



University of Central Florida
STARS

Retrospective Theses and Dissertations

Summer 1981

The Effects of Perceptual Motor Skills on the Reading Ability of Third Grade Students

Mary B. Donaldson
University of Central Florida



Part of the [Communication Commons](#)

Find similar works at: <https://stars.library.ucf.edu/rtd>

University of Central Florida Libraries <http://library.ucf.edu>

This Masters Thesis (Open Access) is brought to you for free and open access by STARS. It has been accepted for inclusion in Retrospective Theses and Dissertations by an authorized administrator of STARS. For more information, please contact STARS@ucf.edu.

STARS Citation

Donaldson, Mary B., "The Effects of Perceptual Motor Skills on the Reading Ability of Third Grade Students" (1981). *Retrospective Theses and Dissertations*. 550.
<https://stars.library.ucf.edu/rtd/550>



THE EFFECTS OF PERCEPTUAL MOTOR SKILLS ON THE
READING ABILITY OF THIRD GRADE STUDENTS

BY

MARY BETH WILLIAMS DONALDSON
B. A., University of Central Florida, 1978

THESIS

Submitted in partial fulfillment of the requirements
for the Master of Arts degree in Communication
in the Graduate Studies Program of the College of Arts and Sciences
University of Central Florida
Orlando, Florida

Summer Term
1981

Acknowledgments

I would like to express my appreciation to my thesis Chairman, Dr. David Ingram. Without his help, this study could never have been accomplished.

My gratitide is also extended to Dr. Albert Pryor for all of his time and expertise, especially with the statistical analysis. I would also like to thank Dr. Edgar Wycoff for his contributions to this thesis.

I would like to thank my family for all of their encouragement during my school years. I want especially to thank my mother and father for their constant support.

A special word of appreciation to my very understanding and loving husband, Pat, who has encouraged me along the way.

TABLE OF CONTENTS

	Page
List of Tables	v
Introduction and Rationale	1
Reading Skills: A Definition	2
Perceptual Motor Skills	3
Reading Readiness	5
Gross-Motor Training Programs	11
Statement of The Problem	21
Methodology	22
Subjects	
Independent and Dependent Variables	22
Procedure	23
Data Analysis	24
Results	25
Discussion	29
Threats to Validity	29
Suggestions for Research	30
Implications for Clinicians or Teachers	31
Summary	31
References	33

LIST OF TABLES

Table		Page
1	Mean Motor Skills Scores	25
2	Analysis of Variance for Motor Skills . . .	26
3	Mean Reading Scores	27
4	Analysis of Variance for Reading Skills . .	28

Introduction and Rationale

There has been an increasing interest in perceptual-motor function and its relationship to academic achievement in children over the past two decades (Resnick, 1967; Cohen, 1962; Scott, 1970; MacGinitie, 1969; Lerch, Becker, Ward, & Nelson, 1974; August, 1970). Lerch et al. (1974) point out that children with learning problems in the classroom may also have poor motor ability. Jersild (1960) states that person's view of himself is influenced by his perception of his body and its properties. His properties are his strength and his skill in physical activities.

A child's entire orientation to the world develops through movement. The most effective type of learning evolves through movement (Scott, 1970). Scott believes that actual learning comes through doing.

It has been acknowledged that physical skills contribute to self-concept and to an ultimate role in life (English, 1961). English states that in our culture, a child's physical vigor and his ability in games are likely to influence markedly his attitudes toward himself as a success in school. Another area that physical skills might influence is reading.

Reading Skills: A Definition

Fries (1962) notes that the important aspects for reading are developing a set of habitual responses to graphic shapes and having certain motor skills. Fries states:

The process of learning to read in one's own native language is the process of transfer from auditory signs for language signals, which the child has already learned, to the new visual signs for the same signals. This process of transfer is not the learning of the language code; or it is not the learning of a new or different language signal. It is not the learning of new words or of new grammatical structures, or of new meanings. (p. 120)

Resnick (1967) alleged that there are essentially three classes of skills for an early learning curriculum. They are not necessarily for reading alone. They are perceptual and motor skills, conceptual and linguistic skills, and orienting and attending skills --such as following directions, paying attention, and accepting delayed rewards.

Gibson (1970) states that there is no way to teach a new word unless the child is told what it is. She feels that the child cannot analyze the components of the new word. Motivation and reinforcement for learning such as reading and speech are internal. She continues that the reinforcement is not a reduction of a drive, but a reduction of uncertainty.

