosborough, Pearl M. Physical Fitness and the Child's Reading Problem. New York: Exporition Press, 1963.

44. Scott, John Paul. Early Experience and the Organization of Behavior. Belmont: Wadsworth Publishing Co., 1968.

45. Spache, George D. "History, Future Developments, Related Research, and Educational Implications," Procedure Manual for Winter Haven Lions Research Foundation, 1963.

46. Stuart, Marion Fenwick. Neurophysiological Insights Into Teaching. Palo Alto: Pacific Book Publishers, 1963.

47. Sutphin, Florence. A Perceptual Testing-Training Handbook for First Grade Teachers. Winter Haven: Winter Haven Lions Research Foundation, Inc., 1964.

48. Trusler, V. T. Fundamentals of Physical Education. Minneapolis: Burgess Publishing Co., 1940.

49. Wechsler, D. Wechsler Intelligence Scale for Children. New York: Psychological Corporation, 1949.

APPENDIX

APPENDIX

PASCO SURVEY OF MOTOR ABILITIES

SPACE AND EQUIPMENT NEEDED

Space needed: The area for administering this survey should be quiet with no distractions. It can be a classroom, stage, gym, or office. The floor should be clean.

Equipment: There should be a table, two regular chairs and two primary size chairs. Equipment needed to administer the specific tasks are listed below.

Task #1 - Shoulder Flexibility
1 - 12" ruler

Task #5 - Eye Control
1 pencil with tack in eraser

Task #6 - Dominance
1. a 12" tube 1" in diameter
2. a piece of hardboard 8" x 14" with a 3/4" hole in the center
3. a 6" tube 3/4" in diameter
4. a piece of hardboard 8" x 12" with a mark such as an "X" (no larger than diameter in tube) in the center
5. a 4" x 12" x 1" stand for #4 above
6. a cup or similar object
7. a piece of chalk or similar object
8. an unsharpened pencil
9. an unsharpened pencil with tack in eraser (a pen-size flashlight could be substituted)
10. a round typing eraser with brush

Explanation of the Survey:

Task #1

Shoulder Flexibility

Lack of shoulder flexibility may be the first clue to a writing legibility problem

In this Survey of Motor Abilities, the test for shoulder flexibility is taken from the Physical Fitness Test Manual for Secondary Schools (32).

The task has two parts:

1. Right shoulder flexibility
2. Left shoulder flexibility

In Item 1, the right arm is placed over the right shoulder with the left arm placed behind the back from the left side. To pass the item, the child must be able to touch the fingers of his hands together behind his back.

Item 2 is administered in like manner, putting the left arm over the left shoulder, etc.

In scoring these items, the actual distance between the fingers should be noted for those children who cannot pass the task. Satisfactory completion of the test is marked with a +.

Task #2

Kraus-Weber Test Items 4 and 5

The Kraus-Weber test of physical fitness was developed to measure physical strength and muscular fitness. Its first use was a much publicized comparison between the youth of America with the youth of Europe.

In a study by R. L. Kagerer (42:42), it was found that there is a high correlation between items 4 and 5 of the Kraus-Weber test and school achievement among elementary school children. The child who has difficulty with these two items would appear to lack general postural and gross motor coordination. For this reason, items #4 and #5 are included in this Survey of Motor Abilities.

In item #4, the child lies face down on the floor with his hands clasped behind his head. To complete this part, the child must raise his head, shoulders and chest off the floor and hold this position for a count of ten. For this item, the child's legs should be held down.

In item #5, the child lies face down on the floor with his head resting on his hands. To complete this part, the child must raise his legs without bending his knees and hold this position for a count of ten. For this item, the child's chest should be held down.

Scoring: Satisfactory completion of activity +
Unsatisfactory completion of activity -

Task #3 Recognition of Body Parts

It has long been noted that knowledge of body parts is vital to subsequent development of spatial relationships. Since the child goes through definite sequences of spatial development, the establishment of body image early is important. A well developed body image provides a solid base from which the child can develop complex perceptual-motor skills (42:34).

