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Importance of perceptional-motor (and motor) coordination of readiness for beginning reading as viewed from the field of learning disorders

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THE IMPORTANCE OF PERCEPTUAL-MOTOR (AND MOTOR) COORDINATION OF READINESS FOR BEGINNING READING AS VIEWED FROM THE FIELD OF LEARNING DISORDERS

by

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PREFACE

Lower elementary teachers for many years have been concerned about judging a child's readiness for beginning reading. The usual criteria for measuring a child's readiness involve his mental age, chronological age, social development, general interest in wanting to learn to read, reading readiness test scores, and lastly, his motor development. These criteria have long been used by many kindergarten and first grade teachers and have proved valuable in some classrooms.

It was the purpose of this paper to explore further the concept of motor development as a valid criterion for appraising readiness. Two questions that the writer wanted to answer through a review of research then were: What exactly is the significance of motor development? and What are the results of perceptual-motor training on reading readiness?

The writer wishes to express her gratitude to the administration and staff of Cardinal Stritch College for its creative environment which has allowed her to complete this work and especially to Sister Gabrielle Kowalski who provided a graduate assistantship in special education and who supervised this paper.

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THE PROBLEM

Statement of the Problem

This review was designed to investigate whether children would improve in reading readiness, as measured by standarized tests, through participation in readiness programs which included motor coordination and visual perception activities. The literature in the area of perceptual motor development and its relationship to reading readiness was examined. The reviewer encountered a few obstacles which at first seemed to hinder the progress and validity of the review: (1) the limited quantity of published research dealing with the problem, and (2) the lack of adequate testing instruments and reported test results.

Chapter II of this paper is a review of the available research. Most of the literature has been written within the past ten to fifteen years. The articles have primarily presented the effect of motor coordination activities and visual perception activities in beginning reading. Chapter III presents a discussion concerned with the meaning and the implications of the research presented in Chapter II.

The second limitation met concerned selection of testing instruments. In order to test the hypothesis that children who are given motor coordination activities improve their readiness for reading more than other children, a readiness test has to be used. Although there are many readiness tests available, the Metropolitan Readiness Test (Nurss and McGauvran, 1976) was selected most often as the instrument to measure children's readiness since (1) it could be given to a small group; (2) it is the test which is customarily given to kindergarten children at schools where studies were being conducted; (3) it has subtests which measure children's motor coordination and visual perception skills; and (4) it is a reliable and valid test.

In order to test the theory that children do or do not improve in reading readiness due to motor coordination activities, a test had to be selected that measured children's motor coordination before and after the coordination training program in order to observe a growth pattern. The test generally selected was the Perceptual-Motor Survey (Kephart, 1960). The test was validated on a normative study of only two hundred children. The coefficient of stability was found to be .946. Although this survey test is not used excessively, the reviewer feels that it is the best selection available since it does not require extensive and expensive physical education apparatus for testing and it incorporates eye-hand coordination which some motor development tests do not.

A newer screening test (Cratty, 1969) based on a sample of 83 pupils, has test-retest reliability of .91, a respectable figure. As this test gains popularity, it may be worthy of study.

Importance of the Study

There has been great emphasis put on reading readiness for several decades. Educators are concerned about how to improve children's readiness and also how to judge or measure successfully that readiness. Reading readiness can be evaluated in terms of a child's emotional, intellectual, social and motor development. This study concerns itself with the child's readiness for reading, mainly his control, manipulation and coordination of the parts of his body. Achieving motor coordination is considered by some educators to be extremely important since some types of reading disabilities have been linked to lack of sufficient motor coordination. Kindergarten and primary teachers need to put emphasis on these motor areas of development. An important skill necessary for beginning reading is perception. "The perception process begins with gross motor awareness" (Fitzgerald, 1973, p. 415). As a child develops in his movement patterns, he also develops his perceptual skills necessary for beginning reading. Thus, the investigation undertaken in this study can help a teacher better understand the importance of and relationship between motor coordination and reading readiness.

It is hoped that this paper will serve the classroom teacher, the physical educator, the special educator, and the parent interested and concerned with developmental physical education, motor development, school achievement and perceptual motor accomplishment. It is also hoped that motor development and movement behavior can be viewed as factors in human performance.

Definitions of Terms Used

For the purposes of this study the following terms will be defined so that the writer can communicate with the reader more accurately.

Reading readiness--"Readiness is the stage in a child's development when he can learn easily, effectively, and without emotional disturbance. It cannot be a definite point in development, however, because growth is a steady, continuous process, always ongoing. Rather it is a condition, or state, indicating that a child is ready to read" (Burton, et al., 1969, p. 167).

Laterality--"Laterality is the internal awareness of the two sides of the body and the recognition that they are different" (Kephart, 1970).

Directionality--"Directionality is the external awareness of left and right, up and down, and before and behind. It develops after laterality is established" (Kephart, 1970).

Psychophysiological maturity--White and Phillips (1969) define psychophysiological maturity "to mean that a child's physiological equipment has developed to a degree appropriate to his chronological age, so that it (physiological equipment) will work efficiently for him in the tasks required in school learning" (p. 3).

