1970

Effects of Two Different Types of Physical Education Programs Upon Skillsdevelopment and Academic Readiness of Kindergarten Children.

David H. Fisher
Louisiana State University and Agricultural & Mechanical College

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EFFECTS OF TWO DIFFERENT TYPES OF PHYSICAL EDUCATION
PROGRAMS UPON SKILLS DEVELOPMENT AND ACADEMIC
READINESS OF KINDERGARTEN CHILDREN

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Health, Physical, and Recreation Education

by

David H. Fisher
B.S., Southwestern Louisiana Institute, 1950
M.Ed., Louisiana State University, 1957
January, 1970
Dedicated to my wife,

Shirley
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The author would like to express his most sincere appreciation to his wife, director of the school from which subjects for the study were used, and to her faculty, all of whom contributed greatly to the conduct of the study. Without their understanding and cooperation, it would have been impossible to have successfully completed the study.

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ABSTRACT

The main purpose of this study was to determine the effects of two types of physical education programs on motor ability, general intelligence, and academic readiness of kindergarten children with two different backgrounds of experience in physical activity. A secondary purpose of the study was to determine the relationships which existed between motor ability and general intelligence and between motor ability and academic readiness.

This study was conducted during the 1968-69 school year at a private kindergarten in Lafayette, Louisiana. Sixty-two children were used as subjects, thirty-eight of whom had been nursery school students during the previous year at this same school, and twenty-four of whom were new students at this school.

The subjects were tested early in the school year on a maze-type motor ability test developed for this study. A test of general intelligence and a test of general readiness were also administered.

The subjects were divided into two groups, both of which were presented with the same type academic program. However, the physical education programs in which the two groups participated were different. One group participated
in a traditional program, consisting of supervised free play and games while the other group participated in a sequential, individualized program of perceptual-motor activities.

The children participated in some phase of their respective training programs approximately twenty minutes a day, five days a week for twenty-two weeks. They were re-tested toward the end of the school term on a second form of the same two mental tests and on the same motor ability test.

T-tests were computed to determine the significance of the gains made in intelligence, readiness and motor ability. An analysis of covariance, utilizing a two-by-two factorial design, was used to measure the effectiveness of the two training programs upon both continuing and new students. Correlations were computed between motor ability and intelligence and between motor ability and readiness.

The findings of this study were:

1. Highly significant gains were made by all children in all areas tested, regardless of what type program they were in or what their background in physical activities was.

2. There was no significant difference between students in the sequential, individualized program and the traditional program in improvement of intelligence scores, readiness scores or motor xii
3. There was no significant difference between continuing students and new students in improvement of intelligence scores, readiness scores or motor ability scores.

4. There was no significant relationship between motor ability and intelligence or between motor ability and readiness.

Though all findings which involved a comparison of the effects of two types of programs or of two different backgrounds of experience must be reported as being non-significant, it was found that relatively high values existed in the area of motor ability, favoring the sequential, individualized program, and in the area of academic readiness, favoring the new student. It is felt that these values, though not statistically significant, do represent a meaningful finding.

Within the limitations of this study, the following conclusions were reached:

1. Significant gains in intelligence, readiness and motor ability of kindergarten children can be realized through participation in specifically designed programs.

2. Neither of the two types of physical education programs employed in this study was shown to be
significantly more effective than the other in improving kindergarten children in the areas of intelligence, readiness and motor ability.

3. There was no significant difference between the effects which different backgrounds of experience in physical activities had upon improvement of intelligence, readiness or motor ability of kindergarten children.

4. No significant relationship existed between motor ability and intelligence or between motor ability and readiness.
CHAPTER I

INTRODUCTION

The idea that a definite relationship may exist between various motor phenomena and mental ability is not new. Langfield, in discussing the historical development of response psychology, called attention to the fact that the early Greek philosophers, Plato and Parmenides, anticipated in their writings the theory that a positive relationship exists between intelligence and muscular coordination.

It was pointed out by Heath that the average person fails to notice a clear relationship between mental ability and motor coordination within the normal range of intelligence unless his attention is specifically called to the fact. He said if one happens to be familiar with the mental level of every individual in the group, and if he closely observes the group during periods of physical activity such as walking, running, swimming or similar activities, he will more than likely observe a trend toward better quality of

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motor coordination among the brighter members of the group. The duller members of the group seem to lack grace of movement. It is from observation of the mentally deficient that the relationship becomes more apparent.

Many theories have been introduced in recent years which have tended to lend support to this feeling. One is the organismic age theory by Olson which suggests that the general performance of a child is associated with certain factors closely related to total motor, emotional, social and intellectual development. It is suggested in this theory that under normal conditions, as a child develops in all these areas, a certain sequential pattern can be expected. Along this line the Gestalt psychologists have seen the necessity of considering the individual as a "whole" within the framework of his environment. Hence, it would seem to be impossible for educators and psychologists alike to separate these human elements when teaching.

Another theory has been proposed by Delacato which stresses a close relationship between physical and mental ability. This theory emphasizes the need for neuro-organization which, in normal children, he asserts, is the

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result of uninterrupted ontogenic development. The theory which he developed with the assistance of Doman is an outgrowth of studies and observations made by a noted neurosurgeon, Dr. Temple Fay, with whom they worked for several years after World War II. This theory suggests that normal physical developments follow a definite sequential pattern beginning with the tonic neck reflex and continuing in the form of such activities as crawling, creeping and walking in well-defined patterns. Each of these movements, they say, is controlled by a specific level of the brain. If any of these normal phases is interrupted or curtailed by some circumstance, an individual weakness, both in the form of physical coordination and mental ability may become evident. They devised a rating scale which they say indicates at which level the child or person functions normally and prescribed specific physical activities based upon this rating. Therefore they advocate that neural patterns omitted during neurological development of the child be introduced to him in order to compensate for these missing links. Consequently, as Smith pointed out, a large and basic part of this program is a rather rigid plan for the

performance and repetition of developmental locomotor activities such as crawling, creeping, and cross-pattern walking, among others.

This theory is very controversial and has not gained widespread acceptance by many professional groups. Though many children in this program have reportedly made great progress, critics claim that the great amount of time devoted to a child on this program is the real key to any success claimed. They feel this much time spent on other types of physical activities may prove just as successful.

A third and similar theory, the perceptual-motor concept by Kephart stresses complete perceptual motor development. This theory explains learning difficulties as a "breakdown" in the perceptual-motor development of the child. Such breakdowns in the developmental sequence may be the result of environmental deprivations, injuries or defects in the organism, or emotional pressures with which the child has been unable to cope. Many of the breakdowns reveal themselves in the early elementary grades through difficulties in learning and low academic achievement. Kephart therefore placed great stress upon furnishing very

young children with many perceptual-motor activities. Though Delacato agrees that much can and should be done with young children, he feels that these experiences might be presented at any age with good results.

During the past decade there have been many approaches to teaching children who had learning disabilities because of one reason or another. One component that has been common to all these programs has been the inclusion of a set of motor experiences.

The growth of motor therapy programs has been fostered by psychologists and educators working with children who have been considered to be "brain damaged," "mentally retarded," or "slow learners." Many of the children who have been tested were shown to possess higher intelligence quotients than might be indicated by the low scholastic achievement scores they attained. In addition to poor performance on scholastic achievement tests and tests of perceptual ability, many slow learners also seemed to perform poorly in test items selected to assess motor ability.  

It was pointed out by Smith that although the current programs about which we are concerned were established for children with learning disabilities, it would

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7Smith, op. cit., p. 28.

8Smith, op. cit., p. 30.
seem if the theories that guide them are valid, that similar experiences should be afforded all children whether or not they have learning disabilities.

Piaget\(^9\) stated that sensorimotor experience is basic to later intellectual operations of children. If this is true and if gross motor activity is an important factor in perceptual development, then no child should be deprived of such experiences.

Kephart,\(^10\) Delacato,\(^11\) and Gettman,\(^12\) among others, have suggested specific physical activities which they feel will help children develop along normal lines both physically and mentally. They point out that through sequential development of basic motor movements, children will be better prepared to approach their capacities for learning.

Humphrey\(^13\) said that if the greatest value is to be obtained from any of the branches of motor learning, a

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\(^11\)Delacato, *op. cit.*, pp. 102-122.

\(^12\)G. N. Gettman, *How to Develop Your Child's Intelligence* (Luverne, Minnesota: Self-Published, 1962), pp. 37-58.

multidisciplinary approach appeared essential. Unquestionably, he said, the physical educator was in an excellent position to play a leading role in expanding and implementing the almost limitless potential of the various dimensions of motor learning.

Smith stated that physical educators needed to know more about the neural basis of movement behavior and the interrelationships of voluntary movement and perception. They also need to direct their attention to the physical stimuli which are presented to children in the environment of the physical education class. With this kind of information, Smith indicated that it may be possible to construct valid and reliable tests of perceptual-motor performance that could be used to validate program experiences in which children participate. The physical educator would then be even more completely equipped to supervise any gross motor activity in which the child participates.

Many physical education programs on the lower elementary level, when they exist, have followed traditional lines, consisting primarily of basic playground games. Physical education as such at the kindergarten level has been practically nonexistent. For the most part, the

\[14\text{Smith, op. cit., p. 31.}\]
physical activity for the children was limited to free-play activities and various circle games. The increased emphasis which has been placed upon early learning and the acquisition of motor skills suggests that more thought and planning be devoted to this crucial area of development.

I. PURPOSE OF THE STUDY

The purpose of the study was to determine the effects of two types of physical education programs on motor ability, general intelligence, and academic readiness of kindergarten children with two different backgrounds of experience in physical activity. A secondary purpose of the study was to determine the relationships which existed between motor ability and general intelligence and between motor ability and academic readiness.

Specifically the study was designed to answer the following questions:

1. What will be the comparative effects of a traditional physical education program and a program of sequential, individualized physical activity on motor ability, general intelligence and academic readiness of kindergarten children, one group of which had previous experience in the individualized activities and the other group with none?
2. What will be the relationship between performance scores on a selected motor ability test and scores of general intelligence of kindergarten children?

3. What will be the relationship between motor ability performance scores and scores indicating general readiness of kindergarten children to perform well academically in first grade?

II. NEED FOR THE STUDY

It has been said that a large percentage of one's total mental and physical development occurs prior to the time he begins school. If this is true, as many writers have indicated that it is, and if there is a significant relationship between physical and mental ability, it would be wise to attempt to determine what types of physical activities would produce the most beneficial results with preschool children. When this is determined and these activities can be presented to preschool children in an efficient manner, it would seem that many of the social, psychological, physiological, and mental problems which may accrue as a result of poor physical ability may be alleviated. Indeed, it would seem possible that an adequate groundwork could be laid which would enhance academic achievement from the very beginning of one's formal education.
and prevent problems from being compounded.