Summers (1970) found that one must consider the reading

process as a sequence of identifiable, observable, and covert behaviors which make up the reading act. Summers states that:

Reading behaviors are covert responses to verbal written language. These covert responses are indicated by overt performance which could have not occurred without the covert responses to the written language. (p. 21)

Nicholas Anastasiow (1970) states that the difference between reading and oral language is reducible to two critical phases. Essentially there are two steps. The child must learn the necessity of a relationship between speech and a written symbol system as the first step. Next, the child must learn to comprehend and decode speech auditorally.

Anastasiow's views are similar to Resnick in the developmental model for early childhood education. Resnick feels there are essentially three classes of skills for an early learning curriculum, not necessarily just for reading (Resnick, 1967). These include perceptual and motor skills, conceptual and linguistic skills and orienting and attending skills.

Perceptual Motor Skills

Resnick (1967) defines perceptual-motor skills as those that underlie higher-order conceptual functioning. This includes such things as the ability to use one's body efficiently with

awareness to position in space, and the ability to make a wide range of sensory discriminations. This includes both gross and fine motor skills (Resnick, 1967).

The sensory skills Resnick states, are that range of visual, auditory, and haptic perception and discrimination behaviors which are virtually synonymous with the child's earliest learned concepts. Part of the process of learning, she adds, occurs when the child organizes the various sensory inputs that occur to an individual at once.

Cohen (1962) describes three steps in the perceptual motor process. They are (a) learning to handle self by control of body process of coordination; (b) learning to relate to the outer world of others and; (c) learning to manipulate the world "out there".

Similarly, Zietz (1970) found three steps in learning perceptual-motor skills. They are (a) the physical ability to hear, see, etc., (b) understanding what something is, and (c) reaction to stimuli in a meaningful manner.

Delacato (1960) bases his perceptual-motor skills program on neurological reorganization. He suggests that the way to remediate brain deficiencies in certain individuals is by neural stimulation through motor activity.

Frostig and Maslow (1969) state that reading is a function of discreet visual perceptual skills. They developed a program to remediate reading disabilities which included gross motor activities.

Kephart (1960) places a major emphasis on motor activity. Kephart states that movement is the basis of all learning. He started remedial programs that are designed to bring the child through the appropriate developmental stages.

Scott (1970) states that perception is an immediate interpretation of incoming sensory information which becomes internalized to form concepts. Concepts are an enduring combination of related perceptual images which the individual manipulates internally without reference to the immediate environment.

At least one author has expressed concern over perceptual-motor programs in the schools as not being similar enough to reading to produce the "transfer" effect all agree upon so readily. Pryswansky (1972) reviews the thinking of these concerned authors and states as his own thesis:

However, some concern has been voiced in the literature regarding the value of training which rests heavily on the transfer effect to reading skills. The materials usually consist of objects or geometric shapes, but no letters. If manuscript writing were approached as a visual-motor task, then intuitively, it would appear to be a more beneficial type of reproduction training. (p.112)

Reading Readiness

Walter MacGinitie, a noted reading researcher completed a review of the literature in reading readiness. He reports

"The question 'Is the child ready to learn to read?' is a foolish one for a child does not learn to read in an instant" (MacGinitie, 1969, p. 398). He clarifies that reading is a process that takes time, so the most appropriate question would be "Is the child ready to read?"

Durkin (1970) also feels the question should not be "Is the child ready to learn to read?" because this omits attention to the most important variable, which to her is, what type of reading instruction is going to be administered. The child might be "ready" if one type of instruction is offered and not ready for another type.

There are two factors that MacGinitie claims are closely related to reading readiness. Maturational factors are important to reading readiness as they may hold clues to inherited differences in intelligence. The child's experiences preceeding the point at which he learns to read are also vital factors.

The goals of current reading research are to better understand the nature of the process of learning to read and to learn to make helpful predictions regarding success in reading. However, MacGinitie feels strongly there is a need for even more research in reading. He would like to see research that would spell out specific skills a child can do in the reading process such as: (a) have a memory span of five letters,

(b) can discriminate all letters except p, d, q, b, (c) can segment sounds in words that are up to four phonemes long, as long as the word contains no nasal consonants or semi-vowels, (d) can sight read common articles and prepositions by sight and therefore predict from this that the child will make good progress on learning to discriminate visually between certain syllables, and (e) be able to read story "Q", and learn "X", easily if he learns task "Y". All this, of course, MacGinitie cites as a clear need for the development of a hierarchy of reading skills, such as "criterion reading" as developed by Marie Hackett (1968). "In general, findings of past reading readiness research can be quite succinctly summarized: best predictors tend to be those tasks most similar to the criterion-tasks similar to reading itself" (MacGinitie, 1969, p. 408).