Vision--For purposes of this study, the term "vision" implies more than the act of seeing with the eye. Vision also pertains to the act of perceiving and discriminating visual stimuli.

Organization

Chapter II of this paper presents the literature that has been published dealing with reading readiness and its relationship to reading, and tests that measure perceptual-motor skills and the reliability. Chapter III discusses the meaning and implications of the literature. Here, also, a sample perceptual-motor training program is presented. Chapter IV reviews the study and discusses its implications.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The role of reading readiness in school curricula has been recognized, discussed, and evaluated for many years by noted educators, administrators, principals, and classroom teachers. Readiness for reading is based on varied criteria. Important criteria are based on a child's stages of growth: (1) mental; (2) social; (3) emotional; and (4) motor. In the past ten years school authorities have greatly emphasized the need for helping children to develop intellectually at the kindergarten level in preparation for first grade formal reading instruction. In the field of learning disorders people began to investigate the role of physical readiness in the preparatory readiness period for later learning. It is the work of these people concerned with the relationship of motor readiness and beginning reading that is presented in this paper.

The presentation of the literature in this field of reading readiness and beginning reading is divided into

the following areas: (1) the importance of reading readiness; (2) perceptual-motor growth as related to reading; (3) laterality and directionality as related to reading; and (4) performance tests for evaluating perceptual-motor readiness.

The Importance of Reading Readiness

Both psychologists and educators agree that a child needs to be "ready" before he can learn new tasks. Both agree that a child can be trained and encouraged in preparation for specific learning if the necessary maturation is present. Most school systems have accepted these concepts and have set aside a specific preparatory period for developing readiness either at the kindergarten level or during the beginning weeks of first grade. The need for preparatory training was the basis of a new program formulated by the Lions Club at Winter Haven, Florida (Powers, 1972). The program was used in the Polk County, Florida, schools. The underlying philosophy of this program was "chronological 'readiness' is not enough, but rather . . . the child must 'learn' to learn" (p. 72). In other words, the old saying, "We learn by doing" was being applied. The children in the nine experimental classes were given specific training in the drawing of geometric shapes. These shapes were a circle, triangle, square, rectangle, and diamond. The children acquired readiness through the

use of geometric shaped templates, chalkboard drawing exercises, rhythmic training and body balancing activities. The results of the three year study showed that the children improved in perceptual development as measured by Kephart's Perceptual-Motor Survey.

Sister M. Bernetta, O.P. (1972), upon investigating visual readiness and visual perception, stated that:

> Readiness for learning is a growing into something. It is brought about by sufficient maturation and education which makes the learner more receptive, retentative, and integrative in his learning. (p. 82)

The importance of readiness was expressed by Hildreth (1947) in her book Learning the Three R's. "Twenty to twenty-five percent of first grade children fail annually, chiefly because of reading difficulty; this failure is attributable in part, at least, to lack of readiness" (p. 174). Gates and Bond (1978), highly respected educators in the field of reading, stated in an article dealing with determining factors of success or failure in reading that, "It appears that readiness for reading is something to develop rather than something merely to wait for" (p. 64).

Kephart (1970) has also stressed the importance of helping children achieve readiness through providing developmental activities. The uniqueness of Kephart's approach lies in strong emphasis on the sensorimotor basis of all learning, which consists of certain generalizations rather than highly specific skills.

> During the past two decades a great deal of research and clinical experimentation has proven that the basic skills acquired in the first half-dozen years of life are not entirely the result of maturation. Instead, they can be significantly improved--even supplied, where entirely missing--by learning. We now know that "readiness" is not only preparedness to learn, but also, to a significant extent, the result of learning. (p. xiii)

The problem of preparation for reading intrigued Monroe (1971); therefore, she devoted an entire book to the topic. In her book Growth Into Reading she speaks about all the areas of development, but here we are concerned with her viewpoint concerning motor readiness.

> Reading readiness activities are admirably suited to the transition period while movements of the smaller muscle groups are being brought into control. Reading readiness activities prepare a child for success in reading, accustom him gradually to longer periods of quiet activity, and serve as an excellent transition from large-muscle activities to the small-muscle coordinations necessary for reading. (p. 49)

From this literature one can say that reading readiness activities are necessary for beginning reading and children usually benefit from some type of readiness training.

Perceptual-Motor Growth as Related to Reading

> One of the many causes of reading disability is a defective visual-motor function. Between the ages of six and eight, visual-motor efficiency is at a critical point in development, and it is the time when most children are beginning to learn to read. (Walters, 1961, p. 370)

A study done by Walters (1961) concluded that reading retardation was related to delay in visual-motor development

in a sampling of second grade children. In this study, visual-motor ability was measured by scores obtained on a balancing test and the Memory-For-Designs Test (Graham and Kendall, 1960). The Metropolitan Readiness Test was the basic reading test used.

