

A COMPARISON OF THE GROSS MOTOR PERFORMANCE  
OF SELECTED FIRST-GRADERS

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We hereby recommend that the thesis prepared under  
our supervision by Donald Lee Tomas

entitled A COMPARISON OF THE GROSS MOTOR  
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be accepted as fulfilling this part of the requirements for the Degree of  
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## DEDICATION

To my loving parents, Bill and Alice, sister Jane, and brother-in-law Bernie, whose constant support, love, and prayers gave me the inspiration to keep going when the going got tough. Also, to my brother Bill whom God saw fit to take at an early age.

"I LOVE YA'LL."

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## CHAPTER I

### INTRODUCTION

Movement or motor activity is the very essence of existence and a major component of the preschool child's life. When young children are learning to move, they are constantly experimenting, exploring, making decisions, and creating in accordance with their past experiences. The development which occurs during these early years is an important facilitator and determinant of later cognitive, affective, and psychomotor development (Block, 1977; McClenaghan & Gallahue, 1978; Luebke, 1981). According to Hymes (1968), "The day will soon come when all children will have the chance to begin their schooling in 'first grade' and the first grade will be for three-year-olds to third grade" (p. 3).

Physical activity is necessary to support normal growth in children. Such early motor experiences have been considered so valuable in the developmental process of the young child that UNESCO passed the following declaration:

An individual, whatever his ultimate role in society, needs in his growing years a due balance of intellectual, physical, moral and aesthetic development which must be reflected in the educational curriculum and timetable . . . . Between one-third and one-sixth of

the total timetable should be devoted to physical activity." (1964, p. 1)

Although few, if any, of the motor skills of early childhood can be classified as specific sport skills, they form the foundation for the fine and gross motor skills refined during the school years. Thus, the young child needs a wide range of early sensory and motor experiences if he is to develop a broad repertoire of movement patterns for use in sport participation later in life (Rarick, 1976).

Despite the fact that authorities from diverse educational fields agree on the importance of early motor activities for the preschool child, many assumptions about the movement capabilities and needs of young children have not been verified by research. In fact, very little research of consequence has been done with this population and experience continues to be our guide (Flinchum, 1975; Rarick, 1976).

According to Cratty (1969) and Rarick (1980), studies are needed on the movement capabilities of young children, especially those examining the emergence of motor patterns. Research is also needed that is related to the motor learning abilities of the child age 3 through 15. When such research has been completed, and our assumptions are replaced with facts, quality motor programs can be designed and implemented in preschool and elementary curriculums.

### Purpose of the Study

The purpose of this study was to compare the gross motor performance of children who had received previous physical education instruction with children who had not received previous physical education instruction.

### Statement of the Problem

The problem was to investigate the status of three motor performance components (running, throwing, and skipping) of 6-year-old first-grade children who had received physical education instruction in the Lamplighter School Inc., Dallas, Texas, with that of 6-year-old first-grade children in the Rayburn Elementary School, Grand Prairie, Texas, who had not received previous physical education instruction. Thirty subjects comprised each group. Data were collected through the administration of the Ohio State University Scale of Intra-Gross Motor Assessment (OSU-SIGMA) (Loovis & Ersing, 1979) during the fall of 1980. A conclusion was drawn regarding the effectiveness of a physical education program upon the development of selected gross motor skills.

### Definitions and/or Explanations of Terms

For the purpose of clarification, the following definitions and/or explanations of terms were established for use throughout the study.

### Gross Motor Performance

According to Moran and Kalakian (1977), gross motor performance skills are large muscle activities including virtually all locomotion and throwing skills and many striking skills. In this study gross motor performance refers specifically to the skills of running, throwing, and skipping.

### Ohio State University Scale of Intra-Gross Motor Assessment (OSU-SIGMA)

The OSU-SIGMA is an assessment tool devised by Loovis and Ersing (1979) at the Ohio State University to assess the gross motor performance of the elementary school age child. The performance skills assessed are: walking, throwing, catching, kicking, jumping, hopping, skipping, striking, and ladder-climbing. Only the performance skills of running, throwing, and skipping will be used from the scale for this study.