One of the most frequently used programs of perceptual-motor training for readiness was developed by Frostig and Maslow (1969). They also addressed themselves to the concept of readiness:

Our knowledge will not be advanced by arguing about the degree to which visual perception is related to reading. A more fruitful approach is to explore the cognitive and other abilities of an individual, and relate them to different task processes at various stages of development and performance, so that an

educator can choose the optimum method to help a particular child learn a particular task. (p. 572)

The reader cannot help but see the similarity between her plea for research in reading readiness hierarchies and those comments just cited from MacGinitie. Both felt that the process skills of reading had yet to be defined ideally.

A recent dissertation on auditory discrimination further verified MacGinitie's views. Van Camp (1970) concluded that little is known about the relationship between auditory and visual discrimination in young children and the role that this discrimination plays in beginning reading. Van Camp argues that if a child is found to prefer one modality over another, beginning reading should probably be presented in the child's best mode to insure initial success in reading. Van Camp believes that a phonetic approach may be meaningless to a child who is visually oriented. Conversely, a visual approach may be meaningless to a child who prefers an auditory mode.

Durkin (1970) scorns the use of reading readiness test scores for placement in teacher-aide programs, summer programs, Frostig and Delacato programs, etc. She questions the validity of such readiness scores as predictors of a child's performance in reading instructional programs.

Durkin believes that reading readiness is a collection of readiness, not just one gross measure. It follows that Durkin's readiness concept also assumes a child will not be ready to learn

everything about reading at once. She feels that past readiness concepts have failed because they have used a gross measure to determine reading readiness.

An example of the type of research Durkin opposes is a study by Livo (1972). In an effort to discover what factors are crucial to reading readiness and beginning reading, she administered the Wechsler Preschool and Primary Scale of Intelligence (WPSSI), the Sartain Reading Readiness Test (SRRT) and the Oral Language Sample. The pupils were then administered the Metropolitan Readiness Test to see what test or subtest would be most effective and efficient in predicting reading success.

Livo's study showed that overall, the WPSSI was not the most effective and efficient test, but the SRRT was effective in prediction of success in beginning reading, especially the subtest of word memory. This test discriminated and predicted well.

Getman, Kane, Halgren and McGee (1968) indicate that a training program for reading must center around five learning stages; (a) general motor patterns, (b) special movement patterns (such as walking, hammering or riding a bicycle), (c) eye movement patterns, (d) visualization patterns, and (e) visual perceptual organization.

There is a prepared list available of what teachers and administrators considered developmental reading skills. This list included reading readiness skills such as hopping,

skipping, jumping, tying shoes, cutting with scissors, left and rightness knowledge, visual discrimination, language usage, identification of body parts, and putting several events into logical sequences. Children who failed in performing these various activities were referred for therapy in developing these skills. It is theorized that such developmental skills integrated into the reading program were a major reason for improved reading skills in that school district.

Eitman (1969) listed a series of process skills that are obtained when one is learning to read. These are behaviors that occur at about the same period when learning to read. No causation is implied. The activities include:

1. The ability to interpret pictures.
2. Language facility to express ideas.
3. An understanding of the meaning of "reading".
4. Understanding the left-to-right sequence in reading.
5. The ability to hear sounds in words.
6. Have an interest in words.
7. Have a small sight vocabulary.

In addition, Eitmann notes that there are a few affective skills which a reading program should strive to enrich, even though they are skills not directly related to reading.

These include:

1. An increase in self-confidence.
2. A desire to enjoy the sounds of language.

3. The ability to work in groups.
4. The ability to listen carefully.
5. A maintenance of eagerness to learn to read.

Resnick (1967) did an extensive study, researching the works of Piaget, Bruner, and others, and determined that early learning should center on the areas of orienting and attending skills, perceptual and motor skills, and conceptual and linguistic skills.

Gross-Motor Training Programs

Radler and Kephart (1960) hypothesize that anything a child learns can be taught. A child learns to move about, and thus moving about can be taught. Reading, they feel, is an extension of motor movement, especially through vision.

All behavior is movement of one kind or another and movement made by a developing child constitutes learning units that contribute to his total store of knowledge. (p. 24)

Specifically, Radler and Kephart feel that the connection between perceptual motor skills and reading is that a child perceives a word first as a shape, or a blob, and he may or may not later learn to distinguish the components of the blob into letters and sounds. The child does not associate the letters with anything. This "form perception" develops from fundamental skills of laterality, posture, and directionality. The subordinate motor skills can be easily taught and trained. Typically, motor skill

programs recommended by Radler and Kephart include "angels in the snow", the walking board, the balance beam, and drawing games.