A paper organized by the staff of the optometric extension program described the relationship of perception, movement, and readiness to reading ("A Brighter Way of Life for All Children," 1971). The authors stated that readiness is a product of experience; experience depends upon movement; and visual development is related to success or failure in reading. More fully explained, this means that a child's readiness to experience new learning situations depends upon how he can organize and understand his past experiences. These past experiences are directly related to how the child has learned to move in organized patterns of action in his everyday world. Then there is a relationship between how he organizes his movement patterns and how well he interprets his world through his visual system. In their paper they presented two modes of development:

> Mode A:
> The development of general movement patterns for action:
> Guidance in this mode assists the child in learning to use his head, body, arms, hands, legs, and feet in moving about to explore his world and assists him in learning to guide these movements by using his eyes as his steering mechanism.
>
> Mode B:
> The development of special movement patterns of action:
> Guidance in this mode assists the child in learning to use his body parts concurrently to control and manipulate

> the things in his world, and assists him in learning to utilize these manipulations to develop the movements of eyes and hands in combination. (pp. 6-7)

Kephart (1968) also stressed the importance of having children develop a good perceptual-motor process through experiences that encourage them to manipulate objects and their own bodies in relation to the objects. Kephart stated that our American civilization is faced with a great dilemma.

> 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 . . . The things with which the child is surrounded are so complicated that, if he experiments with them, they will break and a highly expensive expert will be required to put them together again. (p. 15)

Thus, he feels many children enter our schools today lacking basic perceptual-motor skills. Sister M. Bernetta's (1972) ideas support Kephart's. She feels that modern conditions of living and the use of such things as playpens confine children too much during their growing years.

> Some children get to their feet too quickly and walk without creeping. These children miss some of the horizontalness and actually seem to get too much verticalness into their experience backgrounds. These children's eye movements are clumsy and jerky in the horizontal for reading. (p. 83)

The work of Getman (1962) is very similar to the work of Kephart. Like Sister Bernetta and Kephart, Getman states the need for helping children to develop perceptual skills necessary for beginning reading when he says:

> It is now known that most children, age six, have not adequately acquired the coordinations and neuro-muscular controls essential to advanced learning tasks . . . The free and easy, "Play as I wish," preschool years do not, in and of themselves, provide what the child needs for the cultural activity known as reading. Kindergarten, when available to a child, gives him some chance to organize and acquire a few of the above skills, but even this advanced activity program assumes that most of the basic developmental skills are present. (p. 34)

Getman also shows the relationship between body control and reading:

> Foundational to every intellectual activity of the human being is the skill of motor control and coordination. Movement and the efficiency of muscle use is a prerequisite for all knowledge and intellectual performance . . . The integration of all body movements is also a prerequisite for the refined motions so necessary to reading and writing in our schools and in our culture . . . If the gross motor control is lacking or inadequate, the more refined, special movements will be restricted or inadequate. These children will have great difficulty in visually following a line of printed words. They skip words, or lines, and lose their place on the page because they have not developed the coordinated rhythmical eye movements necessary for reading. (p. 39)

Fitzgerald (1973) also wrote about the importance of perceptual skill.

> The perception process begins with gross motor awareness. The random movements of a child in the early stages of development are not consciously controlled. As the child grows, control develops. Coordinating the eye and the hand, sensing the right side from the left side, extending this knowledge of laterality to determine a set direction, distinguishing figure and ground in objects viewed, and placing observations in appropriate space are the primary demonstrations of a child's capacity to control himself with basic perceptual skill. This control is a direct product of continuous comparing, relating, and integrating in light of one's immediate "set" and one's past experience. It is a control that is vitally necessary in beginning reading. (p. 415)

Cratty (1965) discusses perception from time to time; his primary interest is in the motor development of children. A strong advocate of motor education, Cratty expresses the opinion that it is in a child's best interest to have a well developed body, to be able to move with speed, agility, balance, and grace, and to have both strength and endurance. These are desirable outcomes in themselves, yet indirectly contribute to higher academic attainment.

Like the approaches of authors discussed previously in this chapter, Barsch's (1965) orientation remains essentially nonlanguage with the primary emphasis being upon perceptual-motor learning. Barsch is a man entranced with the world of space and movement within that space. More recently, Barsch's efforts have been directed away from the brain damaged child and toward developing a conceptual schema that describes the child as a learner and provides an approach to education designated as the "physiologic approach." The experimental curriculum for this approach is based on twelve dimensions of learning derived from what Barsch terms "movigenics." These dimensions of learning deal with muscular strength, balance, body awareness, tactual dynamics, kinesthesia, auditory and visual dynamics, bilaterality, rhythm, flexibility and motor planning. These were employed by Barsch (1965) in constructing a curriculum for children with learning disabilities which was sponsored by the Wisconsin State Department of Public

Instruction and was used experimentally at Longfellow School in Madison.

Marianne Frostig, founder of the Marianne Frostig Center of Educational Therapy, Los Angeles, California, has gained national recognition for her work in visual perception. Frostig's writings (1966) evidence the increased concern for the treatment of auditory, language, cognitive and academic problems. Her concern with motor learning in particular has led to the recent publication of an activities manual and some materials in the area of movement education (Frostig, undated). Recognizing that perceptual adequacy may be fundamental to academic success, Frostig's main interest centers on the development of perceptual skills rather than in providing instruction specifically in reading, spelling, and writing. Even when academic subjects are taught, their perceptual aspects are emphasized.