### Physical Education Instruction

Physical education refers to the teaching of structured activities to a physical education class by a certified physical education instructor.

### Preschool Motor Development Program

A preschool motor development program is one in which physical education instruction in the form of gross motor activities is given to 3- to 5-year-old children before they

enter the first grade. It emphasizes the use of movement activities for physical, motor, academic, cognitive, social-emotional, and perceptual development.

### Hypothesis

The following hypothesis was tested at the .05 level of significance: There is no significant difference in the gross motor performance scores of first-grade children who have received previous physical education instruction and first-grade children who have not received previous physical education instruction.

### Limitations of the Study

The study was subject to the following limitations: (a) 30 6-year-old first-grade students from the Lamplighter School Inc., Dallas, Texas, where physical education instruction had been previously taught by a physical education instructor; (b) 30 6-year-old first-grade students from the Rayburn Elementary School, Grand Prairie, Texas, where no physical education instruction had been previously given; (c) the degree to which the subjects were representative of the population from which they were drawn; (d) the degree to which the subjects were motivated to perform during the testing period; (e) the degree to which the components of the test battery measured gross motor performance; (f) the

degree of similarity of testing facilities between the two elementary schools; (g) the teaching ability of the certified physical education instructor of the Lamplighter School Inc.; (h) the degree of objectivity of the test administrator and scorer; and (i) any inadvertent influence that the investigator had on the subjects being tested.

## CHAPTER II

### REVIEW OF RELATED LITERATURE

An extensive investigation of related literature revealed that the present study in no way duplicated previous research. The survey, in fact, revealed a lack of studies pertaining to the gross motor ability of first-grade school children. The review of literature was, therefore, limited to selected studies which were of some assistance to the investigator in the development of this study as well as to other professionals in elementary school physical education who adhere to the values and importance of good motor activity programs. The studies are presented in chronological order.

Miller (1954) investigated the effect of instruction on the throwing ability of 77 first-graders enrolled at the Loch Raven Elementary School in Baltimore, Maryland. The purpose of the study was to determine if instruction would improve the throwing performance of these subjects over and above the effects produced by maturation and general practice. The investigator employed a test of 20 overhand throws at a target which was 9½ ft. from the throwing line. Playground balls of 10 in. diameter were used.

Because there were statistically significant differences between the mean scores of the boys and girls on the first tests, the subjects were placed in four groups for the study: experimental boys (n=21), experimental girls (n=18), control boys (n=15), and control girls (n=23). The experimental groups received instruction in throwing for accuracy for 12 weeks. The 26 instructional periods lasted 20 minutes each. Although the control groups did not receive any training in throwing, they participated in equal time periods of play. During these play periods, games which involved throwing a ball were used.

The investigator collected three scores for each subject. The first score was the sum of the scores obtained on two consecutive test administrations at the beginning of the study. The second score was the sum of the scores obtained on two consecutive test administrations at the end of the instructional period. The third score was obtained from one test administration 10 days after the end of the training period.

Miller found no significant differences between the improvement of either the boys or the girls, although both experimental groups exhibited greater improvement than did the control groups. This was particularly true for the girls. Based on these findings, Miller concluded that had

his study been extended over a longer period of time, the improvement would have been statistically significant.

Whittle (1955) conducted a study to determine the effects of elementary school physical education upon certain aspects of physical development, motor fitness, and motor educability. The subjects tested included 162 12-year-old boys who were comparable in such maturity factors as chronological age, skeletal age, weight, height, and Wetzel developmental level.

The 81 subjects for one group were selected from Oregon schools whose physical education programs were rated 'good' by means of a 12-item modified form of La-Porte's Elementary School Score Card. The comparison group also contained 81 boys, but who were from schools whose physical education programs were rated 'poor'. All subjects had to be free from physical abnormalities, had attended the same school for the 3 preceding years, and had expressed a willingness to participate in the study.