It has been stated that physical education in kindergarten has been poorly defined, even among those people who say that it exists at all. It is important that the need for some type physical education program at this level be firmly established in the minds of educators. As this is accomplished, it then becomes imperative that programs be developed which will supply these young children with needed experiences. It should be the responsibility of physical educators to develop programs which will accomplish this purpose.

III. DEFINITION OF TERMS

**Continuing Student.** This referred to a student who had attended the school used in this study as a nursery school student and had participated in many of the activities presented in the sequential, individualized program.

**Dynamic Balance.** This term had reference to the situation in which the weight of the body was so distributed that the resultant forces were varying from moment to moment. Neuromuscularly, dynamic balance refers to the maintenance of an organized postural orientation under conditions in which the activity pattern of the muscles is continually changing so as to disturb the gross postural
orientation and require further muscular activity to re-establish the orientation. ¹⁵

**Intelligence Quotient.** This was the measurement of general intelligence of the child as assessed by the Pintner-Cunningham General Abilities Tests.

**Motor Ability.** This was the term used to assess the ability of the child to perform gross motor acts that were in the levels of ability of this age group.

**New Student.** This referred to a student who was new in the school which the subjects attended.

**Perceptual-Motor.** This term referred to reasonably complex voluntary movements involving the combining of sensory information and cues gained from the movement itself into an integrated task. ¹⁶

**Readiness.** As used in this study, this term referred to the academic readiness of kindergarten students to perform in first grade. Readiness was measured by the


Metropolitan Readiness Tests and the crucial areas tested were word meaning, listening, matching, alphabet, numbers and copying.

**Sequential, Individualized Program.** This was the physical education program in which the experimental group participated. It consisted of selected perceptual-motor activities arranged in a sequential order of difficulty in the areas of balance, agility, locomotor ability, eye-hand coordination, general body coordination and kinesthetic awareness.

**Static Balance.** This term had reference to the situation in which a body is acted upon by forces whose resultant was zero. Neuromuscularly, static balance refers to the maintenance of a specified posture in which the antagonistic muscles are so employed that there is a minimum of general body sway or finer muscle movements.\(^{17}\)

**Traditional Program.** This was the type physical education program which exists in most kindergartens. It consisted primarily of supervised free-play activities and selected playground games.

\(^{17}\) Seashore, *op. cit.*, p. 31.
IV. LIMITATIONS OF THE STUDY

Some of the children who were used in this study had been enrolled in the nursery school classes of this same school the previous year. At that time they were allowed to participate in some of the activities included in the sequential individualized program. Though the background of the new students was not known, it was assumed that they had not participated in these types of activities as the continuing students had done.

The physical activities in which all children participated while at school were rigidly controlled. However, no attempt was made to control the physical activities of the children while not at school.

It should be pointed out that the nature of children in this age group is such that performance in both the physical and mental areas are subject to fluctuation. Care was taken to establish a testing environment in which the degree of fluctuation would be minimal. However, it is possible that this aim was not achieved in some instances.
CHAPTER II

REVIEW OF RELATED LITERATURE

The review of related literature presented in this chapter was given under three main headings: (1) The Importance of Preschool Motor Activities; (2) Literature in Support of a Relationship Between Motor Performance and Intellectual Achievement in Young Children; and (3) Literature Disclaiming a Relationship Between Motor Performance and Intellectual Achievement in Young Children.

I. THE IMPORTANCE OF PRESCHOOL MOTOR ACTIVITIES

The statement was made by Gesell\(^1\) that the preschool period exceeds all other epochs in developmental importance. Though this period occupies approximately only the first seventy months of the individual's life, during this time the major portion of his total development takes place. Gesell\(^2\) pointed out further that the preschool period of development holds an undisputed preeminence in this development because of the simple fact that it comes first. Science, he said, has confirmed the judgment of common sense in this matter. The earliest periods of development


\(^2\)Ibid., p. 10.
are always the periods of most rapid, most intense, and most fundamental growth. The basic lines of both physical and mental organization are laid down during the formative preschool years. Retardation, abnormal pre-maturation, normal precocity, superiority, and normality all tend to reveal themselves well before the child cuts his first six-year molar.

It was asserted by Montessori\(^3\) that the ages between two and five were most important in the development of a child. She indicated that the child's absorbent mind, sensitive periods and formative period are all manifestations of an inner power that must be utilized during the child's early years. If children do not acquire skills in those activities for which they are physically, psychologically, emotionally, and socially ready, there will be no time later in their lives when they could acquire these skills as easily.

Headley\(^4\) pointed out that in the first five years of life, the individual changes from a newborn infant whose random movements are completely uncoordinated to an alert


child who, in gross muscular control, is very much the master of his motor self.

Cooper and Glassow\(^5\) stated that since children at an early age, certainly before six years, have the basic patterns of throwing, striking, and locomotion, it is possible that if these are not experienced at the time the nervous system is ready for them to be used the patterns will not reach their full potentialities. To those who say that movement patterns are innate and question the need for learning, they pointed out two basic reasons for early learning experiences. First, they said even innate patterns improved with practice and if not practiced at the time in which they appear naturally, they will never be as polished as they might have been. The second reason they gave was that man's basic patterns need to be and can be modified for specific situations.

Kephart,\(^6\) in support of his perceptual-motor development theory, pointed out the great demands that our modern civilization is placing on children. However, the very civilization which is increasing its demands is decreasing

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the opportunities which it offers the child for the very necessary experimentation with basic skills. It is necessary that the child be allowed to experiment randomly with things around him and with his own body in relation to these things. However, this has become more difficult to bring about with the increased amount of mechanization and inherent dangers involved with letting children experiment randomly. Kephart suggested that artificial means may have to be devised to provide additional practice in perceptual-motor skills to decrease the possibility of slow learners in the classroom. He said it may be necessary to bring the equivalent of ladders to climb, fences or railroad tracks to walk, or horses to ride, into the classroom and help the child build up sensory-motor skills which are required by the more complex activities of reading, writing, and arithmetic.

Cratty, Gettman, and Kephart also suggested physical activities which serve as substitutes for those activities which many children fail to experience. Some


8G. N. Gettman, How to Develop Your Child's Intelligence (Luverne, Minnesota: Self-published, 1962), pp. 48-64.

of these activities are included in this study and are discussed in Chapter III.

Godfrey and Kephart\textsuperscript{10} pointed out that preschool education culminates in a large number of skills, attitudes, and knowledges, many of which are of particular importance as underlying skills required by the activities which the school will present. The acquisition of these readiness skills is of extreme importance as a pre-condition for the learning situation which the school will offer. These writers stressed that readiness depended upon maturation and learning. The maturation phase of readiness is an extremely complex developmental process involving the development of muscles and myelinization of nerves which permit muscles to serve the interests of the developing organism. A large proportion of the learning involved in the development of readiness skills is motor learning. They pointed out further that even though students of child development have emphasized for some time the importance of motor learning, it was now time to give more attention to physical education as a process of developing basic motor patterns which can become the foundation for more complex learnings of the

classroom situation.

Hurlock\textsuperscript{11} stated that in preschool and in the early grades of elementary school, much emphasis is placed upon drawing, painting, crayoning, shopwork, writing and forming numbers. The child whose motor development is such that he can compete on equal terms with his classmates will be more successful and happier in school than will the child whose motor development lags behind and who, as a result, is slow, awkward, and unaware of himself.

During the first four or five years of life, Hurlock\textsuperscript{12} pointed out, the most important development along motor lines consists of the development of gross movements which involve large areas of the body, as in the case of walking, running, swimming and bicycling. After five years of age, the major development consists of the development of the finer coordinations which involve smaller muscle groups, as in the case of grasping, throwing and catching balls, writing or using tools. The child is ready to begin working more on balance during this time also because the cerebellum, or lower brain, which controls balance develops


\textsuperscript{12}\textit{Ibid.}, p. 136.
rapidly during the early years of life and reaches practically its mature size by the time the child is five years old.

Breckenridge and Vincent\textsuperscript{13} stressed the fact that the majority of the young child's social contacts are made through play, and his play, in turn, is largely in the form of motor activities. If the child wants to be able to have friends and playmates, he must be able to play the games they play and be fairly proficient in the types of skills exhibited by most of the group. They suggest that weaknesses in these areas may have a carry-over effect in the child's attitude and as a consequence, decreased academic interests.

Espenschade and Eckert\textsuperscript{14} concurred with Hurlock, Breckenridge and Vincent, Montessori and others on the importance of young children acquiring motor skills at early ages. They said that overprotection may hamper a child's motor development by instilling fear in the child at a time when maturation of certain abilities is taking


place. As a consequence, later on a child may be unable to participate satisfactorily with his peers because of this deficiency. Such an effect may snowball in that the child's inability to play on equal terms with others further limits his opportunities for practice and so he falls still further behind.

Johnson\(^\text{15}\) conducted a study in which he investigated the need for ample opportunity and acceptable means for children to exercise their emerging motor skills. The social behavior of nursery school children was compared with behavior of the same children after one-half their playground equipment had been removed. A significant increase in asocial play and physical assault was observed in the more barren surroundings.

McCaskill and Wellman\(^\text{16}\) conducted a study in which they attempted to determine the common motor achievements of children at the preschool level. They considered proficiencies of children from two to six years of age in such motor activities as ascending and descending ladders and


steps, hopping, skipping, jumping, balancing, ball throwing and catching and ball bouncing. They found that competencies in some of these areas began developing quite noticeably in the two- to three-year-old children and decidedly more so in later preschool years.

Sturt\textsuperscript{17} said "the school in any form takes little cognizance of a child under three years old, but yet a large part of his education is already achieved by the time he reaches this age."

Slingerland\textsuperscript{18} said "it is encouraging today that educators are questioning the placement of young children in regular first-grade situations wherein there is exposure to reading instruction just because they have reached the arbitrarily set chronological age of six or thereabouts."

Such arbitrary placement, she said, in disregard of individual needs, can and undoubtedly does, lead many young children into school lives of inadequate achievement or academic failure. Many screening procedures can be incorporated which can assist in early detection of problem areas and


point to methods by which weaknesses can be improved. Included in these methods are perceptual-motor activities.

II. LITERATURE IN SUPPORT OF A RELATIONSHIP BETWEEN MOTOR PERFORMANCE AND INTELLECTUAL ACHIEVEMENT IN YOUNG CHILDREN

Wellman, in an experimental study of the control of hand and arm movements among preschool children, found a correlation of $r = 0.73$ plus or minus $0.04$ for boys, and a $r = 0.76$ plus or minus $0.03$ for girls between Stanford Binet mental ages and scores on a path tracing test.