The factors which influence reading readiness are many and are very complex. They are often interwoven, and thus it is difficult to determine the individual factors weighting. The work of Kephart (1968), Getman (1962), Fitzgerald (1973), Sister Bernetta (1972), Cratty (1965), Barsch (1965) and Frostig (1966) strongly indicate that bodily control and movement are stepping stones in the development of perception necessary for reading activities.

The reader should note, however, that many professionals dispute their stated hypothesis that a lack of certain visual-motor skills, especially those measured by most currently available tests, adversely affects the acquisition of academic and other abilities. For example, Bateman (1964) has observed that "there are children who manifest severe spatial orientation, body image, perceptual, coordination, etc., problems and who are not dyslexic" (p. 11). This point was underscored by the recent work of Larsen, Rogers, and Sowell (1976) and by Larsen and Hammill (1975).

Relative to children with motor difficulties, Irwin and Hammill (1964, 1965) have consistently failed to find differences in perception, language, or intelligence between cerebral palsied youngsters with varying degrees of involvement. This finding is confirmed to some extent by the work of Birch and Leford (1964), who report that differences between cerebral palsied and normal children relative to visual form discrimination are of only slight functional significance. Thus the systems discussed in this chapter should be looked upon as sources of practical suggestions that might aid in the development of perceptual-motor skills; but it should not be assumed that a child who lacks some of these abilities is or will become a slow learner, or that he will necessarily have difficulty with academics.

Laterality and Directionality as Related to Reading

Laterality and directionality are directly related to body coordination. They are sometimes referred to as the component parts of coordination. As stated previously, laterality is the internal awareness of the two sides of the body and the recognition that they are different. Directionality is defined as the external awareness of left and right, up and down, and before and behind. Laterality must be achieved before a child gains directionality. Like other processes of development in young children, laterality relies on maturation but also on experiences, particularly experiences of "internal" and "external." Kephart (1968) said it can be learned by having the child experiment with the two sides of his body and having him see and feel their relationship to each other. One of the best situations a child can experience for developing laterality is one in which he must balance his own body.

> When experimenting with the balancing problem, the child must learn right and left, for he must learn how to innervate one side against the other, how to detect which side has to move, and how it has to move, in order to execute the appropriate compensatory movements as his balance varies from one side to another. (Kephart, 1968, pp. 65-66)

Laterality, the internal differentiation of the two sides of the body, is extremely necessary for a child to acquire during his preschool years. He can project his differentiation outward and thus be using the next skill of

directionality. Kephart (1968) feels that directionality needs to be acquired before a child can distinguish letters such as "b," "d," "p," and words such as "saw" and "was."

Discussion about laterality and directionality often leads to another topic which is highly disputed in the field of reading, mainly lateral dominance. One of the pioneer researchers in the area of lateral dominance was Orton (1928) who reported his work in the 1920s. He based his work upon the theory of neurological organization of humans. Orton hypothesized that if cerebral dominance was well-developed by the time reading began, reading difficulty would not occur (Orton, 1928). He felt that the incomplete establishment of lateral dominance caused such handicaps as stuttering and reversals in reading. Later researchers, such as Harris (1973), Ihinger (1963) and Delacato (1973) studied the misconceptions and loopholes in Orton's work. Delacato (1973) in his book Treatment and Prevention of Reading Problems emphasized the need for early detection of neurological disorders so that reading problems can be prevented. He placed emphasis on prevention rather than treatment. Research today seems to be swinging toward directional confusion rather than lateral dominance as a cause for reversals in reading. As reported in Harris's (1973) book, Reading on Reading Instruction:

> The problem of reversed orientation in reading perception has become confused with left- and right-sidedness, but it is becoming clear that the major question for reading is the presence or absence of directional confusion rather than which hand or eye is preferred. (p. 51)

Ihinger (1963) reported that the studies done on the relationship of lateral dominance and reading success are conflicting. He stated that the discrepancies in the conclusions reached are due to the types of testing instruments used. In other words, some investigators asked their subjects to perform a small number of tasks in order to determine which hand they preferred. Even children who were strongly right-handed would often choose the left hand because of proximity to an object or because of the simplicity of the skill required.

Performance Tests for Evaluating Perceptual-Motor Readiness for Reading

If some research and theory agree that children need to develop motorically in preparation for formal reading instruction, then some type of valid instrument should be used to help teachers determine a child's readiness, especially physical readiness. Various tests have been developed that measure children's perceptual-motor readiness. The tests incorporate sub-tests designated as tests of coordination. These usually require a child to draw some of the basic geometric shapes.

Tests incorporating perceptual-motor tasks are not new. The original Binet-Simon Test of Intelligence includes perceptual-motor tasks such as matching forms. Gesell (1941), working in the area of child development, stressed the importance of the drawing of basic geometric shapes at different age levels. Tests which are being used today for testing perceptual-motor readiness will be discussed later following the presentation of how the drawing of a geometric shap can test motor and visual ability.