Getman and Kane (1964) comment that perceptual-motor programs should consider the following:

1. Academic performance in today's schools depend heavily upon the form and symbol recognition and interpretation.
2. There are perceptual skills which can be developed and trained.
3. The development of perceptual skills is related to the levels of coordination of the body systems, that is, the better the coordination of body parts and body systems, the better the prospects for developing perceptions of forms and symbols.
4. The child whose perceptual skills have been developed is the child who is free to profit from instruction and learn independently. The greater the development of perceptual skills, the greater the capacity for making learning more efficient. (p. 57)

August (1970) conducted an experiment using a physical education program that emphasized laterality and directionality. The purpose of this study was to investigate whether there would be any difference between groups on measures of reading readiness, visual perception, and perceptual-motor development. Six experimental groups comprised of twenty students received 36

sessions of a special educational program, while a control group of the same size received a conventional program.

Results revealed significant differences between groups for the measures of visual perception and perceptual-motor development. There was a slight, but not significant difference between the reading readiness of the two groups.

Lipton (1970) studied the relationship between visual perception and reading readiness in first grade children. This study used four classes which were matched by age, height, sex, and weight, and then randomly assigned to treatment groups. The control group was exposed to a regular first grade curriculum, including a reading readiness skills unit. The experimental units were administered a program that emphasized directionality of movement and ability to comprehend spatial relationships of objects surrounding the child. The program included such activities as "angels in the snow", Simon-says, walking, jumping, balance beam, catching, and so on. These activities were used to develop the following skills:

1. Balance and maintenance of posture.
2. Walking, running, jumping, etc.
3. Coordination, dynamic balance, speed, accuracy.

The experimental groups also were exposed to the regular first grade program, including the reading readiness skills.

Both groups were pre- and post-tested using the Purdue Perceptual Motor Test, the Metropolitan Reading Readiness test

test and the Frostig Developmental Test of Visual Perception. Lipton found that there were significant differences on all gain scores and interactions between teachers and treatments except for the teacher/treatment interaction in the Frostig test.

From these results, Lipton concluded that a physical education program that emphasized directionality of movement produced significant gains in perceptual motor development, visual perception and reading readiness, as measured by the three instruments.

A similar sensory-motor training program was tested on kindergarten children who scored low on the Goodenough Draw-A-Man Test, but had average IQ's, as measured by the Stanford-Binet (Painter, 1966).

Twenty subjects were pre- and post-tested with the Illinois Test of Psycholinguistic Abilities, the Goodenough Draw-A-Man Test, and Barry Geometric Form Reproduction Test. Hypotheses examined in the experiment were:

1. A systematic program of rhythmic and sensory-motor activity will affect the level of ability to draw a human figure.
2. The program will ameliorate the apparent distortion of body image concepts.
3. The program will improve visual-motor integrity.
4. The program will improve sensory-motor spatial skills.
5. The program will improve psycholinguistic abilities.

Painter administered 21 half-hour sessions of the treatment program over a seven week period to the 20 subjects. There was no control group. There were 21 different types of activities in the program including Simon-says, skipping, jumping, etc.

The results of the experiment showed gains in all skills tested, according to Painter. The experimenter did not specifically test reading readiness ability, but approached it when testing with the Illinois Test of Psycholinguistic Ability. Although, Painter concluded that the sensory-motor program drastically improved, pupils' body image concepts, rhyme, visual-motor integrity, spatial skills and psycholinguistic abilities, there is no way to ascertain that the results were not due to mean regression or the Hawthorne effect.

The relationship of pre kindergarten training to first grade achievement in disadvantaged first graders was tested in Campbell's dissertation (1969). In the study 320 students were used from a pool of 974 students initially tested. There were four experimental groups in the study. Group one was given sixteen weeks of pretraining and non-pretraining activities, group two was given eight weeks of pretraining and non-pretraining. Groups three and four were each pretraining only groups for the duration of the experiment. Campbell found that this pre-training was positively related to first grade achievement with respect to disadvantaged children.

A perceptual-motor play program was administered to 75 kindergarten children by Rutherford (1965) in order to assess the effects of perceptual-motor training on readiness. Results indicated that the experimental group did significantly better than the control group on the Metropolitan Readiness Test for reading. However, the mathematical skills were not influenced by the treatment.

C. H. Delacato (1960) presented a theory on the use of motor training as a critical factor in the development of reading readiness for children. The theory in Neurological Organization and Reading holds that the phylogenetic development is reflected in the development of the central nervous system of each human. If for any reason the neurological development of a child does not proceed through "sequence of stages", the child will exhibit difficulties in mobility and speech and in the "essence of human nervous system, reading" (Delacato, 1960, p. 44).