Cunningham, working with infants and young children, found "coefficients of correlation between motor scores and Binet mental ages which suggested a relationship at all levels."

Hertzberg, using an unselected group of forty-six kindergarten children between the life ages of four and six


years, utilized a 2 x 4 inch "walking board," ten feet in length, as one of eighteen tests used in a study of the relationship of intelligence to motor ability. Between his test and Stanford Binet mental ages, he found a correlation of 0.41 with chronological age when mental age was held constant.

Heath found a significant correlation between mental age and beam walking scores of endogenous mentally retarded boys. Meanwhile, no significant relationship was found between motor and mental scores of the exogenous mentally retarded boys.

Ismail, Kephart and Cowell studied the relationship between motor aptitude and intellectual achievement. They concluded that intellectual achievement can be predicted by motor aptitude test items. In addition, they advocated that the classification of children into identifiable subgroups in terms of level of achievement as well as sex

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tends to increase the power of prediction or the efficiency of estimating the intellectual component.

Ismail and Gruber\textsuperscript{24} conducted a study using over two hundred elementary school boys and girls in which they scored all subjects on performance of thirty-six different physical tests. An intellectual performance test, namely the Otis Short Form Test of Mental Ability, was given and correlation and ANOVA techniques were used to study the data. It was found that the highest correlations existed between the Otis I.Q. Test and tests of coordination and balance. Speed, power, and strength items had low predictive power for estimating intellectual achievement. They also concluded that an organized physical education program had no effect on I.Q. scores but did have a favorable effect on academic achievement scores.

Kagerer\textsuperscript{25} conducted a study in which first-grade children were tested to determine their ability in activities involving flexibility of the posturing mechanism. These test scores were then correlated with achievement in


school as measured by standardized school achievement tests. Substantial and consistent correlations were found between activities designed to measure ability to move within a posture and achievement in school.

Whereas the group of studies reported above employed correlational techniques to indicate relationships which existed between certain physical attributes and accepted criteria which assessed intelligence, most of the following are studies in which different types of programs were presented and the results compared to determine their relative effects upon the children. Some of these studies parallel the general procedure and objectives of the study the writer conducted.

Oliver conducted a study in which he used two matched groups of educationally sub-normal boys as experimental and control groups, respectively. The experimental group was given a ten-week course of systematic and progressive physical conditioning. Both groups were given physical and mental tests before and after the experimental period. The results showed that there was significant

improvement by the experimental group both physically and mentally. Though the writer said it was possible that the factor responsible for this improvement was emotional, he concluded that these effects were achieved through the medium of physical activity. He did not attempt to estimate the permanence of the gains made. However, he did indicate that the gains made were so marked as to suggest that more emphasis should be given to the physical education of educationally sub-normal boys.

Sloan\textsuperscript{27} administered the Oseretsky Test of Motor Proficiency to twenty mentally deficient children and twenty normal children. He found that the normal children performed significantly better on all six subtests than did the mentally deficient children. It was his conclusion that these results indicated that a positive relationship did exist between motor proficiency and intelligence.

Rarick and McKee\textsuperscript{28} conducted a study in which they compared the academic performance of a group of lower elementary children who were superior in motor performance

\begin{itemize}
\item \textsuperscript{27}William Sloan, "Motor Proficiency and Intelligence," \textit{American Journal of Mental Deficiency}, 55:394-406, January, 1951.
\end{itemize}
with a group of children who were inferior in the performance of these same motor skills. They reported that the superior performance group gave evidence of a more satisfactory scholastic adjustment than did the inferior performers. This was evidenced by the presence of a greater number with high intelligence, excellent or good ratings in reading, writing, and comprehension, and by a lesser number of children assigned to special classes. Children in the superior group tended to be active, popular, calm, resourceful, attentive, and cooperative; whereas children in the inferior group more frequently showed negative traits, and were often indicated as being shy, retiring and tense.

In separate studies conducted by Hardy, Sperling and Thorpe, they concluded essentially the same thing as did Rarick and McKee. They found that the self-confidence and social approval gained by the individual skilled in motor activities may be a valuable asset in personality development and in social adjustment. It was pointed out


by Thorpe\textsuperscript{32} that during infancy and early childhood, many of the most important learnings are of a psychomotor nature and are intimately associated with the normal physical, mental, and social growth of the child.

Kulcinski\textsuperscript{33} conducted a study in which he attempted to determine the relationships of superior, normal and sub-normal intelligence quotients of fifth and sixth grade boys and girls to learning selected fundamental muscular skills when the same material is presented. He concluded that a definite and positive relationship exists between various degrees of intelligence of fifth and sixth grade boys and girls and the learning of fundamental muscular skills and this relationship could be measured.

McCormick, Schnobrick, and Footlik\textsuperscript{34} reported a study they conducted in which they studied the effect that perceptual-motor training had upon improvement in reading achievement of first grade children. This study more closely paralleled the present one than any other reported.

\textsuperscript{32}Ibid.


They used three different groups, an experimental group which was subjected to perceptual-motor training periods for two forty-five minute sessions each week, a group involved in standard physical education activities, and a control group. They used the Pintner-Cunningham Primary Test to obtain an I.Q. estimate and the Metropolitan Readiness Test to obtain an estimate of their reading readiness both before and after the training periods. All activities in the experimental group followed the pattern of establishing control over the gross musculature and proceeding in developmental sequential patterns. The training period was for nine weeks, one hour a day, two times a week. The experiment resulted in statistically significant gains for the group which received perceptual-motor training but not for the other two groups. Their conclusion was the perceptual-motor training could be a useful adjunct to the regular physical education curriculum, contributing by increasing the child's capacity for academic achievement. In addition to these observations, they also compared progress made in reading by children of low, average, and high IQs. In this area, they concluded that perceptual-motor activities are better for underachievers than for average or above-average children.
Early and Kephart\(^{35}\) reported a case study of a single individual in which they employed gross-motor and perceptual-motor training as the major elements of remediation. The child received nine weeks of training, one hour each day, five days per week. The hour was divided equally between perceptual-motor training and academic training. Pre-tests and post-tests were given, and though some problems remained at the end of the training period, marked improvement was shown in balance and posture, differentiation, perceptual-motor match, and ocular control. The Durrell Reading Test showed a striking gain in reading rate, accompanied by a solid gain in comprehension. Oral and silent reading comprehension each rose one grade level, and listening comprehension increased by two grade levels. Whereas pre-test results on visual memory of words and phonic spelling showed practically no ability in these two areas, post-test results indicated the subject was above grade placement in both areas. The writers suggested that the academic improvements noted were related to the improvements in gross-motor coordination and in perceptual-motor matching.

Ayers administered thirty-five perceptual-motor tests to one-hundred fifty young children, one hundred suspected of having perceptual problems and fifty who were not thought to have problems. Intercorrelations were run and a factor analysis technique was employed. She concluded that perceptual deficits in children show affinities resulting in symptom arrays or syndromes which are not found in children from a random population. She said these syndromes did not reflect inherent categorization based on individual sensory modalities, but rather, to be specific of rather particular mechanisms by which intersensory and motor information is coordinated to permit development of perceptual-motor ability.

Johnson, Fretz and Johnson reported a study they did concerning self concept. They used as subjects for their study young children who were enrolled in a remedial children's clinic who had various types of problems resulting in learning disabilities. The children participated in a program which included individualized, systematic, 


neuromotor-perceptual training. Tests of self-concept were
developed and administered to the children before and after
the six-week program. It was noted that the children
developed an increase in willingness to be with larger
groups of children. The results further suggested that an
individualized program can be of significant value in total
functioning of the child.

III. LITERATURE DISCLAIMING A RELATIONSHIP BETWEEN
MOTOR PERFORMANCE AND INTELLECTUAL ACHIEVEMENT
IN YOUNG CHILDREN

Goodenough38 claimed that the tests used for measure­
ment of what is called "intelligence" and those used for
what is called "motor ability" during infancy and early
childhood, have so much in common, one could only expect a
positive correlation between them. She said that careful
examination will usually show that much of the obtained
correlation is found with lower levels of intelligence.
Backward children and adults are typically awkward in their
movements; their gait is frequently shambling and their step
heavy, lacking in resilience and grace. Among children or

38 Florence L. Goodenough, Mental Testing: Its
History, Principles and Applications (New York: Rinehardt
adults of normal intelligence, she found that the relationship between mental and motor abilities, although still positive when large groups were considered, was low.

Bayley\textsuperscript{39} found that though a definite relationship did exist between motor coordination and mental abilities in children under three years, she felt as though the line of demarkation between mental and motor abilities with children this young was hard to define. She found that as maturation proceeded, there was a gradual increase in the functional independence of motor and intellectual abilities.

Garrett\textsuperscript{40} found substantially the same thing in his studies as stated by Bayley. He found greater differentiation in correlations between mental and motor abilities at the upper age levels than at the lower age levels.

Espenschade\textsuperscript{41} said that gross motor measures do not correlate with intelligence test scores, even when non-verbal tests are given. She observed that the only association between mental and motor abilities was at the very low

\textsuperscript{39}Nancy Bayley, "The Development of Motor Abilities During the First Three Years," Society for Research in Child Development Monographs, 1:1-26, 1936.

\textsuperscript{40}Henry E. Garrett, "A Developmental Theory of Intelligence," The American Psychologist, 1:373-78, September, 1946.

\textsuperscript{41}Anna Espenschade, "Perceptual-Motor Development in Children," Academy Papers, 1:14-20, 1967.
end of the mental range. As one went up the scale of mental
ability, motor association appeared to be lost.

Singer\textsuperscript{42} conducted a study using seventy-two third
and sixth graders as subjects. He ran correlations between
intelligence tests and physical and perceptual-motor tests
which he administered in a laboratory using mechanical-type
tests for the most part. He found very low correlations
and only a few correlations showed significance at the .05
level.

Abernethy\textsuperscript{43} investigated a large number of children
and college men and women. The physical data included
measures of standing and sitting height, weight, carpal
development, chest girth, lung capacity, and pubescence.
The data with regard to mental development were obtained
from systematic mental tests. She found that there was a
positive correlation between mental and physical status,
but that this correlation was relatively low.

\textsuperscript{42} Robert N. Singer, "The Inter-relatedness of
Physical, Perceptual-Motor, and Academic Achievement Vari-
ables in Elementary School Children." (Paper presented
at Annual Convention of AAHPER, St. Louis, Missouri, April,
1968.)

\textsuperscript{43} E. M. Abernethy, "Relationships Between Mental and
Physical Growth," Monographs of the Society for Research in
Child Development, 1, No. 7 (Washington, D.C.: National Re-
Jones\textsuperscript{44} found that there was practically a zero relationship between intelligence and motor performance in a group of children whom he tested.