One of the basic shapes a child is required to draw on most of the tests is a square. It might be difficult for an adult to realize the thinking and necessary movements required to draw such a simple design. Kephart (1968) has said:

> In order to draw a square, the child must have learned to coordinate his eye movements with his hand movements. The recognition of right and left, up and down, forward and backward, and so forth, in space or on paper, develops first within the child's own body in terms of the muscle movements he makes. In order to draw a square he must connect these internal feelings with the visual pattern in front of him so that he knows rapidly and accurately that two of the lines in the square go up and down, while the other two go left and right. Even more subtle and more difficult is the necessity to begin a movement and then to change the direction of that movement as one does in getting around the corners of a square. This requires muscle coordination. Each movement and each change in direction of movement must be controlled by a visual stimulus. The child looks at the square. Then he must take the parts thereof and put them together in a series to make his square. (pp. 65-66)

Kephart feels that greater success in developing readiness accrues from breaking down simple activities into more basic skills and teaching those skills. Furthermore, he states that no training technique should be considered a goal in itself but the technique is characterized by process-oriented teaching.

Vernon (1973) in "The Development of Visual Perception in Children," stated that research has shown that the copying of more complex geometric designs reveals such things as treatment of interior detail, direction of lines made, relationship of the parts in comparison to the whole, etc.

One test widely used for testing perceptual-motor growth is the Bender-Gestalt Test (Bender, 1970). Koppitz, Mardis, and Stephens (1971) used this test for testing 272 beginning first graders in the Montgomery County, Ohio, Public Schools. Of the eleven classes used, eight were tested with the Lee-Clark Readiness Test (Lee and Clark, 1962), and three were tested with the Metropolitan Readiness Test. All subjects were also tested individually on the Bender-Gestalt Test by a psychologist. The results showed that in this particular sampling, the Bender-Gestalt Test could predict readiness for reading as well as either the Lee-Clark or Metropolitan Readiness Tests.

Parrish (1962) in an unpublished doctoral thesis reports that the Bender-Gestalt Test could differentiate

between readers and non-readers. Keogh and Smith (1965) tested 149 middle socio-economic level children using the Bender-Gestalt. They found correlation coefficients between the tests and teachers' predictions was .70.

An examination of the Metropolitan Readiness Test (Nurss and McGaurran, 1976) shows that two subtests deal with visual-motor ability. They are matching shapes and copying designs. Another test of perceptual-motor growth is the Roach and Kephart Percpetual-Motor Survey (Roach and Kephart, 1960).

Justison (1973) also used a copying ability test to determine if a relationship exists between copying performance and reading achievement. A sampling of 398 children in the third grade in the Montgomery County Schools, Maryland, were given a copy-test designed by Justison with figures taken from the Bender-Gestalt and the Memory-For-Designs Tests. Each figure was given a total of ten points. The study revealed positive correlations between copying ability and tests of achievement in reading. Approximately two-thirds of the results indicate that such motor activity is linked with reading success.

A study by Lowder (1972) reported in Psychology in Teaching Reading, showed that the scores of 1510 first, second, and third graders in Winter Haven, Florida, who were given the task of drawing seven geometric forms, were very closely related to school achievement.

White and Phillips (1974) conducted a study to determine the role of psychophysiological maturity in school learning. They did three individual studies using Pelham, New York, school children. Results showed the following:

First Pre-Kindergarten Study

In may of 1972 they screened twenty-six pre-kindergarten children and predicted their readiness for reading the following January. The tests used for this group and in the following two studies were a test of perception and a test of coordination. Results with the pre-kindergarteners showed positive correlation with teacher placement and also with the Metropolitan Readiness test.

Second Pre-Kindergarten Study

In May, 1973, they repeated their screening process and found correlations just slightly below those of the first study.

First Grade Study, System-Wide

In September, 1973, they screened all first grade pupils. They then compared these September predictions with reading achievement in January, 1974. Predictions were statistically significant beyond the .001 level of confidence. In the discussion of the study, they stated that one implication is that children's percpetion and coordination are indeed related to early reading ability. Another

implication is that further research should be undertaken to determine if children would benefit from training in perceptual and coordination skills.

Summary of the Literature

The literature reviewed holds that readiness depends on maturation, but that readiness can also be taught or developed. Theorists feel that children can benefit from improvement of or introduction to basic skills through readiness activities, and these reading readiness activities are necessary before formal reading exercises for the purpose of coordinating smaller muscles.

Reading disabilities can be caused by defective visual-motor functioning. It has been found that poor visual-motor skills are related to reading retardation. There is a definite relationship between movement, perception, readiness, and reading. The importance of development of general movement patterns and then special movement patterns has been stressed.

All the literature reviewed emphasizes that children living in our American civilization are deprived of many experiences and situations in which they can develop their muscles, learn to coordinate their body parts, and learn perceptual skills. Furthermore, theorists summarize that the ability to generalize in higher mental processes

(basically reading) grows out of and has a foundation in ability to form motor generalizations.