For this study Whittle used the following test batteries: the Metheny-Johnson Test of Motor Educability, Roger's Physical Fitness Index Battery, and the Indiana Physical Fitness Test for the Elementary Level. All tests were administered on two consecutive days during the month of May. The group from the good physical education programs

were found to be superior to the group from the poor programs. Such elements included basic strength, motor fitness, motor educability, and muscular explosive power.

Masche (1960) conducted a study of 48 second-grade boys and girls in the North Winneshiek Elementary School, Decorah, Iowa. This study was conducted to determine if there were any differences in a structured program of motor skill instruction as compared to a combination of low organization play and movement exploration in the development of motor performance.

The subjects tested included an experimental group consisting of 24 children, 12 boys and 12 girls, and a control group of 24 children, 12 boys and 12 girls. The experimental group was instructed in volleyball and basketball skills for 10 weeks, while the control group participated in low organization play and movement exploration.

Magnuson's Motor Performance Test for Elementary School children was administered as a pretest and posttest for both groups. The test consisted of the following events: a ball handling test, the broad jump, an obstacle race, a throw for distance, and the stork stand. The two groups were found to be statistically equal in motor performance before instruction began.

The two groups met twice weekly for a 10-week period.

Each class period was 30 minutes in length. The control group met for 20 lessons in which 15 minutes were allotted to movement exploration and 15 minutes to low organized games. The experimental group spent 5 weeks working on volleyball skills and 5 weeks on basketball skills. After 10 weeks of instruction a posttest was administered to each group.

Significant differences were found on the posttest in 4 of the 5 events. The experimental group scored significantly higher on both the broad jump and the stork stand at the .05 level. The difference in the ball handling and the throw for distance between the two groups was significant at the .01 level. Again, the experimental group scored much higher on these two events than did the control group. The difference on the obstacle race was not statistically significant.

Masche concluded that the findings of this study indicated that the experimental group made extensive improvement from the pretest to the posttest on 4 of the 5 events, while the control group made very little improvement. Therefore, it was concluded that a structured program of instruction would challenge and interest second-grade students more than a program of low organization play and movement exploration.

Hanson (1961) conducted a study of the overhand throw of 36 subjects from a kindergarten class at Crestwood School

in Madison, Wisconsin. The children were divided into an experimental and a control group with 18 children in each group.

Each of the subjects was given three trials on the overhand throw. Flight time of the ball and the distance traveled from the point of release to point of contact were then measured for each trial. A reliability check was made by testing the children 48 hours later. Each of the children was also subjectively rated by two experienced physical education teachers on five specific phases of the throw. The ratings were taken during both the actual testing and pre-testing periods. A film recording of the throws was also used during the pretest period.

The experimental group was taught physical activities twice a week for 15 minutes during an 8-week period. Activities included in the lessons were related to the throw and were intended to develop a better understanding of the basis for the movement. Following the instructional period, the entire group was given a posttest. This posttest was given by the same individuals and in the same manner as the pretest. Ball throwing distance, test-retest reliability, and inter-observer objectivity were all statistically significant at the .01 level.

Hanson concluded that kindergarten boys and girls can

learn to modify their pattern of the overhand throw. Instruction improved the children's throw for distance. The throwing patterns of the boys and girls in the experimental group matured more rapidly than those of the control group. Hanson also stated that girls tended to benefit more from the instruction than boys, but that each sex benefited to a great extent. Hanson furthered her conclusion by stating that boys and girls develop a throwing pattern in a specific manner with regard to the efficiency of the pattern. A less mature performer tends to use the trunk as a lever, whereas, the more mature performer can delay one segment until a more effective time. It was Hanson's final finding that the control group did not change appreciably in any phase of the throw as determined by the performance and pattern measures.

Mackes (1971) conducted a study to determine if there were a sequence of emergence of the elements and deviations in the locomotor sliding pattern. Also studied was whether there existed a configuration of relationships between the number and degree of elements present and the number and degree of deviations present in the movement pattern of sliding.