Brown\textsuperscript{45} reported on a study which he conducted with first grade children in which he attempted to determine the effect of a program emphasizing perceptual-motor activities in the physical education classes on perceptual-motor skills and reading readiness of first grade children who were reading below grade level. He found that the experimental group showed significant improvement in the development of perceptual-motor skills. However, his data showed that the perceptual-motor program had little effect on the reading performance of the experimental group.

IV. SUMMARY OF RELATED LITERATURE

A large number of writers have had much to say in support of offering physical activities and selected perceptual-motor activities to children of preschool age. Most of the early researchers and writers who did work in


\textsuperscript{45} Roscoe C. Brown, Jr., "The Effect of a Perceptual-Motor Education Program on Perceptual-Motor Skills and Reading Readiness," (Paper presented at Research Section, AAHPER, St. Louis, Missouri, April 1, 1968).
This area were child development experts and psychologists. They pointed out the fact that the preschool period of development held undisputed preeminence in the total development of the child. Even though this period occupies only about seventy months of the individual's life, most of these writers stressed the fact that during this time, the basic lines of the total mental and physical development of the child is laid down during these formative years.

These writers have said that during the first four or five years of life, the most important development along motor lines consisted of the development of gross motor movements, whereas after five years the major development is in the area of finer coordinations involving smaller muscle groups. The writers in this area generally agree that children in this age group are physically, psychologically, emotionally and socially ready to acquire a wide variety of skills. They say further that if they do not acquire them during this time of their lives when they are most ready for them, there will be no time later in their lives when they could acquire them as easily.

Many studies have been performed by experimenters in which they compared performance on selected motor ability tests with mental age as determined by the Stanford-Binet. Most of them obtained positive results indicating that there was a relationship between motor performance and mental
ability. Another group of experimenters performed studies in which they ran correlations between large batteries of motor ability tests and intellectual achievement. They found significant correlations between some of these tests and the criteria they used to determine intellectual performance. Highest correlations were found to exist between intelligence and tests of balance and coordination. These writers stated that it was possible to use scores of certain of these motor ability tests as a predictive device in determining the intellectual component.

Other writers have reported on studies which they conducted in which they compared the relative effects of various types of physical activity programs upon intelligence and proficiencies in particular academic areas. In some of these studies, attempts were made to evaluate the effects of the various programs used upon children who possessed various degrees of intelligence. One meaningful conclusion that was made in one comprehensive study was that physical programs of a perceptual-motor nature are better for underachievers than for average or above-average children. The consensus of findings was that the individualized and perceptual-motor programs were more effective than those of a more traditional nature.
There are comparatively few writers who indicate that there is no relationship between mental and physical ability. Many of the studies that have been reported in this area have concluded that there is a positive relationship between mental and physical ability, but not a statistically significant one. Other studies conducted in this area have indicated that most of the positive relationship between mental and physical ability occurred only at the younger ages or at the lower end of the mental scale.

The literature is greatly balanced in favor of a positive relationship between physical and mental ability and that individualized perceptual-motor programs are more effective than traditional programs. Most studies in these areas have been positively oriented and have established hypotheses which would support these claims. In most cases, the data gathered in these studies have warranted the acceptance of those stated hypotheses.
CHAPTER III

PROCEDURE FOR THE STUDY

I. OVERVIEW OF THE STUDY

This study was conducted during the 1968-69 school year at a private kindergarten in Lafayette, Louisiana. Sixty-two kindergarten children were used as subjects, thirty-eight of whom had been nursery school students during the previous year at this same school, and twenty-four of whom were beginning students at this school. The main purpose of this study was to determine the effects of two types of physical education programs on motor ability, general intelligence, and academic readiness of kindergarten children with two different backgrounds of experience in physical activity. A secondary purpose was to determine the relationships which existed between motor ability and general intelligence and between motor ability and academic readiness.

The subjects were tested early in the school year on a maze-type motor ability test developed for this study. A test of general intelligence and a readiness test were also administered.

The subjects were divided into two groups, both of which were presented with the same type academic program.
However, one group participated in a traditional physical education program during their physical activity period and the other group participated in a sequential individualized program of perceptual-motor activities in addition to some free play activities.

The students engaged in some type physical activity related to their respective training program five days a week for twenty-two weeks. They were retested toward the end of the school term on a second form of the same two mental tests and the same motor ability test.

Correlations were run between intelligence and motor ability scores and between readiness and motor ability scores and the data were analyzed for statistical significance. Analysis of covariance, utilizing a two by two factorial design, measured the effectiveness of the two training programs upon both continuing and new students.

II. SELECTION OF SUBJECTS

The children who were used in this study were enrolled in a private kindergarten located in Lafayette, Louisiana. A total of seventy children were enrolled in the school to begin the year, forty of whom had been nursery school children in this school the previous year and thirty of whom were new students in this school. Both boys and girls were used in the study, though performance by sex was
no criterion in the study. All these children were eligible under Louisiana law to enter first grade at the completion of that academic year. Specifically, they must have reached their sixth birthday before January 1 of the year following the current school term. Written permission was granted from all parents to use their children in this study.

The subjects were randomly selected to be in two groups in the following manner. The names of all the continuing students were placed in a container and names were alternately drawn to be placed in the sequential individualized group and in the traditional physical education group. In this manner, twenty of these children were placed in each group. The thirty new students were placed in these two groups in the same manner. Initially, there were thirty-five children in each of the groups, twenty of whom were continuing students and fifteen of whom were new students.

III. SELECTION AND DESCRIPTION OF TESTS

Mental Tests


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Evaluation. One section of the book gave the names of tests that were applicable to different age groups, the merits, shortcomings and reliabilities of each test and the names of the companies publishing these tests.

Four publishing companies were contacted for information. They were Harcourt, Brace and World, Inc., Houghton-Mifflin and Company, Science Research Associates, Inc., and Educational Testing Service. After having received information from those companies and narrowing the selection to tests from either Harcourt, Brace and World or Educational Testing Service, extensive correspondence was conducted with representatives from these companies. Considering all information gathered and after having discussed various tests with experts in measurement at Louisiana State University, Baton Rouge, Louisiana, it was decided to use two tests published by Harcourt, Brace and World, Inc. These met the following criteria: the tests were available in two forms; the tests were basically pictorial in nature, requiring no knowledge of reading; the tests could be administered to groups of children rather than to single individuals; and national norms had been established for each.

The Pintner-Cunningham Primary Test of General Abilities\(^2\) was used as the instrument to measure intelligence.

\(^2\)Harcourt, Brace and World, Inc., New York, N.Y.
and the Metropolitan Readiness Test was used to ascertain academic readiness. Each of these two tests was available in Forms A and B, which was a major criterion in the test selection.

The Pintner-Cunningham was a test composed entirely of pictures which were marked by the subjects according to the examiner's verbal instructions. This test was divided into seven subtests: common observation, esthetic differences, associated objects, discrimination of size, picture parts, picture completion and dot drawing. These seven areas have proved to be highly discriminative in the assessment of intelligence at these age levels. A scale was available with this test from which each subject's I.Q. could be determined based upon his total raw score and chronological age. The reliability of the Pintner-Cunningham as determined by the split-half method was reported as .84.

The Metropolitan Readiness Test was a test which measured academic readiness of kindergarten children to do first grade work in the crucial areas of word meaning, listening, matching, alphabet, numbers and copying. Like the Pintner-Cunningham, this test was also entirely

\[3\text{Ibid.}\]
pictorial in nature and answers were given based upon verbal instructions by the examiner. This test yielded a single score which was indicative of general academic readiness. The reliability of the Metropolitan Readiness Test was .93 using the split-half method and .91 when Form A was followed with Form B.

**Motor Ability Test**

During the spring prior to the school year when this study was conducted, a pilot study was conducted in which ten individual motor ability tests were selected to evaluate the motor ability of the subjects. The selection of these tests was based upon the experience of the writer in working with kindergarten children and upon material gathered from Gettman, Ismail and Gruber, Jenkins, Kephart and

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McCaskill and Wellman.8

This battery of tests was administered to twenty-eight preschool children and scored objectively on two occasions. The reliability of all test items was found to be above .92.

On the basis of the results of this pilot study, a maze or circuit-type test was designed consisting of components which were meant to measure agility, balance, eye-hand coordination, general body coordination, kinesesthetic awareness, and locomotor ability. The reliability of this test was calculated between trials three and four of the pre-test and was found to be .82. The subject was timed while going through the various components of the test. The test was laid out on the school playground and various items of scenery were painted to resemble a wooded area with a stream of water running through it to stimulate the imagination of the subjects. The location of various test stations and items of scenery were marked by wooden stakes driven into the ground. This assured that each item would be placed in exactly the same location each time the test was given, both for the pre-test and post-test. The

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length of the maze was approximately 250 feet. The general layout of this test is shown in Appendix A with pictures of the individual test stations appearing in Appendices B through K.

General Description of the Motor Ability Test

The subject held a ten-inch rubber playground ball in his hands and upon being given the command, "Get ready - Go!", he bounced the ball ten times (see Appendix B). If the ball got away from him, he had to retrieve it and continue counting. After he had bounced it ten times, he was told to imagine that a wild animal was after him and he had to try to run away. He first had to run to a "bridge" which was about 35 feet away. This was a four-inch balance beam eight feet long which crossed the "river" (see Appendix C). He had to cross this as quickly as he could with his body under control, being careful not to fall into the "water." Upon crossing the "bridge," he had to run 19 feet to reach the mouth of a "tunnel" which went through a "mountain" (see Appendix D). The cloth tunnel was laid under the "mountain" in such a way that the subject had to creep through on his hands and knees a distance of 10 feet. After emerging from the "tunnel" the subject had to run 36 feet to a place where he was to throw a playground ball at a tiger which was concealed in a tree (see Appendix E).
The tiger was drawn on a piece of poster paper and was 28" by 36" in size. The bottom of the tiger was 54 inches above the ground. As the subject approached the area, an assistant handed him a playground ball and directed him to a rope which was placed six feet from the base of the target and instructed him to hit the tiger. The target and the line from which the ball had to be thrown were arranged in such a way that if the subject hit the tiger, he would more than likely be in a position to catch the ball on first bounce. The object was to hit the tiger three times but a maximum of six trials was allowed. A second rope fifteen feet from the base of the target represented the "out-of-bounds" line. If the ball was not caught but remained within the boundaries of the two ropes, the subject had to get it himself, go back to the rope closest to the base and throw at the tiger. If the ball rebounded past the outer rope, the assistant handed him another ball. When he had satisfied the requirement of this phase of the test, that is, either hitting the target three times or throwing six times, the assistant told him to go on to the next station. The next phase of the test was 18 feet away and was a "cliff" which the subject had to run up and jump from (see Appendix F). This test station covered eight feet. Nine feet from the base of the "cliff" were three "logs" over which the subject had to jump in such a fashion that both
feet were together on take-off and landing. These "logs" were spaced two feet apart (see Appendix G). Approximately 14 feet from this point the subject had to cross the "river" again, but this time on "stepping stones" which were laid out across the "water." There were nine "rocks" spaced equidistant apart across the "river," resting on the flat side. The distance across the "river" was ten feet (see Appendix H). It was 5 feet from this point to the beginning of the locomotor test which itself was 29 feet long. The subject was told to "do what the feet tell you to do as quickly as you can" (see Appendix I). It was 15 feet from the end of this test to the next phase which was an obstacle 21 inches above the ground under which the subject had to roll on his side (see Appendix J). The obstacle under which the subject had to roll was 30 feet from a small house into which he had to run to escape the "animal" he was running from (see Appendix K). The stop watch was started when the subject bounced the ball the first time and was stopped as he entered the door of the house. His score was his time in minutes, seconds and tenths of a second.