Laterality is the internal awareness of the two sides of the body; whereas, directionality is the external awareness of left and right, up and down, etc. Laterality can be learned by experimentation with the sides of the body and is necessary for distinguishing objects.

Orton (1928) stated that reading problems can be caused by the lack of fully developed cerebral dominance; Delacato (1973) added that poor neurological organization can cause reading problems and encouraged early recognition of disorders. Harris (1973) emphasized directional confusion as the cause of reversals.

Reviews of studies in the field of lateral dominance show that most of the research contains discrepancies because of faulty construction of a sound experimental program and vagueness in defining terminology.

Numerous performance tests are available to measure children's perceptual-motor growth. Children are asked to draw a geometric shape such as a square like they see on the chalkboard, flashcard or in a book. This requires eye-hand coordination, recognition of direction, use of visual stimuli and the discrimination of interior details. Several motor test results with pre-kindergarten and beginning readers correlated positively with teacher ratings and readiness test scores and reading achievement.

Literature in the area of perceptual-motor readiness for reading has just been reviewed. In the following chapter the meaning and implications of this research is discussed.

CHAPTER III

INTERPRETATION OF THE LITERATURE

Introduction

In order for literature to have an impact, it needs to be evaluated and the principles applied and retested. Therefore, the purpose of this chapter is to explain: (1) the meaning and implications of the literature reviewed in the previous chapter, and (2) the motor coordination skills that need to be developed in young children.

The Meaning and Implications of the Research

All of the literature reviewed implied that children need to be "ready" for reading. Gates (1978), Bond (1965), Kephart (1968) and Getman (1962) stated that readiness depends on maturation and learning. Lee and Lee (1968) wrote "The child's readiness is a combination of biological development, including both physical change and growth of the nervous system, and his previous learning" (p. 359). If this is the case, then school authorities and curriculum planners need to provide some type of readiness period for school beginners. The work of Kephart (1968) and Sister Bernetta (1972) showed that children may be very inadequate in body coordination. Coordination is the foundation for

later developments such as perception. Past research has also illustrated that perception is a basic skill used in the process of reading (Fitzgerald, 1973).

Since the studies discussed in Chapter II seem quite valid and reliable, teachers of kindergarteners and first graders might consider heeding the advice of the researchers in order to begin to evaluate their readiness programs. The literature definitely emphasizes the need for including physical motor coordination activities since children during their preschool years are living in an environment that deprives them of development of muscular coordination. Teachers might also want to include visual skill activities since the three year study at Winter Haven concluded that children benefit and improve in reading achievement when given directed instruction in the reproduction of geometric shapes. Likewise, Hurlock (1976) states, "In copying geometric figures which require fine coordination of the finger muscles, children show rapid improvement up to the age of seven years" (p. 154).

Another implication that the literature suggests is agreement that teachers need to look at their schools' testing and evaluation programs. Are the schools testing a child's readiness in all areas? Is the emphasis put primarily on intellectual readiness judged by a child's score on verbal and informational tests? The literature

discussed in the last chapter strongly advocates incorporating into the testing program some type of instrument that would test a child's perceptual-motor growth. The literature reviewed many tests that have proven worthwhile as predictors of readiness and later reading achievement. These tests are the Metropolitan Readiness Test, the Bender-Gestalt, Justison's Drawing Test, and Kephart's Perceptual Motor Survey. A readiness program, including motor coordination activities and visual perception activities with a mode of evaluating the worth of each of the activities would support some of the previously discussed concepts.

Children need to be given opportunities for development of basic skills. "Skills must be learned, but <u>when</u> they are learned is as important as <u>how</u> they are learned" (Hurlock, 1976, p. 154). The inclusion of motor skill activities in a kindergarten curriculum should encourage youngsters to participate and receive satisfaction from their growth and achievement in mastering the basic motor skills. In order for the child to receive satisfaction and not frustration while doing the skill building activities, the classroom teacher has to be able to determine the level of motor development which the child has reached. Readiness tests which include subtests measuring motor development are helpful. Teachers should keep in mind the varying abilities of different children in regards to motor development.

These concepts concerning the importance of motor skill activities were formulated after reading the literature reported in the previous chapter.

The Behaviors That Need to be Developed in a Readiness Program

If a kindergarten teacher is going to use a readiness program based upon the physical development of the child, she needs to have a clear concept of the specific behaviors that a pre-reader needs to acquire before beginning the reading process. Researchers, such as those cited, have identified some of the basic skills to be developed, such as control of large and small muscles, coordination of finer muscles, awareness of left, right and other directions, and improvement in the use of the eyes.