A preliminary study was conducted: (a) to provide practice in the analysis and establishment of procedures for training of raters, (b) to increase inter-rater reliability,

and (c) to improve rater validity. The population for the preliminary study consisted of 10 elementary school children from the Holy Cross School in Champaign, Illinois, and 5 preschool children from the Child Development Laboratory of the University of Illinois at Urbana-Champaign, Illinois.

Performances of the subjects executing the three sub-patterns--forward, side, and slide on floor--of the movement pattern of sliding for the right and left legs were evaluated by three raters. A modified checklist was used to identify the elements and deviations present after viewing the filmed performances.

The mean performance scores of the subjects were statistically analyzed. Based on the analysis of data, Mackes concluded that the elements within and among the three sub-patterns of the movement pattern of sliding developed in significant but varying orders.

Sinclair (1971) conducted a study: (a) to determine the progressive development in movement and movement patterns of children 2 to 6 years of age, (b) to identify general characteristics which could be studied for appraisal of growth and development, and (c) to study variations in movement among normal subjects 2 to 6 years old. The study was supported by the Virginia State Department of Education. Subjects were from the Richmond City schools and ranged in

age from 2 years 1 month to 4 years 11 months at the beginning of the study which lasted for 6 consecutive school semesters. Although 133 subjects were enrolled in the study, only 119 completed all tasks. Subjects were classified into the following age categories: (a) age 2--30 subjects, (b) age 3--29 subjects, (c) age 4--31 subjects, (d) age 5--25 subjects, and (e) age 6--18 subjects.

Subjects were observed and photographed as they performed 18 to 25 movement tasks. An analysis form adapted from the Kephart Movement Pattern Check List was used to analyze the movement tasks as recorded by slow motion photography. Inter-rater reliability was established by three authorities in the field (G. L. Rarick, B. Godfrey, and H. Eckert).

Based on an analysis of data, Sinclair concluded that: (a) motor performance and motor development vary among individuals and with age and sex, and (b) given ample opportunity and motivation, normal preschool children will perform a variety of motor tasks successfully, similarly, and predictably. She also concluded that a child's progress over a period of time and his achievements and patterns, as compared with his peers, appear to be effective in the evaluation of a child's development. Seven characteristics were identified as significant in the movement development of

young children. These were: (a) dynamic balance, (b) opposition and symmetry, (c) total body assembly, (d) rhythmic locomotion, (e) eye-hand efficiency, (f) agility, and (g) postural adjustment (p. 22).

Detweiler (1973) conducted a study to evaluate the effect of various training frequencies upon the running endurance capacity of primary age children, as reflected by performance in a 1-mile run. Also studies were: (a) the differences between male and female running times, (b) the differences between black and white children's running times, and (c) the differences between first-, second-, and third-graders' running times.

Four hundred eight students were cluster sampled from grades 1, 2, and 3 to participate in a 6-week training program. Any children who had questionable medical problems were excluded from the program.

A 3-week pretraining program in which pacing was the main objective was taught to all groups. The groups were also instructed that no racing was allowed. Each grade was then divided into six training groups. Four groups ran either 1, 2, 3, or 4 days per week. The fifth group ran only 1 lap, 2 days per week, for 6 weeks. All subjects ran in small groups at 15-second intervals. A star was received by each student, for motivational purposes, whenever he/she

improved over the previous time. Any student with a significantly better running time was moved to a faster group. The control group, or sixth group, continued to participate in their regular physical education classes in which no aerobic training exercises were taught.

During the experimental period the groups ran the following distances: (a) the 4-day-per-week group ran 18 miles, (b) the 3-day-per-week group ran 13.5 miles, (c) the 2-day-per-week group ran 9 miles, (d) the 1-day-per-week group ran 4.5 miles, and (e) the 1-lap-twice-a-week group ran 3 miles. Data from a pre and post 1-mile run-walk test were analyzed to determine the effects of the training programs on cardiovascular endurance. Results indicated that the groups training 3 and 4 days per week improved significantly over all other groups. No significant increase in performance occurred for either the control group or the group that ran 440 yards twice a week for 6 weeks. Nevertheless, it was found that the group which trained only 1 day per week had a significant increase in performance. Boys performed significantly (.01 level) better than girls, but running times between the black and white boys and girls indicated no significant difference.