Even though Delacato believed that reading difficulties stemming from poor neurological organization can be corrected by training, he hypothesized that since Johnny could not read well, he was therefore neurologically disorganized. Delacato and his researchers did not first diagnose the neurological disorder, but instead they treated an observed symptom (poor reading) as if it were the disease itself. Glass and Robbins (1967), Stone and Pielstick (1969), and Falik (1969), have all severely

criticized this.

For example, Glass and Robbins found the following major threats to validity regarding the Delacato articles:

1. Nearly all experiments used matched groups, rather than randomization and in some cases the subjects were volunteers for membership to one group or the other.
2. Frequently, the experimental and control pupils were treated as an intact group.
3. The various classes met at different times of the day.
4. Different teachers were used for experimental and control groups.
5. The sample size in the studies were too small.
6. Experimental bias was not controlled. Enthusiastic Delacato teachers were used for the experimental group.
7. There was no control for the Hawthorne effect.

Glass and Robbins stated that the position of their research on the Delacato theory was that:

Extravagant claims have been made for the validity of experiments which Delacato has reported as supporting his claims. Without exception, these experiments contained major faults in design. At best, uncontrolled factors inflated small, but legitimate effects due to Delacato's therapy in each of the experiments; at worst, these uncontrolled influences were the sole sources of gains or differences between experimental groups. (p. 49)

In a well-designed study, Falik (1969) attempted to determine whether perceptual-motor training in kindergarten would enhance the later reading skills of students. Subjects were selected from those kindergarten pupils who scored in the lower two-thirds on the Anton Brennen Gestalt Test of School Readiness. These children were randomly placed into control and experimental groups and groups were balanced for the effects of sex. The two groups were then assigned to teachers judged equally competent.

In the experimental treatment, the curriculum was restructured to follow the perceptual-motor program developed by Kephart (1960). Included in the activities were chalkboard training, sensory-motor training such as use of the walking board, training ocular control and training form perception. In addition, there was training in identification of body parts, drawing clothing articles and so on.

The control group spent the year with the other teacher in a standard kindergarten program except for a semi-structured experience designed to correspond in setting and general activity to the experiences of the experimental group.

After the year-long treatment, pupils were post-tested with the Bender Gestalt, the Metropolitan Readiness Test and a basic perceptual-motor development test to determine if the two groups could be differentiated in terms of their perceptual-motor development. The perceptual-motor test included subtests of

dominant patterns of eye, hand, and foot, left-to-right directionality, figure-ground perception, formboard assembly, and visual reach-grasp-release abilities. On the perceptual-motor test, pupils were scored along a continuum from "immature/undifferentiated" to "mature/well-differentiated".

Since the post-testing was done on an individual basis, the testers were not allowed to know which pupils were from the control or experimental group. In addition to the post-testing after the kindergarten year, pupils were retested in the middle of second grade using the Metropolitan Achievement Test.

The test results showed no significant difference between the experimental and control groups at the end of kindergarten on any of the three instruments. This indicated there were no differences in developmental readiness for the two treatment groups. Results from the grade two testing also showed no significant difference between groups. However, it was noted the control pupils' scores remained fairly homogenous while the experimental pupils' scores showed a considerably greater range. Falik (1969) cited no Hawthorne effect and no reading gains by the experimental groups that the control subjects did not equal. He did note that eleven children (about a quarter of the sample) scored high in perceptual motor skills but low in reading ability, and cites this as evidence for further research into the existence of such false positives.

The greatest flaw in the experiment was the small sample size and the use of only two teachers, one for each situation. Although the two teachers were judged equally "competent", this does not assume true equality between pupil treatments. It is possible that the control group teacher favored the style of teaching used and that the experimental teacher did not agree wholeheartedly with the perceptual-motor program. Additionally, the control group teacher knew her class was the control class and this may have caused her to strive harder and push the children into greater than usual achievement.

Statement of the Problem

In summary, most of the experimentation with reading readiness in gross motor programs has followed the theories of Frostig, Radler and Kephart. Some positive results were obtained, such as Lipton's conclusion that a physical education program of directionality increases perceptual motor development, readiness, and visual perception (Lipton, 1970). Gross motor training was found to be an asset in Rutherford's (1965) study as well. Unfortunately, much of the previous research is marked by a lack of proper control groups and small sample sizes. Further, the research has been criticized in terms of stating which conclusions did not follow indications of the data (Glass & Robbins, 1967). In no case was replication cited in the literature, causing one to question seriously if the results described could be repeated.

It appears that those who support the use of perceptual motor programs in early childhood for the purpose of reading facilitation have not provided substantial evidence to validate their claims. It is the purpose of this study to present a perceptual motor skills program to third grade students and to examine its effects on the reading skills of these children. It was hypothesized that the reading skills of third graders would be improved following exposure to a program of motor skills activities.