In the following paragraphs, these basic skills are considered along with suggestions illustrating the development of the skills for effective beginning reading. For purposes of clarity, these skills have been arranged into major categories. These categories are: large muscle control; small muscle control; left and right differentiation; eye-hand coordination; and visual perceptual skills. These skills usually follow a sequential development according to Lee and Lee (1968) but may also develop simultaneously. There may also be the later acquisition of skills which usually are developed first. For example,

children can walk without passing through the crawling stage, although most children crawl before walking. Some beginning kindergarteners may be very adept when using fine muscles but can be very awkward when using large muscles. Generally, children master large muscle control before small muscle control. Thus, it is important to remember that children acquire these skills individually and do not always follow a set motor developmental pattern. On the contrary, Delacato (195) concludes:

> Neurological organization is that physiologically optimum condition which exists uniquely and most completely in man and is the result of a total and uninterrupted ontogenetic neural development. The development recapitulates the phylogenetic neural development of man. (p. 19)

Subsequently, Delacato's basic premise that if man does not follow the sequential continuum of neurological development, he will exhibit problems of mobility and/or communication. There is much recent criticism of Delacato's theory.

Small muscle control should be achieved after control of the large muscles is adequate. Small muscular control requires finer movements such as the use of hands and fingers and eye movements. Small muscle control is necessary for writing, pointing, and turning pages. Control of small muscles under some conditions helps a child to eliminate habits such as tapping of the feet or fingers or blinking of the eyes. These nervous habits can interfere with a child's attention span for reading and concentration on reading material. Tapping and blinking could slow down a child's reading rate.

Previous to the learning of left and right in his environment, a child must have had experiences that permitted him to gain laterality. The differentiation of left and right is necessary for writing reading seatwork, distinguishing the sequence of letters forming words, distinguishing letters that look similar, and determining the left side of a page for left to right word progression. For example, a child may be confused if he cannot distinguish "b" from "d" because of inadequate knowledge of left and right. Unawareness of left from right can cause a child to read "bib" from "did" and destroy a child's fluency and comprehension. A child also needs to know what "left" means in order to know on which side of the page he should begin and which direction he must move his eyes.

Eye-hand coordination involves control of small muscles and the manipulation of the eye and the hand together in a coordinated movement. The child must have control of his large and small muscles before he can begin to integrate movements of various parts of his body. Eye-hand coordination is necessary since it trains a child to use his eyes for seeing an object and then being able to reach and touch it with his hand. Eye-hand coordination is necessary in beginning reading when a child reads chart stories and chalkboard stories and must locate specific

words as part of the reading lesson. Hand movements also help to direct eye movements during early eye improvement training. Eye-hand coordination is used when doing reading seatwork also.

Most children are given an eye examination before they enter first grade. The test most often used is the Snellen Vision Test. Through the use of this eye test, the children's far point vision can be screened. Those who have poor vision are referred to an eye doctor. Good vision is essential for reading both at a distance and at near point.

Children need to be trained in using their eyes effectively. They must develop visual perception skills. "Visual success is reading success" (Getman, 1961, p. 1). First of all, a child must learn to see whole objects. Seeing something in its entirety is one of the fastest ways of identifying objects. For example, a cat is more easily identified when viewed as a whole animal rather than just by its eyes, ears, tail, etc. A child must also learn to discriminate between similar objects. To do this, he has to perceive small details and parts of the object which separate it from like objects. "Pat" and "Pot" are similar in appearance, but differ because the middle letters are not identical. Another important visual perception skill is spatial orientation. In learning this skill, the child

must learn to see things at various angles, such as inverted and backwards. The training for better perception helps to develop efficient visual perception in young children.

In summary, the behaviors to be developed are large muscle control, small muscle control, eye-hand coordination, and visual perception skills.

A Sample Perceptual-Motor Training Program

The methods and techniques included in the category of perceptual-motor processes are strongly developmental in orientation and place great emphasis on early motor learning and visual-spatial development of the child. A sample training program would begin after completion of the initial testing program in early fall.

An experimental kindergarten group could begin its training daily. This perceptual-motor training could last for ten to fifteen minutes and come at the end of the free activity period. Thus, other parts of the curriculum could be carried on as usual. Based upon the diagnostic testing, some of the activities are solely individualized for purposes of practice or remediation. Other activities are done by everyone at the same time. It is advisable to remember the following important facts:

1. Children for whom the techniques would be beneficial are varied; the classification is not

important in determining whether to use these procedures; rather, the developmental level of the child in sensory-perceptual-motor areas is the crucial factor.

2. Watch for fatigue. Children tire easily at such a young age.
3. Give encouragement. Children will try harder and be more successful when praised.
4. Give repeated guidance. Children need to be shown and then given both visual and oral directions repeatedly. Motoric guidance is offered.
5. Retention. Children will retain more information when skills are taught in a rhythmic and integrated nature and through a process of overlearning. Retention will be best when, previous to practice, the children have been informed that they must retain the skill taught and told how the skill is to be used.

The activities selected for this sample program are gathered predominantly from the activities suggested by Getman (1961) and by Kephart (1960, 1968). Cratty (1969, 1967) has several books filled with educational ideas; Getman (1962) outlines a program for development of visual perception and closely related skills: general motor patterns; special movement; eye movement; visual-language and visualization that offer a framework for added understanding of training programs. Following, too, are a few

activities that the writer thought were also good for building motor coordination skills. Included are short descriptions of the skills that each particular activity can develop. These skills are large and small muscle control, directionality, visual perception, etc. The activities are:

Angels in the Snow

In this activity the child is flat on his back with his legs together and arms at his side. He moves his arms and legs according to oral directions. Directions include both arms, both legs, right arm and right leg, left arm and left leg, right arm and left leg, etc. Movement is done according to count and later with music. This exercise activity makes a child aware of the parts of his body, give practice in muscular control, provides for coordination of arms and legs, and helps to overcome overflow of energy in unnecessary movements.