Based on the data collected, Detweiler drew four conclusions: (a) that frequent training results in improved

cardiovascular endurance, (b) that boys are far superior to girls in cardiovascular endurance, (c) that there is no significant difference between black and white students in regard to endurance capacity, and (d) that third-grade students are superior to second- and first-grade students in endurance capacity, but that second-grade students are not significantly superior to first-grade students in endurance.

The primary purpose of a study conducted by Gordon, Thompson, and Alspaugh (1973) was to determine the relative importance of various physical education objectives for kindergarten through second grade as perceived by specialists in the field. The physical education objectives were broken down into five general areas: mental development, body handling pattern development, object handling pattern development, physical development, and social development.

After reviewing the literature, the researchers developed a set of 100 behavioral objectives, 20 for each of the 5 general areas included in the study. Five elementary physical education specialists evaluated and critiqued the objectives.

Of a group of 89 experts in elementary physical education, 63 specialists from 26 different states completed a Q-sort of 100 objectives. Items were rated from 0 to 10.

An analysis of the data indicated that the objectives

related to social development, mental development and body handling pattern development were perceived by physical educators to be of equal value. It appeared that within the area of social development the highest priority was the ability to follow the directions of the teacher. In the area of mental development, the important items were body image and spatial awareness. Top priority in the object handling pattern development seemed to be concerned with simple and direct tasks of throwing, hitting, bouncing, and receiving objects. Within the physical development area it appeared that highest priority involved the use of the arms and hands with concern for coordinated movements.

In conclusion, Gordon, Thompson, and Alspaugh reported that a well-rounded physical education program is needed at the elementary school level. The program should involve mental development, body handling pattern development, object handling pattern development, social development, and physical development.

Hrkal (1977) conducted a study to determine if pre-school age children were capable of attaining the mature pattern of the overarm throw. The study was also designed to gather information on whether the subjects would attain designated previous stages of the overarm throw before reaching the mature pattern. For use in this study, the

overarm throw was broken down into five stages; stage one being the lowest and stage five being the highest.

Thirty-eight subjects from the Grosvenor Nursery School in London, Ontario, Canada, were selected by a screening process (description not included) which required the throwing of a ball at a picture on the wall. Only those children who performed at the lowest level were included in the study. The children selected were then divided into three groups, two experimental and one control. Each experimental group was further divided into three smaller groups to decrease child-instructor ratio.

The control group received no programming, whereas both experimental groups received 12 instructional lessons extending over a 6-week time period. Both experimental groups received 5 minutes of instruction in body awareness activities. This was followed by 10 minutes of instruction in ball throwing: (a) experimental group I received instruction at stage V (mature stage); (b) experimental group II received instruction progressively in all ball-throwing stages. Instructional lessons for both groups concluded with 5 minutes of games incorporating throwing.

All children were videotaped during the pre, post, and post-post ball throwing tests and were rated by the same examiner. Children were permitted five throws during each

testing session. Data were collected and analyzed statistically.

Based on the statistical findings, Hrkal concluded that the subjects in both experimental groups were unable to attain stage V after the 12 training sessions. It appeared that stage V was too advanced for the preschool aged child in terms of coordinating the body parts into a smooth sequence of movements. There was no significant difference between groups in the learning of the mature stage in terms of both quality and time required to attain stage V. The final conclusion was that the relationship between the age of subjects in the experimental groups and their ability to acquire the mature stage is not significant, indicating that the ability to learn a new skill does not depend mainly on chronological age but, more importantly, on readiness which combines maturation and previous learning experiences.

Nestroy (1978) conducted a study to determine if any difference in fitness levels existed between children taught by a physical education specialist and those taught by a classroom teacher. The subjects tested included 43 second-grade children from Blue Ridge Elementary School, Blue Ridge, Texas, and 43 second-grade children from Anna Elementary School, Anna, Texas.