Testing Equipment

Balance Beam. This was a device on which the children had to walk in crossing the "river" the first time. It was eight feet long and the walking surface was four
inches wide.

**Creeping Tunnel.** This was a device placed under the "mountain" through which the children had to creep. It was a piece of cloth supported by heavy gauge wire approximately two feet in diameter.

**Locomotor Test.**\(^9\) This was a test of primary locomotor ability. The test consisted of footprints drawn in the shape of a right and a left foot outlined in different colors on the back of a piece of carpet. The actions elicited consisted of jumping from both feet, turning right or left while jumping and hopping.

**Painted Scenery.** Various items of scenery were painted on heavy cardboard and placed at particular places in the general layout of the test area. Some of these were a river, a mountain, groups of trees, shrubs and bushes. They were used to stimulate the imagination of the children, and in some cases, to outline the direction of the course and present a barrier so they would tend to follow the test items in the proper order.

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\(^9\) Test of locomotor ability developed by Dr. Louis Bowers, formerly at the University of Southwestern Louisiana, Lafayette, Louisiana and currently at the University of South Florida, Tampa, Florida.
Playground Balls. Ten-inch rubber playground balls were used in the bouncing drill to begin the test and in that phase of the test in which the subject had to throw at a target.

Stairsteps. A set of four steps leading up to a base four feet square and twenty-four inches high was used to simulate a cliff in the test. The children had to ascend the steps, then jump from the platform.

Stepping Stones. These were pieces of 2" x 4" material seven inches long on which painted cardboard resembling rocks was attached. These were used on which to cross the "river" the second time.

Stop Watch. Track stop watches accurate to the nearest tenth of a second were used to time subjects on the motor ability test.

Tumbling Mat. A mat was placed on the ground under a barrier twenty-one inches high under which the subjects had to roll.

IV. TESTING PROCEDURES

Preliminary Procedures

In order to facilitate the removal of various sized groups from the classrooms for the purpose of working with
them in the activity room or outside with a minimum amount of confusion, the children were divided into smaller groups. There were three classrooms in the school, with nursery school and kindergarten children in each. The children in the sequential, individualized group were called lions and tigers and the children in the traditional group were called bears and wolves. Depending upon what group was to be worked with and the size of the group preferred, it was possible to assemble the children hurriedly.

The first month of school was spent doing the routine type of classroom work usually covered in the early weeks of kindergarten. This time was spent allowing the children to become accustomed to the new routine and acquainted with all the teachers and the writer. During the first three weeks of the school term, the writer took the children out in various sized groups, played games with them and attempted to gain their confidence.

During the fourth week of the school term, the equipment used in the motor ability test was laid out and the children were taken through the test in small groups. The "game" they were to play beginning the following week was explained to them.

To prepare for the mental tests, the children were helped to establish good habits of using a pencil or crayon, and taught to follow instructions and pay attention. They
were told that at a later date they would "play some games" with booklets and crayons. In an attempt to eliminate pressure on them, the term "test" was not used in their presence. At no time prior to the date when the first test was administered was any of the teachers or the school director allowed to see or study the test material.

**Mental Tests**

These tests were administered to groups of children ranging in number from four to ten. The examiner in each case was the director of the school and she was aided by one assistant, unless the number being tested was below six, in which case she handled them alone.

The children were seated in small desks in a room removed from the other activities of the school when taking the tests. The desks were arranged so that all children faced the examiner and they could not copy from one another. The specific instructions as listed in the test manuals were followed in administering the tests. Complete instructions were given prior to the time that the tests began. Once they began, however, the examiner read only those instructions outlined in the manual.

The Pintner-Cunningham General Abilities Tests were administered to the children in one sitting with one exception. This was caused by a child's having to leave the
room and therefore being unable to complete the test. Short rest periods were given between test segments as deemed advisable by the examiner. This test yielded a raw score which was used to determine I.Q. by referring to a table furnished in the test manual. These tests were administered during the sixth and seventh weeks of the school year. Approximately six days were required to complete the testing.

The Metropolitan Readiness Tests were administered to the children in three sittings as recommended in the test manual. Tests one and two were given in the first session, tests three and four were given in the second session and tests five and six were given in the third session. Short rest periods were given to the children between tests during each session. This test yielded a score indicative of the general readiness of the child to perform academically in first grade. These tests were administered during the seventh and eighth weeks of the school year. Approximately eight days were required to complete this test.

Motor Ability Test

This test was administered to the children during the fifth and sixth weeks of the school year. Approximately six to eight children at a time were removed from the rooms for testing purposes. The writer was present for all testing
and had a minimum of two teachers in addition to the school
director on hand as assistants. One teacher was on duty at
the station where the child had to throw the playground ball
at a target. The second teacher was placed equidistant
between the opposite ends of the maze so as to be available
to encourage children who needed it. The author and the
director of the school handled the stop watches and timed
all subjects. The author recorded all scores in minutes,
seconds and tenths of a second.

It was possible to have two subjects run through part
of the test simultaneously. When one subject finished
throwing at the target and continued on his way, a second
subject was allowed to start bouncing the ball at the first
station as there was no possibility that any conflict would
occur.

Each subject had to run through this test four times.
The stop watch was started when the subject bounced the ball
the first time in starting the test and was stopped when he
entered the door of the house. The harmonic mean of these
four trials was computed to arrive at a score for each
subject. Trials three and four of the pre-test were used to
establish a reliability for the motor ability test. In most
instances, a child had to run through the test only one time
a day. However, due to the absence of several children on
days when this test was conducted, it was necessary that
some of them run the test two times in one day. When this was necessary, the child ran through the maze at the beginning of school the first time and toward the end of the school session the second time. This represented a time lapse of approximately two hours and thirty minutes, and it was felt that fatigue was not a factor to be considered under these circumstances. Approximately five days were needed to complete the motor ability test the first time it was administered and approximately four days were required on the post-test.

V. TRAINING PROGRAMS

Each of the two training programs lasted a total of twenty-two weeks, beginning November, 1968. The training program did not start until the pre-test in both mental tests and the motor ability test were given. The program continued until all post-tests were administered during the second week of April, 1969.

Traditional Physical Education Group

The activities that this group participated in were of the type that is generally referred to as supervised free-play and big-muscle activities.

The free-play time was spent in activities in which the subjects participated every day that weather permitted
them to go outside onto the playground. They had access to all the common items of playground equipment such as swings, see-saws, glider bars, monkey bars, balls and jump ropes. As they participated in these activities, care was taken that they were properly supervised but no specific instructions were given in the proper way of doing any particular thing. The general aim was to let them do what they wanted to do as long as they were having fun and were not interfering with others or creating a hazard to others or themselves. This free-play period consisted of approximately twenty minutes each day.

Generally, two days a week, usually on Tuesdays and Fridays, if weather permitted, this group was organized into various types of circle games that had particular appeal to this age group. Kirchner\textsuperscript{10} and Vanier and Foster\textsuperscript{11} were the basic sources used from which to select playground games that were appealing to this group. Examples of some of the games conducted were A-Tiskit, A-Taskit; Squirrel in the Tree; Follow the Leader; Brownies and Fairies; and Simple Tag. On these days, the type of game and the number of

\textsuperscript{10}Glenn Kirchner, \textit{Physical Education for Elementary School Children} (Dubuque, Iowa: Wm. C. Brown Company Publishers, 1966), pp. 121-137, 150-156.

children present determined whether one large game or two smaller games were played.

Once every two weeks, the entire kindergarten group was organized into various relays. The basic method by which the group was divided was by employing the previously discussed terminology given them, lions, tigers, bears and wolves. However, some changes were necessary to assure an equal number in each group. Various types of relays were employed involving running, hopping, skipping, and galloping. No instructions were given during this time. The main purpose of this activity was to allow the entire group to participate together in a group activity and have fun doing so.

At no time during the training program were members of the control group allowed to use the various types of training equipment or activities that had been developed for the experimental group. The equipment was stored or placed in such a way that this group would not give particular thought to the other activities.

Though the author spent more time with the experimental group than he did with the control group, he did spend at least two days a week with the control group. On days when he could not work with them, other teachers did so.
Sequential, Individualized Group

The activities presented to this group were those in the category of perceptual-motor activities. They were presented in a sequential order determined by the author, based upon experiences he had working with children and as suggested by writers in this field such as Cratty, Gettman, Godfrey and Kephart, Kephart, and McCaskill and Wellman.

Upon experimenting with various activities and groups of different sizes during the first two weeks of the training program, the activities of this group were conducted as follows: On Mondays, Wednesdays and Fridays, the activity periods were devoted to selected activities in the general areas of locomotor activities, eye-hand coordination, and


13 G. N. Gettman, How To Develop Your Child's Intelligence (Luverne, Minnesota: Self-published, 1962), pp. 48-64.


balance. On Tuesdays and Thursdays, activities were presented in the areas of kinesthetic awareness, agility and general body coordination. The lions and tigers from one classroom formed a group. The size of these groups varied between eight and twelve children, depending upon the number of absentees. Three different groups were worked with each day on the same types of activities. The time for each group was approximately twenty minutes. Some amount of subjectivity necessarily entered into the activities offered on any given day and the manner in which they were offered. On occasion, as many as three different activities were going on simultaneously and the children alternated activities. At other times, all children were involved in the same activity.

In addition to the perceptual-motor activities in which the children in this group participated, they also were allowed to have a free-play period on the playground which was shorter in duration than that of the control group. As stated previously, this group was combined with the control group once every two weeks and various types of relays were run.