Methodology

Subjects

Nineteen seven and eight year old third grade students comprised the subject pool. All subjects had normal hearing. Group I (experimental group) consisted of ten subjects, six females and four males. Nine subjects made up Group II (control group), five females and four males.

Independent and Dependent Variables

The administration of the Perceptual-Motor Exercise Program served as the independent variable. The dependent variables were reading improvement and motor skills ability. The Reading Sections of the California Achievement Test were used to measure reading ability. This instrument was used because the school required this test to be given at the beginning and end of each school year. The Perceptual-Motor Screening Test was used to measure motor-skill ability. The examiner chose this test because she was familiar with it and it required no special or expensive equipment. All children were tested individually on the motor-skills test. Administration took about 20 minutes per student. All skills were described

verbally and then demonstrated in exactly the same manner the tester wanted the movement to be executed. The Reading tests took a total of 41 minutes to administer to the group of 19 students.

Procedure

All subjects were first administered the Perceptual Motor Screening Test and the California Achievement Test. This testing was done in a small, quiet room at the elementary school. These students were then randomly assigned to one of two groups, Group I, the experimental group or Group II, the control group.

Group I subjects were given a half-hour training session in motor skill activities five days per week for nine weeks. An example of a typical motor skills activity session taken from skills from the Perceptual Motor Screening Test is:

1. Sit Ups-- Feet must lie flat on the floor. One person holds the feet of the person doing the sit-ups.
2. Balance Beam-Walking-forward, backward, sideways and then turning around while still on the balance beam.
3. Hitting a Ball on a Rope-- A tether ball was used. A student had to swing at the ball and hit it with a light-weight bat.
4. Chalk Board Writing-- The student is required to write a given letter in cursive and a set of numbers.

It is written several times; and has to be neat and written within the lines drawn on the board by the teacher. Both hands are used.

5. Jumping Jacks - The goal for this activity was to get the hands and feet to move simultaneously.

Group II subjects were given "free play" activities during these training sessions. They were on the other side of the building from Group I. They played on the swings, played games, or had free time.

Both groups continued in their reading groups within the A Beka Reading Program as usual. About an hour each day was devoted to reading activities. At the end of the nine week session, each student was again given the California Achievement Test and the Perceptual-Motor Screening Test.

Data Analysis

Analysis of variance (ANOVA) was used to analyze the data. A 2 (pre-post) X 2 (experimental-control) ANOVA was used to assess main and interaction effects for both reading and motor skills. One tailed t tests were used for contrasting pairs of means.

Results

It was hypothesized that the reading skills of the third grade students would be improved after 45 one hour sessions of motor skill activities. In order to validly test this hypothesis, it must be shown that the motor skills program significantly enhanced motor skills. If no improvement in motor skills occurred, one would not expect that reading scores would increase.

Table 1 contains pre and post test motor skill scores.

Table 1
Mean Motor Skills Scores

	Subjects	Pre	Post
Treatment	10	56.0	69.20
Control	9	55.6	60.67

The data show that the pre-test scores were almost identical (56.0 and 55.6) for both groups. However, the treatment group shows a much larger gain than the control group.

Analysis of variance was conducted to measure the reliability

of the relatively greater gain shown by the treatment group.

Table 2 summarizes the analysis.

Table 2
Analysis of Variance for Motor Skills

Source of Variation	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u> ^a
Between Subjects	5889.74	1		
A (treatment)	1116.73	1	1116.73	
Subjects within group	4772.74	17	280.75	3.98
Within Subjects	6678.00			
B (pre-post)	833.79	1	833.79	2.51
AB	194.63	1	194.63	0.59
B X Subjects within groups	5649.58	17	332.33	

* $p < .05$

^a $F(95 (1-17) = 4.45)$

The F ratio (3.98, $p < .07$) for treatment indicates that exposure to the motor-skills program tended to enhance motor skills. Subsequent t tests showed that the motor skills score produced by the treatment group post-test condition was significantly above ($p < .05$, one-tailed) the scores obtained in the three remaining cells. The control group experienced a non significant gain from pre-to post test. Thus, the hypothesis that reading skills will

be enhanced by exposure to a successful motor skill improvement program can be tested.

Table 3 indicates the mean reading scores for all conditions.

Table 3
Mean Reading Scores

	Subjects	Pre	Post
Treatment	10	3.32	4.34
Control	9	3.46	3.94

It is interesting to note that the control group began with a slightly higher reading score than the experimental group, yet the experimental group attained a higher post test reading level than the control group. Table 4 summarizes the analysis of variance for the reading skills.