Both groups participated in a daily 30-minute activity

class in which identical curriculum guides were followed. Data were collected through the administration of a modified version of the AAHPER Youth Fitness Test during the fall and spring quarters of the academic year 1976-77. Comparisons of the fall and spring scores for the specialist-taught group revealed significant improvement on all test items except the flexed-arm hang for the girls and the flexed-arm hang and shuttle run for the boys. Performances by the non-specialist-taught groups decreased on all test items with the exception of the softball throw for distance for the boys.

Nestroy concluded that those children who participate in physical education programs taught by physical education specialists appear to increase their fitness performance levels. Second-grade girls appear to benefit more from specialist-taught physical education programs than do boys.

Mahmoud (1979) investigated the effects of instruction and practice on the overarm throwing ability and patterns of preschool children. A secondary purpose was to determine the best combination of selected temporal and kinematic factors and anthropometric measures for predicting throwing distance and improvement based on distance gained.

Fifteen boys and fifteen girls from three private day care centers in Eugene, Oregon, whose ages ranged from 45

months to 71 months served as subjects. Standard anthropometric measurement techniques were utilized. In addition, a super 8 mm high speed motion picture camera was used to film subjects during the pre- and posttest of the overarm throw. The test used in this study was simply to throw a tennis ball as far as possible using the overarm throwing pattern. Each subject was allowed five warm-up throws prior to the actual testing in which three trials were filmed and measured.

Camera speed was set at 100 frames per second, and a lateral view of each performance was filmed. A stop action projector was used for observing all films and acquiring the necessary data for analysis. A form score was assessed for the three trials of each subject in accordance with a checklist of six factors identified as part of a mature throwing pattern. These data were then statistically analyzed.

The findings indicated that there were significant changes in throwing ability form and stride length from pre- to posttest and that significant differences existed in throwing ability, form, and velocity of the ball between sexes.

Mahmoud concluded that the 4-week experimental period had a positive effect on the throwing ability and pattern of the preschool children and that the boys exhibited better

throwing ability and a more mature throwing pattern than the girls. Both groups of subjects appeared to benefit from the experimental treatment.

The preceding literature indicated that children who experience structured physical education programs during the elementary school years exhibit higher gross motor performance levels than children who do not. Because structured physical education programs usually begin at the first-grade level, research designed to determine the benefits of physical education for preschool children is negligible.

## CHAPTER III

### PROCEDURES FOLLOWED IN THE DEVELOPMENT OF THE STUDY

The present study entailed a comparison of three gross motor performance components (running, skipping, and throwing) of a group of 6-year-old first-grade children who had received previous physical education instruction and a group of 6-year-old first-grade children who had not received previous physical education instruction. The procedures followed in the development of the study are described in this chapter under the following headings: Sources of Data, Preliminary Procedures, Selection and Description of the Instrument, Selection of Subjects, Collection of Data, Treatment of Data, and Preparation of the Final Written Report.

#### Sources of Data

The data utilized in this study were gathered from documentary and human sources. Documentary sources included available books, periodicals, microfilms, published studies, and unpublished reports of research related to the study. The human sources of data included the investigator and 60 first-grade children from The Lamplighter School Inc. in

Dallas, Texas, and Rayburn Elementary School in Grand Prairie, Texas.

### Preliminary Procedures

The investigator surveyed, studied, and assimilated the available documentary and selected human sources related to all aspects of the study. Permission to conduct the study was secured from the administrators of The Lamplighter School Inc. and Rayburn Elementary School. Parental permissions were obtained for the students tested. The investigator sought and obtained permission to conduct the present study from the Human Subjects Review Committee at the Texas Woman's University, Denton, Texas.

The tentative outline for the thesis was developed and presented in a thesis committee meeting at the College of Health, Physical Education, and Recreation at Texas Woman's University, Denton, Texas. A copy of the revised and approved outline of the study was filed in the form of a prospectus in the Office of the Provost of Graduate Studies at the Texas Woman's University, Denton, Texas.