Walking Board

The walking board is a two by four board that provides an opportunity for children to practice walking narrow surfaces. The children begin walking on the four inch side of the twelve foot board. When they have mastered this, they switch to the two inch width. The children walk the board forward, backward, and sidewise. It is

similar to walking along the rails of a railroad track. The walking board helps the child to learn to balance. When experimenting with the balancing board, the child must learn right and left. He must learn how to move the appropriate side as his balance changes from one side to another. The walking board also aids a child in learning directionality. He learns to move to the right, left, forward, and backward. Also learned is eye-foot coordination since the child learns to use the far end of the board as a visual goal which he is trying to reach.

Balance Board

The balance board is a board that is eighteen inches square. Attached underneath this square board is a three inch cube platform. Thus the larger square is elevated off the ground by the smaller cube. This board encourages the child to practice balancing. At first it appears difficult for the children but with the helping hands of the teacher they can soon learn to balance. The object is not just to balance on the board but to move the feet toward the edge of the board, make it "tippy" and then regain your balance. A child learns from losing his balance and then learning how to correct it. In this skill activity the child learns balance, control of body, posture, and laterality.

Obstacle Course

This activity is delightful to children. There are no set directions or pieces of equipment. Chairs, tables, tunnels, hoops, ropes, etc. are used in the classroom. The children play follow the leader and travel around the room on the obstacle course. This game activity teaches children to control their body parts such as arms and legs which may knock objects over, to use their eyes for directing their movements, to judge spatial openings, and to revert back to the crawling stage. Footprints painted on a playground for children to follow also provide an opportunity for learning differentiation of left and right.

Jumping Rope

This activity also is not new but very delightful and instructional. By jumping rope the children learn eye-foot coordination, rhythmical movement of body parts, and the skill of jumping on both feet.

Climbing Apparatus

On climbing apparatus, children can learn laterality, directionality, balance, movement of a specific body part, eye-hand coordination and eye-foot coordination for reaching a particular bar, and general large muscular development.

Chalkboard Exercises

Chalkboard exercises are of many types. Children can practice drawing straight lines between two end points and thus be developing left to right progression and also eye-hand coordination. By drawing circles, the children can develop control of arm and hand movements. The drawing of circles simultaneously with each hand can improve eye-hand coordination and coordination of two body parts, both arms. At the chalkboard, children can develop visual perception skills by practicing the copying of geometric shapes. In this activity they learn to view the entire figure and to organize the interior parts into the correct pattern.

Miscellaneous Activities

Some activities that can develop good eye-hand coordination are bean bag games, target games, bowling games, dropping bottle caps into a jar, throwing jar rubbers around a stationary post, working with peg boards and stringing beads. These activities are also good for control of body parts, mainly the arms.

Control of muscular activity and balancing can be learned by throwing and catching a ball. Rhythmic movement to music can help to develop bodily movement and control.

In summary, Cratty (1965) provides the educator with this suggestion for a program of instruction:

> To an increased degree it has been found that when a program of movement experiences is filled with academic content and/or requires a child to think, to make decisions about the learning process, and to engage in various intellectual operations, it is likely that such a program will exert a positive influence upon both academic competencies, as well as intellectual functioning. Programs of this nature should proceed along two main dimensions: on one hand, they should afford the child increased freedom to make at least some of the decisions about what he is undertaking, and secondly, situation and movement and action problems should be presented which contain increased difficulty, as the child evidences the ability to engage in single intellectual operations. (pp. 3-4)

This writer would recommend that a perceptual-motor training program in the schools be carefully evaluated and re-evaluated before implementation. The positive research findings suggest that perceptual-motor training can be effective. Therefore, this writer recommends that further research efforts be undertaken and suggests that these be directed toward the following:

1. Identifying the characteristics of children for whom training has been demonstrated to be beneficial.
2. Determining the optimal amount and type of training necessary to produce real perceptual and/or motor growth.
3. Continually demonstrating that perceptual-motor processes can actually be improved as a result of training.

CHAPTER IV

SUMMARY AND CONCLUSIONS

From this study of the literature, the writer concludes that children can benefit from perceptual-motor training. Thus, the writer advocates that curriculum coordinators, administrators and kindergarten teachers incorporate motor coordination activities and visual perception activities as described in this paper into a kindergarten readiness program in order to help children gain readiness for first grade reading.

The easiest way of appraising readiness is by observation and testing. The Perceptual-Motor Survey may be an instrument that should be incorporated into a testing battery in order to determine a child's perceptual-motor development. With both tools, the practitioner can observe a broad spectrum of behavior within a set of circumstances and environment. Perhaps current research with specific and varied kindergarten populations could test the worth of using this test along with a general reading readiness test. The results could certainly support the ideas set forth in this paper.

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