All three F ratios were significant. The treatment main effect indicates that the group receiving the motor-skills program produced significantly greater reading scores than the control group. This superiority is due to the relatively greater improvement of the treatment group from pre-to post-test. While the B main effect indicates that both groups improved reading skills significantly, the statistically significant AB interaction shows that the gain is reliably greater for the treatment group. Therefore, the hypothesis that motor-skill improvement will enhance

reading skills is supported.

Table 4
Analysis of Variance for Reading Skills

Source of Variation	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>f</u>
Between Subjects	8.22	1		
A (Treatment)	2.63	1	2.63	7.97 ^a
Subjects within groups	5.59	17	.33	
Within Subjects	7.62			
B (Pre-Post)	5.61	1	5.61	8.14 ^a
AB	.88	1	.88	12.57 ^b
B X Subjects within groups	1.13	17	.07	

$$^aF_{95} = 4.45$$

$$^bF_{99} = 8.40$$

Discussion

The hypothesis that reading skills would be improved after 45 sessions of motor skills activities was supported. These findings will allow many teachers or clinicians to justify time spent on motor skills activities for children. Some schools and teachers may want to develop a curriculum that includes motor-skill activities to enhance reading skills.

Threats to Validity

There were several methodological and procedural factors which may limit generalization. One of these problems was subject mortality. Two students in the control group missed two sessions. One student in the experimental group missed three sessions and one missed one session. The data from these four students were used in the results because of the already small sample size and because the mortality level was roughly equivalent between groups.

The selection of testing materials was another factor to consider. The California Achievement Test was used because it is a regular part of the students' program and therefore could be administered unobtrusively.

Experimental bias was another possible problem. The individual who evaluated the motor skills test was kept unaware

of control and experimental group assignment. However, the experimenter was in charge of the motor-skill activities for 40 of the 45 sessions and aware of group assignments. Although every effort was made to maintain consistency in administration of reading activities across the treatment and control groups, it is not possible to rule out unconscious biasing.

Subjects were randomly assigned to the control or experimental group. The mean motor skills and motor score of both groups differed nonsignificantly. Therefore, post-test differences can not be attributed to initial nonequivalence.

Suggestions for Research

Further research is encouraged in several areas. First, this study should be replicated using a double-blind technique, that is an experimenter might train several assistants to administer the treatments. Therefore, neither the subjects nor the administrators would be aware of the purpose of the study.

Another potential relevant factor in this area of research is initial reading proficiency. It is possible that motor-skill activities would benefit below average, average, and above average readers differently. Similarly, it would be helpful to know how this program would benefit younger or older children than those used in the experiment. Additionally, sex, age, and culture are factors which merit investigation.

The motor-skill activities were done for 45 one-half hour

sessions. It would be useful to determine the effect of more lengthy programs of motor-skills. Finally, the current study measured only immediate effects of motor-skills activities on reading ability. Follow-up assessments of long term effects is an important dimension for study.

Implications for Clinicians or Teachers

From the results of this study, it may be seen that motor skill activities improved reading ability. Formal curriculum of motor-skills exercises should be developed for third grade children. These activities could be incorporated into the activities of the school day.

Perhaps children who have reading problems would also benefit from motor-skill activities. Clinicians and teachers are constantly searching for ways to help children who have reading problems. Aides could be trained to administer these activities.

Summary

A review of the literature indicates there is a positive relationship between a physical education program of motor-skills and reading ability. It was the purpose of this study to present a perceptual motor skills program to third grade students and to examine its effects on the reading skills of these children. It was hypothesized that the reading skills of these third grade students would improve following exposure to motor skills

activities.

Nineteen third grade students comprised the sample. Ten were randomly assigned to the experimental group. These students were given a half-hour training session in motor-skills activities five days per week for nine weeks. There were nine students assigned to the control group. Control students were given free play during this half-hour segment of time. All students were pre and post tested on the Reading Subtests of the California Achievement Test and The Perceptual Motor Screening Test.

Analysis of Variance and one-tailed t tests were used to analyze the data. The results indicated support for the hypothesis. The treatment group produced a significantly greater improvement in reading skills than did the control group. The findings suggest that a structured motor-skills program does enhance the reading skills of children.