### Selection and Description of the Instrument

The instrument used in the collection of data for this investigation was selected according to the following criteria: (a) the instrument must be reliable, objective, and

valid; (b) the instrument must include tests for running, skipping, and throwing; (c) the instrument must be applicable to both girls and boys in the first grade; (d) the instrument must be simple to organize, administer, score, and interpret for the administrator; (e) the instrument or its components must be easily administered within the limits of a formal observation period; (f) the instrument must require equipment that is available or easily obtained; and (g) the instrument must require performances that are safe, interesting and challenging, and within the capabilities of the children to be tested.

The Ohio State University Scale of Intra-Gross Motor Assessment (OSU-SIGMA) (Loovis & Erasing, 1979), a criterion referenced assessment tool designed for children ages 6 through 14 years, met the above established criteria and was selected as the evaluation instrument for this study. This tool examines the qualitative aspects of 11 basic motor skills. The skills of running, throwing, and skipping were selected from the instrument for use in this study. A description of these test items appears in Appendix B. Each basic skill has four developmental levels ranging from Level 1, least mature performance, to Level 4, mature functional skill.

Each test component is rated on a scale from 0 to 4, 0

being the lowest and 4 being the highest possible score. Each of the subjects is given 4 trials on each test item. The highest trial score is then recorded for final analysis. The subjects are observed from the side, front, and back while performing each test item.

The OSU-SIGMA has face validity. Test-retest reliability coefficients for the items selected for use in this study were reported by the authors as being: (a) running, .5294, (b) throwing, .9167, and (c) skipping, .8222.

#### Selection of the Subjects

The subjects for this study were the first-grade children of Lamplighter School Inc., Dallas, Texas, and Rayburn Elementary School, Grand Prairie, Texas. The following criteria were established for the selection of subjects: (a) subjects must be of normal grade placement; (b) subjects must be 6 years of age at the time of testing and no older than 6 years 11 months; (c) subjects must be free of physical abnormalities which would interfere with performance; (d) subjects from the Lamplighter School Inc. must have been enrolled in their respective school for the previous 2 years; and (e) subjects from the Rayburn Elementary School must have been enrolled in their respective school for the current fall term.

Upon the basis of the criteria established, 60 first-grade boys and girls were selected for the study. The group with previous physical education instruction consisted of 17 girls and 13 boys. The group with no previous physical education instruction consisted of 17 girls and 13 boys. All subjects ranged in age from 6 years 0 months to 6 years 11 months.

#### Collection of Data

Prior to the initial testing dates, appropriate equipment and facilities had to be acquired. Since the items to be tested did not require any specific equipment except a tennis ball, tests were easily administered. Sufficient amount of space was required for the children to accomplish their full running gait.

All tests were administered outdoors. A 50-yard running strip was made available for the children when running. A section of the school building was used for the children to throw the tennis ball against. When skipping, the 50-yard distance was used to allow the children ample space.

An individual score sheet was prepared for recording the scores of each test component for each student in the group. A score of 1 to 4 was marked in the appropriate space according to the criteria set forth by the test instrument. Each of the subjects was given 4 trials on each

test item. The highest score was then recorded for analysis. A copy of the score sheet may be found in Appendix C.

The three test components were administered to all the subjects in a 1-day session at each of the schools during the month of October, 1980. The children were scheduled and tested individually on each item. After being tested on the first item, the children were instructed to stand and wait quietly in line for the next test item. All the test items were scheduled during an hour of formal observation. The investigator personally administered and scored all the tests.

Individual reports and test results were prepared and made available to those parents who requested such data. The raw data of all subjects may be found in Appendix D.

#### Treatment of Data

Following the administration of the OSU-SIGMA, scores on the three dependent variables (running, throwing, and skipping) were analyzed by the Mann-Whitney U-test. The Mann-Whitney U-test is a non-parametric analytic tool to be used with ordinal data. After obtaining the ordinal data and achieving the z scores, the three dependent variables were compared at the .05 level.

Preparation of the Written Report

The preparation of the final report of the study entailed writing each chapter, submitting it to the members of the thesis committee for suggestions and corrections, and revising each chapter in accordance with the recommendations of the committee members. The findings of the study were presented and interpreted, conclusion was drawn, a bibliography of relevant research was included, and recommendations for further studies were made.