**Sequence of Presentation of Perceptual-Motor Activities and Points of Emphasis**

*Locomotor Activities*
I. Crawling

A. This activity was done in the crawl box, a picture of which is shown in Figure 1. Each child went through the crawl box a minimum of ten times each day spent on this activity. A companion activity which was conducted along with this activity was in the area of agility and general body coordination. A mat was placed alongside the crawl box. When a child completed a trip through the crawl box, he had to execute some type of roll going back to the other end, a side roll, shoulder roll or somersault as specified by the author.

B. Technique and Points of Emphasis

1. Flat on stomach, "like an alligator."

2. Arms and legs worked in opposition to one another.
   a. One arm was extended well forward of the head with the palm down.
   b. The leg opposite this arm was flexed at the hip and knee with the inside of the foot touching the base of the crawl box.
   c. The child pulled with the arm and pushed with the leg simultaneously.
FIGURE 1

PICTURE OF CRAWL BOX
d. The same procedure was repeated with the opposite arm and leg.

3. Ideally, the head turned so that the eyes focused on the forward hand each time. However, as long as the neck was not arched upward, the child was not stopped or corrected.

II. Creeping

A. This activity was done on strips of carpet which surrounded the activity room. When the children first began this activity, they were only told to creep on their all fours without being given specific instructions. The desired form was a cross-pattern movement and it was found that many children executed this pattern initially—whereas excessive instructions frequently inhibited good form. When the general pattern had been established, specific points were then stressed.

B. Technique and Points of Emphasis

1. As the left hand moved up, the right knee likewise moved up so that it came to rest shortly behind the right hand. As the right hand moved up, the left knee was also moved up so that it came to rest shortly behind the left hand. This cycle was repeated.
2. The hands were placed flat down on the carpet with the fingers together and the thumb lying alongside the hand. The fingers were pointed in the direction of movement.

3. As the knees were moved forward, the toes remained in contact with the carpet.

4. The head was moved so that the subject was looking at the forward hand each time.

5. In early stages of instruction, the subject was told to stress good form in deliberate action until he got the proper "feel" for the activity.

III. Jumping From Both Feet

A. Jumping was done on the playground and in the activity room in place and moving along.

B. Technique and Points of Emphasis

1. The subject was encouraged to have both feet leave and hit the supporting surface simultaneously.

2. He was encouraged to push off his toes, then land on the balls of his feet rather than flat-footed.

3. The knees were flexed as he took off and landed.
IV. Hopping on One Foot

A. In the early stages of this activity the subject was encouraged to hop on his dominant foot. He was encouraged to hop in place under control. He hopped on the foot other than his dominant foot.

B. Technique and Points of Emphasis
   1. Body control and balance were stressed with each hop.
   2. Subjects were allowed to move along as they hopped.
   3. Subject changed feet upon command as he hopped.

V. Skipping

A. In the early stages of this activity, the subjects were told to skip to some object, then back again. Their action was observed. Only those who performed poorly were worked with individually.

B. Technique and Points of Emphasis
   1. The author stood in front of the subjects or between two of them while holding their hands and demonstrated as he spoke to them.
   2. They were told to stand on one foot, then hop, landing on that same foot.
3. Next they were told to take a step with the opposite foot and lift the first foot off the ground.
4. They were told to hop on the second foot, and follow with a step with the first foot.
5. The procedure was repeated slowly at first until the proper mechanics were executed.
6. While attempting the activity the subjects repeated verbally: "hop-step-hop-step-hop-step—etc."

VI. Galloping

A. When this activity was introduced initially, the subjects were told to "gallop like a horse" to an object and back. They were observed and the variations from the accepted form of each was determined.

B. Technique and Points of Emphasis

1. The author demonstrated the correct form as he stood in front of them facing in the same direction.
2. Starting position was assumed by placing the right foot forward.
3. A step was taken with the front foot and the rear foot was brought forward to a point somewhat behind the right foot.
4. As this action was repeated, the subjects repeated verbally "step - slide, step - slide, etc."

5. This procedure was repeated beginning with the left foot forward.

6. Practice was given at alternating the foot in front upon a verbal command to "change."

VII. Combining Hopping on Either Foot, Skipping and Galloping

Toward the end of the training period after the foregoing activities had been refined by all subjects, verbal commands were given as the subjects moved about the activity room or playground causing them to change from one form of locomotion to another. An example of the commands given was: "gallop!----, change feet!----, hop on the right foot!----, hop on the left foot!----, skip!----, gallop!----, change!----, etc.."

VIII. Running

Very little instruction was given on running. The subjects were given ample opportunity to run and upon occasion were given general instructions such as "move your arms like a locomotive."
IX. Summary

As these locomotor activities were refined by the subjects, the specific instructions outlined above were omitted and the subjects were given many opportunities to perform the activities.

Balance

I. Balance Beams

A. Four-inch and two-inch balance beams were used during the training program. The four-inch beam was used exclusively for the first twelve weeks and after this time, those who desired to do so were permitted to use the two-inch beam. During the last four weeks of the program, all subjects were encouraged to attempt some activities on the two inch beam.

B. Sequence of Activities

1. Walked forward.
2. Stooped to pick up bean bag.
3. Stepped over stick held approximately twelve inches high.
4. Walked under stick held at varying heights.
5. Carried weighted bottles in one hand, shifted them occasionally to opposite hand.
6. Caught bean bag while standing still.
7. Caught bean bag while walking forward.
8. Galloped gently.
10. Walked backward.

II. Balance Blocks
   A. Balanced with right foot resting lengthwise on narrow side of block and eyes open.
   B. Balanced with left foot resting lengthwise on narrow side of block and eyes open.
   C. Balanced as above except with foot crosswise to block.
   D. Balanced on wider side of block with preferred foot lengthwise to block and eyes closed.

III. Tilt Boards (See Figure 2)
   A. Mounted board with gentlest curvature, placed feet against wood slats on base and rocked from side to side, shifting weight.
   B. As skill in balancing improved, began to practice on board of intermediate curvature or difficulty, and finally on board with semicircular base.
   C. Attempted to remain in balanced position with base board remaining parallel to floor.
FIGURE 2

PICTURE OF TILT BOARDS, SHOWING DIFFERENCES IN CURVATURE OF BASES
IV. Jump Board
   A. Stood in middle of board, and jumped.
   B. Sequence of activities.
      1. Faced one direction while jumping.
      2. Turned around slowly while jumping.
      3. Turned in one-quarter turns while jumping.
      4. Lifted knees high when jumping, swinging arms upward forcefully.

   **Eye-Hand Coordination**

I. Ball Bouncing
   A. Bounced under-inflated ball with dominant hand.
   B. Increased pressure in ball as proficiency improved.
   C. Bounced ball high, low, fast, or slow on command.

II. Catching
   A. Threw ball up, let it bounce once, brought hands together and caught it. Threw ball up, let it bounce two times, then caught it. Repeated for three bounces, four bounces, five bounces, more if possible.
   B. Paired off, threw ball to one another on first bounce. Assistance was given in many cases.
   C. Threw ball gently on fly to partner.
   D. Threw bean bags into air to self and caught them.
E. Paired off, threw bean bags to one another. Those who had difficulty were worked with individually. The subjects' eyes were watched as the bean bag was moved around. When the eyes were focused on the bean bag, it was thrown gently, and the subject was urged to watch the bean bag hit his hands.

III. Throwing

A. Bean bags at a target underhanded. Proper weight distribution was discussed and stepping forward with opposite foot as throwing arm swung forward.

B. Bean bags at a target overhanded. Less proficiency was shown here but proper mechanics was presented and practiced.

Agility

A wide variety of agility drills was presented. They all employed common items of equipment and were presented with progressively more difficult physical skills and thought processes required if they were to be executed properly.

One group of these agility drills was conducted with the use of flat wooden slats two inches wide and seven foot long. These slats were placed on the floor or playground in different arrangements, depending upon the nature of the
Ordinarily, in these drills two or three slats were placed end to end which meant that the subjects traveled fourteen or twenty-one feet in performing each drill. Diagrams of the drills conducted in this manner are shown in Appendix L with a brief discussion of how each was performed.

Use was made of the balance blocks in conducting another group of agility drills. Diagrams and discussions of these drills can also be seen in Appendix L.

A tumbling mat was available in the activity room upon which basic rolling skills were practiced. These consisted of rolling with the body in an extended position, side rolls and forward rolls. These activities were conducted in conjunction with the crawling activity. The mat was placed adjacent to the crawl box and when a subject completed a trip through the crawl box, he was assisted in executing the selected type of roll on his way back to the entrance of the crawl box.

On days when these activities were presented, each subject was expected to repeat each one a minimum of ten times.

Kinesthetic Awareness

It was felt that many activities heretofore discussed contributed to the development of kinesthetic awareness. However, several specific activities were presented which
were aimed primarily at development in this area.

**Location of Body Parts.** The subject was asked to close his eyes and bring the index finger of a particular hand directly to a part of the body named. In most instances the subject was directed to touch various parts of the anatomy near the head such as his nose, his right or left eye, or his right or left ear. He was also asked to raise both arms and with his eyes open, bring the index fingers of his two hands directly toward each other so that the finger tips touched. He was then told to raise his arms to different heights and, with his eyes closed, bring the finger tips together.

**Balance.** The subject was asked to perform various types of balance activities with his eyes opened and closed. He had to perform the stork stand in this manner on each foot and he also had to practice balancing on the balance block.

Many of the activities that were primarily designed to assist in the development of agility undoubtedly had some effect upon the development of kinesthetic awareness as well. Reference can be made to those agility drills described in Appendix L which involved the body leaving the ground in performing some activity, then coming back to rest in a predetermined position under control.
**Body Turning in Space.** The activities in this area were performed in an activity room which was rectangular in nature. The subjects were told to face a given direction, then, upon command, jump and come to rest facing a specified wall. In this manner, the subject was asked to execute quarter, half, and three-quarter turns in the air. These exercises were done initially with the eyes open and later, with the eyes closed.

**General Body Coordination**

The work in this area involved assisting the subject individually with those activities in which he was having difficulty in all other areas. A greater amount of this time was spent in developing a knowledge of how to perform the activity rather than the number of times a given activity was repeated. The reader is referred to the specific instructions presented in the section on locomotor activities for the approach that was used with a subject who was having difficulty. Similar instructions were given to those subjects who had difficulty as they were performing the activities outlined in the section on agility.

**VI. STATISTICAL ANALYSIS**

At the end of the twenty-two week training program, each subject was retested on the motor ability test and on
Form B of the Pintner-Cunningham and Form B of the Metropolitan Readiness Test.