References

- Anastasiow, N. Oral language and learning to read. Anaheim, California: 1970. (ERIC Document Reproduction Service No. ED 043 453)
- August, I. A study of the effects of a physical education program on reading readiness, visual perception and perceptual-motor development in kindergarten children (Doctoral dissertation, New York University, 1970). Dissertation Abstracts International, 1970, 31, 2121A. (University Microfilms No. 70-21, 159)
- Campbell, M. Prekindergarten training and its relationship to the first grade reading achievement of educationally disadvantaged children (Doctoral dissertation, University of Southern California, 1969). Dissertation Abstracts International, 1969, 30, 4673A. (University Microfilms No. 70-08, 519)
- Cohen, S. A dynamic theory of vision. Journal of Developmental Reading, 1962, 16, 15-25.
- Delacato, C. Neurological organization and reading. Springfield, Illinois: Charles C. Thomas, 1960.
- Durkin, D. What does research say about the time to begin reading instruction? Journal of Educational Research, 1970, 64, 51-56.

- Eitman, T. Readiness: Some travel faster than others, a unit on reading readiness. Council Bluffs, Iowa: Project Impact, 1969.
- English, H. Dynamics of child development. New York: Holt, Rinehart, & Winston, Inc., 1961.
- Falik, L. The effects of special perceptual-motor training in kindergarten on reading readiness and on second grade performance. Journal of Learning Disabilities, 1969, 2, 395-402.
- Fries, C. Linguistics and reading. New York: Holt, Rinehart, & Winston, 1962.
- Frostig, M., & Maslow, P. Reading, developmental abilities, and the problems of the match. Journal of Learning Disabilities, 1969, 2, 571-574.
- Getman, G., & Kane, E. The physiology and readiness: An action program for the development of perception for children. Minneapolis, Minnesota: Programs to Accelerate School Success, 1964.
- Getman, G., Kane, E., Halgren, M., & McGee, G. Developing learning readiness. Manchester, Missouri: Webster Division, McGraw-Hill, 1968.
- Gibson, E. The ontogeny of reading. American Psychologist, 1970, 25, 136-143.

- Glass, G., & Robbins, M. A critique of experiments on the role of neurological organization in reading performance. Reading Research Quarterly, 1967, 3, 5-51.
- Hackett, M. A hierarchy of skills in listening comprehension and reading comprehension (Doctoral dissertation, University of California, 1968). Dissertation Abstracts International, 1968, 30, 109A. (University Microfilms No. 69-14, 900)
- Jersild, A. Child psychology. Englewood Cliffs, N.J.: Prentice Hall, Inc., 1960.
- Kephart, N. The slow learner in the classroom. Columbus, Ohio: Charles E. Merrill Books, Inc., 1960.
- Lerch, H., Becker, J., Ward, B., & Nelson, J. Perceptual-motor-learning theory and practice. Palo Alto, California: Peek Publications, 1974.
- Lipton, E. A perceptual-motor development program's effect on visual perception and reading readiness of first grade children. Research Quarterly, 1970, 41, 402-405.
- Livo, M. Reading readiness: Research in review. Bloomington, Indiana: Indiana University, ERIC Clearinghouse on Reading, 1972.
- MacGinitie, W. Evaluating readiness for learning to read: A critical review and evaluation of research. Reading Research Quarterly, 1969, 4, 396-410.

- Painter, G. The effect of a rhythmic and sensory motor activity program on perceptual motor spatial abilities of kindergarten children. Exceptional Children, 1966, 33, 113-116.
- Pryzwansky, W. Effects of perceptual-motor training and manuscript writing on reading readiness skills in kindergarten. Journal of Educational Psychology, 1972, 63, 110-115.
- Radler, D., & Kephart, N. Success through play. New York: Harper & Row, 1960.
- Resnick, L. Design of an early learning curriculum. Pittsburgh: University of Pittsburgh, Learning, Research, and Developmental Center, 1967.
- Rutherford, W. Perceptual-motor training and readiness. In J. Figurel (Ed.), Reading and inquiry (International Reading Association Conference Proceedings Vol. 10). Newark, Delaware: International Reading Association, 1965.
- Scott, B. Perceptual skills, general intellectual ability, race, and later achievement of reading. Reading Teacher, 1970, 23, 660-668.
- Stone, M., & Pielstick, N. Effectiveness of Delacato treatment with kindergarten children. Psychology in Schools, 1969, 6, 63-68.
- Summers, E. Toward a research definition of reading. Winnipeg, Manitoba: Conference of the Canadian Council of Teachers of English, 1970. (ERIC Document Reproduction Service No. ED 047 902)

Van Camp, S. An auditory and visual discrimination test for kindergarten and first grade children: A new approach (Doctoral dissertation, University of Massachusetts, 1970). Dissertation Abstracts International, 1970, 31, 5680A. (University Microfilms No. 71-04, 486)

Zietz, M. B. Developmental visual perception for reading. The Slow-Learning Child: Australian Journal on the Education of Backward Children, 1970, 17, 16-26.

8108 18 8 MM
NO LINES