The child closes his eyes and using both his hands touches parts of his body upon voice command of test administrator. Each part is called at least twice in mixed order.

A - head
B - shoulders
C - elbows
D - stomach
E - waist
F - knees
G - toes

Scoring: Satisfactory completion for each body part +
Unsatisfactory completion, hesitancy, or inability to touch proper area without searching is marked -

Task #4 Laterality

A child must be able to distinguish between his left side and his right side and to control the two sides of his body separately and simultaneously, in order to be successful in learning (27:32).

The task that is used to determine the child's present level of development in this area is a game called, "Angels in the Snow." The child is asked to lie on his back with his feet together and his arms at his side. While in this position the child will perform certain activities at the command of the administrator.

In activity #1, the child is asked to move his arms and legs simultaneously along the floor. In order to pass the task the child must perform the movement in a coordinated and controlled manner. His hands must touch above his head when his legs are apart and touch at his side when his legs are together. Activity #1 tests the child's bilaterality. In activity #2, the child is asked to move only the arm and leg on the right side. Again, the child must perform the movement in a coordinated and controlled manner with no hesitancy in initiating the movement, restriction in the extent of the movement, nor any overflow of movements to the limbs on the other side. This is a unilateral activity.

Activity #3 is a repeat of activity #2 but with the left arm and left leg. In activity #4, the child is asked to move the right arm and the left leg in the same manner as the other tasks. In activity #5, the child moves the left arm and the right leg. Activity #4 and #5 are cross-lateral movements. To pass these activities the same considerations as mentioned in activity #2 are in effect.

Following is a detailed description of the Laterality movements:

Laterality Movements and Scoring

Bilateral

Spread and return both arms and legs at the same time.

Scoring - Satisfactory execution - +
Unsatisfactory execution - -

Unilateral Right

Spread and return right arm and leg at the same time. Keep oposite arm and leg still.

Scoring - Satisfactory execution - +
Unsatisfactory execution - –

Unilateral Left

Spread and return left arm and leg at the same time. Score same as unilateral right.

Crosslateral Right

Crosslateral right refers to the movement of spreading the right arm and left leg at the same time.

Scoring - Satisfactory execution - +
Unsatisfactory execution - –

Crosslateral Left

Spread and return left arm and right leg at the same time. Score same as crosslateral right.

Task #5 Eye Control

Eye control in the acquisition of reading skills and other academic subjects is important (19:6). There are many causes of failure in ocular control. The following items are designed to reveal only the extent of control, not the reasons for failure of control.

Four items, including horizontal, vertical, and circular movement control along with convergence make up this test.

To administer these items a common lead pencil with a thumb tack through the side of the eraser is used.

To check the horizontal eye control the examiner holds the pencil upright before the child's eyes and about 3 feet before his face. Ask the child to focus his eyes on the head of the tack. Move the pencil back and forth horizontally in front of his face. The child must not move his head. To pass the task, the child must follow the tack with a smooth movement of the eyes with no head movement.

The check for vertical eye control is obtained in much the same manner. Here, the pencil is moved up and down in front of the child's face. In the check for circular eye control the pencil is moved in a circle in front of the child's face. Again, the child must follow the task with a smooth eye movement with no head movement.

Item #4, convergence, refers to the posture of the two eyes in relation to the distance of the target from the eyes. This means that when the target is distant, the eyes are roughly parallel. When the target is near, the two eyes must turn inward to see it. The eyes must work as a team being equal distance from the nose at all times. To check this, the administrator asks the child to focus on the tack at a point about twenty inches away from the child's face. The pencil is moved within 3 or 4 inches of the child's nose. To perform this activity properly the child must exhibit a smooth inward movement of both eyes equally as the pencil is moved toward his nose.

Scoring: Success +
Continous rhythm or smooth movement of eyes with no head movement.
Failure -
For eyes that stare or move in uncontrolled movements. If both eyes do not converge together then, also, note which eye follows the pencil.