An analysis of covariance utilizing a two by two factorial design was employed in an effort to ascertain whether or not significant differences existed between the control group and the experimental group, which represented the two levels of factor A, and between the new and continuing students, which represented the two levels of factor B in the areas of IQ, readiness, and achievement in motor ability. Interaction between the two training groups and the two classifications of students was also analyzed. Correlations were run to determine the relationships which existed between motor ability and general intelligence and between motor ability and academic readiness.

In the analysis of covariance, the arithmetic means of scores from the Pintner-Cunningham General Abilities Tests and the Metropolitan Readiness Tests were used. In computing the means for the motor ability test, the harmonic mean was employed as recommended by Guilford\(^{12}\) to be an appropriate statistical procedure for work-limit tests.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

I. INTRODUCTION

The data in this study consisted of the initial test scores and final test scores of two groups of kindergarten children on a motor ability test, the Pintner-Cunningham General Mental Abilities Primary Tests and the Metropolitan Readiness Tests.

T-tests were computed to determine the significance of the gains made in intelligence, readiness and motor ability. An analysis of covariance utilizing a two by two factorial design was used to determine the comparative effects of two different types of physical education programs on skills development, I.Q., and academic readiness of two groups of kindergarten children. The second area in which this design was meant to yield results was to determine the comparative effects of these programs on children who had different backgrounds of experience in physical activities. This design was employed also to determine if any interaction existed between the two different types of physical education programs and the two different types of former physical experience these children had.

Pearson-Product correlation coefficients were computed between pre-test scores of motor ability, intelligence
and readiness and between post-test scores of motor ability, intelligence and readiness.

II. ANALYSIS OF COVARIANCE

An analysis of covariance utilizing a two by two factorial design was used to determine if there were significant differences between two different groups of kindergarten children that had been exposed to two different types of physical education programs. This statistical procedure also was designed to indicate if interaction was present between programs (Factor A) and groups (Factor B). If no interaction was present, it meant that the difference between the two types of physical education programs was uniform for the two groups regardless of what their previous experience had been concerning physical activity.

In the analysis of covariance, pre- and post-test I.Q. scores, pre- and post-test readiness scores and pre- and post-test motor ability scores were used. Since unequal numbers were used, the least-squares method was utilized in computing the analysis of covariance. Thirty-one subjects completed the individualized program and thirty-one completed the traditional program.

Analysis of Covariance for Pre- and Post-Test I.Q. Scores

As seen in Table I, the F-ratios for A, B, and A x B respectively were 0.00, 0.78, and 0.71. None of these was


TABLE I

ANALYSIS OF COVARIANCE ON PRE- AND POST-TEST I.Q. SCORES
OF TWO GROUPS OF KINDERGARTEN CHILDREN IN TWO
TYPES OF PHYSICAL EDUCATION PROGRAMS

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>$M^2$</th>
<th>F-ratio</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (Programs)</td>
<td>0.01</td>
<td>1</td>
<td>0.01</td>
<td>0.00</td>
<td>NS</td>
</tr>
<tr>
<td>B (Groups)</td>
<td>66.28</td>
<td>1</td>
<td>66.28</td>
<td>0.78</td>
<td>NS</td>
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<td>A x B</td>
<td>60.20</td>
<td>1</td>
<td>60.20</td>
<td>0.71</td>
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<tr>
<td>Error</td>
<td>4842.68</td>
<td>57</td>
<td>84.96</td>
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<td></td>
</tr>
</tbody>
</table>

Adjusted Final Means

Factors of A
- Individualized Group: 116.95
- Traditional Group: 116.93

Factors of B
- New Students: 118.04
- Continuing Students: 115.85

F-ratios needed: 4.00 at the .05 level;
7.08 at the .01 level.
significant. The F-ratios needed with 1 and 62 degrees of freedom were 4.00 at the .05 level of probability and 7.08 at the .01 level.

This was interpreted to mean that there was no significant difference between continuing or new students in the sequential, individualized program and the traditional program in improvement of intelligence scores. Neither was there any interaction between the two different types of physical education programs and the previous experience of the children in physical activities.

**Analysis of Covariance for Pre- and Post-Test Readiness Scores**

It can be seen in Table II that the F-ratios for A, B, and A x B respectively were 0.12, 2.65, and 0.31. Since the F needed for significance at the .05 level was 4.00 and at the .01 level was 7.08 for 1 and 62 degrees of freedom, none of these was significant.

This was interpreted to mean that there was no significant difference between continuing or new students in the sequential, individualized program and the traditional program in improvement of readiness scores. The F-ratio of 0.31 for A x B indicated that there was no interaction between the type of program that the children participated in and their previous experience in physical activities.

**Analysis of Covariance for Pre- and Post-Test Motor Ability Scores**

Table III shows that the F-ratios for A, B and A x B
TABLE II
ANALYSIS OF COVARIANCE ON PRE- AND POST-TEST READINESS
SCORES OF TWO GROUPS OF KINDERGARTEN CHILDREN IN
TWO TYPES OF PHYSICAL EDUCATION PROGRAMS

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<th>Source of Variation</th>
<th>SS</th>
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<th>M^2</th>
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<th>P</th>
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<td>91.92</td>
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<tr>
<td>A x B</td>
<td>10.66</td>
<td>1</td>
<td>10.66</td>
<td>0.31</td>
<td>NS</td>
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<tr>
<td>Error</td>
<td>1980.40</td>
<td>57</td>
<td>34.74</td>
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</tbody>
</table>

Adjusted Final Means

Factors of A
- Individualized Group: 66.06
- Traditional Group: 66.60

Factors of B
- New Students: 65.05
- Continuing Students: 67.62

F-ratios needed: 4.00 at the .05 level;
                 7.08 at the .01 level.
respectively are 3.50, 0.00 and 0.41. None of these is significant.

This was interpreted to mean that there was no significant difference between continuing or new students in the sequential, individualized program and the traditional program in improvement of motor ability scores. It also indicated that there was no interaction between the two different types of physical education programs and their previous experience in physical activities.

III. PEARSON-PRODUCT CORRELATION COEFFICIENTS

There was no significant relationship between either pre-test or post-test scores of motor ability and intelligence or between motor ability and readiness.

IV. SIGNIFICANCE OF MEAN GAINS ON TESTS

The data were analyzed to determine the significance of the gains made by children. In both programs and with both backgrounds of physical experiences. The t tests were computed and results are shown in Table IV.

Highly significant gains beyond the .01 level in intelligence, readiness and motor ability were made by children in both types of physical education programs and by children with both types of physical education backgrounds.
### TABLE III

ANALYSIS OF COVARIANCE ON PRE- AND POST-TEST MOTOR ABILITY SCORES OF TWO GROUPS OF KINDERGARTEN CHILDREN IN TWO TYPES OF PHYSICAL EDUCATION PROGRAMS

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>SS</th>
<th>DF</th>
<th>M^2</th>
<th>F-ratio</th>
<th>P</th>
</tr>
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<td>A (Programs)</td>
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<td>3.50</td>
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<td>B (Groups)</td>
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<td>A x B</td>
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<td>0.41</td>
<td>NS</td>
</tr>
<tr>
<td>Error</td>
<td>4335.81</td>
<td>57</td>
<td>76.08</td>
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</tbody>
</table>

Adjusted Final Means

Factors of A
- Individualized Group: 79.69
- Traditional Group: 84.11
- New Students: 81.84

Factors of B
- Continuing Students: 81.97

F-ratios needed: 4.00 at the .05 level; 7.08 at the .01 level.
## TABLE IV

**SIGNIFICANCE OF THE MEAN GAINS FOR TWO GROUPS OF KINDERGARTEN CHILDREN IN INTELLIGENCE, READINESS AND MOTOR ABILITY**

<table>
<thead>
<tr>
<th>Program and Group</th>
<th>N</th>
<th>Adjusted Mean Gain</th>
<th>Standard Error</th>
<th>t</th>
<th>P</th>
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<tr>
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<tr>
<td><strong>Intelligence</strong></td>
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<td></td>
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<tr>
<td>Individualized</td>
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<td>.01</td>
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<td>1.70</td>
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<td>.01</td>
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<tr>
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<td>1.52</td>
<td>11.27</td>
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<tr>
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<td><strong>Readiness</strong></td>
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<tr>
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<td>1.11</td>
<td>16.09</td>
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<tr>
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<td>18.43</td>
<td>1.09</td>
<td>16.91</td>
<td>.01</td>
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<tr>
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<td>16.87</td>
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<td>17.39</td>
<td>.01</td>
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<tr>
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<td>5.12</td>
<td>.01</td>
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<tr>
<td>New</td>
<td>24</td>
<td>7.06</td>
<td>1.81</td>
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<td>.01</td>
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</tbody>
</table>

_t_ needed for one-tail test of significance at the .05 level, 1.65; for the .01 level, 2.40.
CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

I. SUMMARY

It was the purpose of this study to determine the effects of two types of physical education programs on motor ability, general intelligence, and academic readiness of kindergarten children with two different backgrounds of experience in physical activities. It was also the purpose of the study to determine if there was any relationship between motor ability and intelligence or motor ability and academic readiness.

The subjects for this study were sixty-two kindergarten children, boys and girls, who were students in a private kindergarten located in Lafayette, Louisiana. The subjects were randomly divided into two groups with thirty-one in each group. One group was involved in a traditional physical education program for kindergarten children while the other group was involved in a sequential, individualized activity program. Nineteen children in each of the groups were continuing students who had been exposed to the individualized activities before, and twelve in each group were new children in this school who had not been exposed to these types of activities.
After having been given ample time to settle down into the regular school routine, all children were administered a motor ability test, Form A of the Pintner-Cunningham Test of General Mental Ability and Form A of the Metropolitan Readiness Test. The children participated in their respective training programs for a period of twenty-two weeks at the end of which time they were retested on the motor ability test and on Form B of each of the aforementioned mental tests.

T-tests were computed on all gains. An analysis of covariance utilizing a two by two factorial design was employed to determine the comparative effects of the two different types of physical education programs upon skills development, I.Q., and academic readiness of the two groups of kindergarten children. The factorial design also permitted the investigation of the comparative effects of these programs on children who had different backgrounds of experience in physical activities.

Correlations were computed between pre-test scores of motor ability and I.Q., and motor ability and readiness. Correlations were also computed between post-test scores of motor ability and I.Q. and motor ability and readiness.

II. FINDINGS

The findings of this study were as follows:
1. Highly significant gains beyond the .01 level of probability were made in intelligence, readiness and motor ability by children in both types of physical education programs and by children with both types of physical education backgrounds.

2. There was no significant difference between students in the sequential individualized program and the traditional program in improvement of motor ability scores. However, an F-ratio of 3.50 was found which approaches that needed for significance at the .05 level of probability (4.00). The mean score for the group of children in the individualized program was the better score.