Task #6 Dominance

A very important facet of the perceptual motor concept is that "a child cannot realize his full potential in receptive and expressive abilities until he develops complete one-sidedness--that is, when his leading hand, eye, ear, and foot are on the same side, be it right or left. There has long been evidence that speech and reading and visual difficulties may be associated somehow with mixed-sidedness or lack of definite sidedness," states Delacoto as quoted by Bird (3:30).

Richmond S. Paine (33:9) has stated that the apparently dominant hand, eye, and foot should be recorded since disproportionately frequent mixed or crossed dominance is a generally acknowledged observation.

In this survey of motor abilities, there are three activities each for eyes, hand, and foot.

In item #1 of the activities for eye dominance the child is asked to look at an object through a tube one inch in diameter (such as a golf tube), about twelve inches long. The child takes the tube in both hands as it is handed to him directly in front of his midline. Keeping both eyes open, he is asked to bring the tube to one of his eyes and sight the object. The eye to which he draws the tube is recorded.

In item #2 of the activities for eye dominance the child is asked to look through a peep hole. A piece of hardwood about eight inches by twelve inches with a three-fourths inch diameter hole in the center is used for this item. The board is held in front of the child's face with the hole positioned at the midline. Keeping both eyes open the child is asked to peek through the hole at the administrator. The eye that appears at the hole is recorded.

In item #3, the final task for eye dominance, the child sights through a tube three-fourths inch in diameter and six inches long at an X which is 3/4 inch in size, which is placed in the center of a piece of hardboard 8" x 12" supported at a 120° angle by a stand. The child is seated at a table with the stand in front of him with the X at the midline of his body and the stand approximately two feet distant from his eyes. He holds the tube in both hands away from his eyes and in line with the X. Keeping both eyes open, he then draws the tube to one eye but continuing the focus on the X. The eye to which the tube is drawn is recorded.

In item #1, of the activities for hand dominance, the child is asked to stand erect, feet together and arms at his side. The administrator then picks an object directly in front of the child and asks him to point to it. The hand he used is recorded.

In item #2 of the activity for hand dominance, a piece of chalk and a cup are used. The child stands before a table with the chalk and cup in line with his midline. He then is asked to pick up the chalk and place it in the cup. The hand that he uses is recorded.

Item #3 is a quick reaction hand dominance activity. The child sits in a chair with his hands on his knees. His knees should be about 8 inches apart. The administrator kneels before the child and asks him to focus his eyes on an object (such as a typing eraser) which is held at the child's eye level but away from his face. The administrator shows the child a pencil and instructs him to quickly grab it when the pencil moves upward from the floor to the front of the child's face. The hand that he uses to grab the pencil is recorded.

The three activities for determining foot dominance are as follows: kicking the administrator's hand, the child's initial step in walking, and stepping onto a chair.

In item #1, the child is asked to stand erect facing the administrator. The administrator places his hands about waist high at the child's midline. The child is then instructed to kick the hand. The foot that is used is recorded.

In item #2, the administrator has the child place his feet together so his weight is equally distributed and on command the child walks forward. The administrator records the foot that steps forward first.

In item #3, the child walks to a chair, at least 6 feet distant, and places a foot on the seat of it. The foot that is put on the chair is recorded.

Scoring: Record R (for right) or L (for left), according to eye, hand, or foot used in each activity.

FINAL SCORING

Task #1 - Shoulder Flexibility
Each + receives 10 points

Task #2 - Kraus-Wever (Items 4 & 5)
Each + receives 10 points

Task #3 - Body Parts Recognition
Each + receives 5 points

Task #4 - Laterality
Each + receives 20 points

Task #5 - Eye Control
Items 1, 2, & 3 receive 10 points for each +
Item 4 receives 15 points for +

Task #6 - Dominance
If 8 or 9 scores are alike = 80 points; 7 items alike = 70; 6 items = 60; 5 items = 30

Add the total score

Maximum score is 300 points