3. There was no significant difference between continuing students and new students in improvement of motor ability scores.

4. There was no significant difference between students in the sequential individualized program and the traditional program in improvement of general intelligence.

5. There was no significant difference between continuing students and new students in improvement of general intelligence.

6. There was no significant difference between students in the sequential individualized program and the traditional program in improvement of academic readiness.
7. There was no significant difference between continuing students and new students in improvement of academic readiness. An F-ratio of 2.65 (4.00 was needed at the .05 level of probability) was found with new students scoring higher.

8. There was no significant relationship between motor ability and intelligence as measured by instruments used in this study.

9. There was no significant relationship between motor ability and academic readiness as measured by instruments used in this study.

Discussion of Findings

It can be seen from Table IV that gains by all students were highly significant in all areas tested, regardless of their background or the group they were in. Though it is undoubtedly true that much of this improvement must be attributed to normal maturation, the large t's attained suggest that the enriched program offered at this school, including a strong emphasis on physical education, was a contributing factor to the gains made.

As indicated in the review of literature, experts in early childhood education agree that kindergarten children are physically, psychologically, emotionally, and socially able to acquire a wide variety of skills. The teachers and researcher involved in this study found this to be true and the activities described in the sequential, individualized program have long been an important part of the curriculum at the school used in this study. However, in addition to
this, many other activities have been selected by the director of the school and incorporated in the school curriculum, such as the Winter Haven Program, developed by the Lions Club of Winter Haven, Florida and techniques developed by Montessori. It is felt that many of these activities enhanced the learning experiences of children. Therefore, stressing physical activities to the degree done in this study represented enrichment of an already enriched program. In view of this fact, any gains made which could be attributable to the physical activities would take on more meaning.

The sequential, individualized program in this study had many elements common to most perceptual-motor programs. The literature revealed a difference of opinion concerning the relative effects of traditional and perceptual-motor programs. However, it was stated that perceptual-motor programs were more effective for underachievers than for average and above average children. Most of the children in this study were in the latter group. This may account for no significant difference being found between the groups in the two programs. The children came from middle to upper middle class homes in which a large percentage of both parents had college educations.

With these facts in mind, some specific points can be made concerning areas of this study. The F-ratio of 3.50 for Factor A (programs) on motor ability scores was the one which most nearly approached significance. Upon observing the adjusted final means on motor ability scores, it can be seen that the sequential, individualized group had a mean
of 79.69 as compared to 84.11 for the traditional group. This indicated that the individualized group performed the motor ability test in a faster time than did the traditional group. Though not statistically significant, this difference in scores represents a definite indication that kindergarten children do profit from participation in the types of perceptual-motor activities presented in this study.

The F-ratio of 2.65 for Factor B (groups), though not statistically significant, represents a value to which some attention should be given. This indicated that some difference in academic readiness may exist between those children who had different backgrounds of physical activity. It can be seen upon observing the adjusted final means that the new students scored higher than the continuing students. A possible explanation may be that the greatest amount of progress which accrues as a result of participation in perceptual-motor activities occurs during the early months of activities and progress thereafter is slower.

The literature shows that a positive relationship exists between motor ability and intelligence and between motor ability and readiness in academic areas. However, in many cases, this positive relationship is very small and is present most noticeably in the very young ages or at the lower end of the mental scale.
III. CONCLUSIONS

Within the limitations of this study, the following conclusions were drawn:

1. Highly significant gains in intelligence, readiness and motor ability of kindergarten children can be realized in twenty-two weeks of participation in specifically designed programs.

2. Kindergarten children in both traditional programs and sequential, individualized programs can make highly significant gains in intelligence, readiness and motor ability as can children with different backgrounds of experience in physical education.

3. There was not any significant difference in the results achieved through the sequential individualized program or the traditional program in the areas of intelligence, readiness or motor ability.

4. There was not any significant difference in the results achieved by continuing students or new students in the areas of intelligence, readiness or motor ability.

IV. RECOMMENDATIONS

On the basis of this study, the following recommendations are made:
1. Similar studies to this should be undertaken using children from various socio-economic and physical ability levels.

2. Similar studies to this should be undertaken with emphasis upon the following:
   a. The time during which the children are on this program should be varied from a few weeks to a year or more and the results studied.
   b. The time devoted to specific activities should be varied and the results studied.
   c. Particular activities should be deleted from the program of different groups and the results studied.
SELECTED BIBLIOGRAPHY

A. BOOKS


B. PERIODICALS AND PUBLICATIONS


C. UNPUBLISHED MATERIALS


Singer, Robert N. "The Inter-relatedness of Physical, Perceptual-Motor, and Academic Achievement Variables in Elementary School Children." Paper presented at Annual Convention of AAHPER, St. Louis, Missouri, April, 1968.
APPENDICES
APPENDIX A

BLOCK DIAGRAM OF MOTOR ABILITY TEST WITH PERTINENT DISTANCES SHOWN

STATION 6
SEE APPENDIX G

STATION 5
SEE APPENDIX F

STATION 7
SEE APPENDIX H

STATION 4
SEE APPENDIX E

STATION 8
SEE APPENDIX I

STATION 3
SEE APPENDIX D

STATION 9
SEE APPENDIX J

STATION 2
SEE APPENDIX C

STATION 10
SEE APPENDIX K

STATION 1
SEE APPENDIX B

TOTAL DISTANCE - APPROX 250'
This picture shows a child bouncing a playground ball which he had to do ten times before proceeding to the next station.
APPENDIX C

ILLUSTRATION OF A SUBJECT AT THE SECOND STATION
OF THE MOTOR ABILITY TEST

This picture shows a child crossing the "river" on a balance beam.
This picture shows a child entering the mouth of a tunnel, through which he had to creep.
This picture shows a child throwing a playground ball at the picture of a tiger which he had to hit three times or throw at six times.
This picture shows a child leaping off a platform which represented a "cliff" that he had climbed.
This picture shows a child jumping over "logs."
APPENDIX H

ILLUSTRATION OF A SUBJECT AT THE SEVENTH STATION
OF THE MOTOR ABILITY TEST

This picture shows a child crossing the "river" on "stepping stones."
APPENDIX I

ILLUSTRATION OF A SUBJECT AT THE EIGHTH STATION
OF THE MOTOR ABILITY TEST

This picture shows a child jumping as part of a
general locomotor test and following suggested footprints
drawn on material.
This picture shows a child rolling beneath an obstacle.
This picture shows a child entering his "house" which marks the end of the motor ability test.
The subject stood with his feet placed together on one side of the slat, lengthwise to it. The object of the drill was for the subject to jump back and forth across the slat in a zig-zag fashion with his feet remaining together and striking the floor parallel to the slat. As he jumped back and forth he had to move along to the far end of the slat. A variation of this drill was to allow the subject to hop on one foot in a similar fashion.
The subject began on one side of the slat with his toes pointed toward it. While facing in the same direction, he had to jump alternately forward and backward across the slat while moving along toward the far end. This drill was done with the subject moving along both to his right and to his left.
In this drill the slats were placed approximately fifteen inches apart and the starting position of each subject was standing with his feet together in the middle of the slats at one end. The object of the drill was to jump forward and land with both feet hitting simultaneously outside the slats. Next he jumped and hit with both feet together between the slats. He continued to the end in this manner.
The child started this drill in a similar manner to Drill No. 3. As he moved along toward the far end of the slats, he had to jump alternately with both feet first to the outside of one slat, back to the middle, then to the outside of the other slat. His feet and body faced toward the far end of the slats throughout this drill.
This drill was begun in a manner similar to Drills 3 and 4. However, as the subject moved along toward the far end and jumped alternately to the right and to the left, he had to complete a quarter turn in that direction so that his feet were pointing away from the slat. Each time he alighted between the slats, he faced toward the far end of the slats.
A series of blocks were placed approximately eighteen inches apart to begin this drill. The subject had to jump over the blocks with his feet leaving and hitting the ground simultaneously. A variation of this skill was hopping over the blocks on one foot.
The blocks were arranged as indicated for this drill approximately fifteen inches apart. The subject started at one end with one foot resting on either side of the first block. He jumped and turned so that his feet straddled the next block, then back to the next block. He jumped over all blocks in this fashion. He was told to turn so that he faced either the same wall each time he jumped, or as he improved, alternate walls.
In this drill, a large number of blocks were laid out in a non-systematized manner, approximately fifteen inches apart. The subject had to negotiate the blocks in the manner previously discussed, turning his body to whatever degree was necessary each time to land straddling each block.
Each of several subjects were given a block for this drill. He was told to stand either with his feet parallel to the block as in "A" or with his toes pointing toward the block as in "B". The subject had to jump back and forth across the block either sideways or forward and backward.
In this drill, the subject straddled the block as indicated above. Upon being given the signal to do so, the subject jumped up and attempted to execute a one-hundred eighty degree turn in the air, and come down straddle of the block facing in the opposite direction. This was repeated many times.
In this drill, the beginning position was as shown in "A". It was a four-count exercise and the position of the feet on each of the four counts were as shown above in 1, 2, 3, and 4. When this drill was first introduced, the author used hand signals along with counting to indicate foot positions on given counts. A more involved application of this drill was to have the subject execute the one-hundred eighty degree turn described in Agility Drill No. 10 on the count of "3".
VITA

The author was born in Evangeline, Louisiana on December 12, 1925. He received his elementary and secondary education there and at Jennings, Louisiana.

Upon graduation from Jennings High School in 1943, the author entered the Army Air Corps. He served as a radio operator on a B-29, with one tour of duty having been completed in the Pacific theater of operations.

After having been discharged from the service, the author entered Southwestern Louisiana Institute, Lafayette, Louisiana in March, 1946. He was graduated in May, 1950 with a Bachelor of Science degree in Physical Education and minors in chemistry, biology and mathematics.

The author was employed as teacher and athletic coach at Jennings High School, Jennings, Louisiana upon graduation from college. He remained in that position until June, 1958. During this time he did work on and was awarded the Master of Education degree from Louisiana State University in August, 1957.

The author was employed at the University of Southwestern Louisiana in July, 1958 as Assistant Professor of Health and Physical Education and Director of Intramurals. He held that position until June, 1969, at which time he began devoting full time to teaching.
He is married to the former Shirley Rhodes of Houma, Louisiana and they are the parents of seven children, five girls and two boys.
Candidate:    David H. Fisher

Major Field:    Physical Education

Title of Thesis:    Effects of Two Different Types of Physical Education Programs Upon Skills Development and Academic Readiness of Kindergarten Children

Approved:

Helen E. Jantz
Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

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J. H. Drury

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Date of Examination:

January 7, 1970