## CHAPTER IV

### PRESENTATION OF THE FINDINGS

This chapter includes the results of the statistical analysis of the data and a discussion of the findings. The purpose of this study was to determine if any difference existed in the gross motor performance of first-grade children who had received previous physical education instruction as compared with first-grade children who had not received previous physical education instruction.

Data were collected through the administration of three gross motor items selected from the Ohio State Scale of Intra-Gross Motor Assessment (OSU-SIGMA) to both the children with previous physical education instruction and the children with no previous physical education instruction. The three test items were administered to all subjects during the month of October, 1980.

The raw scores were analyzed by the Mann-Whitney U-test (Siegel, 1956), a non-parametric measure with ordinal classification of data. Because of the large number of ties in the test scores, the Mann-Whitney U with correction for ties was applied to find the appropriate  $z$  score. The results of the statistical treatment of the data are presented in

both tabular and narrative form.

### Description of the Subjects

All 60 subjects used in the present study were enrolled in first grade during the 1980-1981 school year and ranged in age from 6 years, 0 months to 6 years, 11 months. The description of the subjects included findings on running, throwing, and skipping.

Comparisons of ratings for the two groups on running, throwing, and skipping can be found in Tables 1, 2, and 3 respectively. The highest of four trial scores was recorded as each subject's rating and was used for final analysis.

#### Running

Running, a locomotor movement of gross motor performance, was the first item assessed. Each subject was instructed to run as fast as he or she could so that an accurate measurement could be taken. A distance of 20 yards was marked off for each trial. Table 1 presents the total number of ratings, at each level of performance, for all subjects in both groups.

Table 1

## Ratings by Groups on Running

Ratings	P.E. Group (n=30)	Non-P.E. Group (n=30)
4	28	20
3	1	10
2	1	0
1	0	0
0	0	0

According to Table 1, 28 of the 30 subjects in the group with previous physical education instruction achieved a rating of 4. In the group without any previous physical education instruction, 20 of the 30 subjects received a rating of 4 and 10 received a rating of 3.

### Throwing

Throwing was used to measure the children's ability to perform a complex gross motor skill. Each subject was instructed to throw a regulation size tennis ball as hard as possible at a wall from a distance of 20 feet. The raw data were collected by the test administrator for analysis. The total number of ratings at each level of performance for all subjects in both groups is presented in Table 2.

Table 2  
Ratings by Groups on Throwing

Ratings	P.E. Group (n=30)	Non-P.E. Group (n=30)
4	18	13
3	9	10
2	3	6
1	0	1
0	0	0

According to Table 2, 18 of the 30 subjects in the group with previous physical education instruction achieved a rating of 4, 9 received a rating of 3, and 3 received a rating of 2. In the group without any previous physical education instruction, 13 of the 30 subjects received a rating of 4, 10 received a rating of 3, 6 received a rating of 2, and 1 received a rating of 1.

#### Skipping

The skip, a locomotor movement involving total gross motor performance, was the third test item. Each subject was instructed to "do the best possible job" while skipping a distance of 20 yards. The raw data were collected by the test administrator for analysis. Table 3 presents the total

number of ratings at each level of performance for all subjects in both groups.

Table 3  
Ratings by Groups on Skipping

Ratings	P.E. Group (n=30)	Non-P.E. Group (n=30)
4	27	10
3	3	16
2	0	0
1	0	4
0	0	0

According to Table 3, 27 of the 30 subjects in the group with previous physical education instruction achieved a rating of 4 and 3 received a rating of 3. In the group without any previous physical education instruction, 10 of the 30 subjects received a rating of 4, 16 received a rating of 3, and 4 received a rating of 1.

#### Comparison of Groups

To determine if significant differences existed between groups on the three variables, a Mann-Whitney U-test was computed. The results appear in Table 4.

Table 4

## Differences in Ratings between Groups

Skill	P.E. Group N	Non-P.E. Group N	<u>z</u> score
Running	30	30	3.407*
Throwing	30	30	.432
Skipping	30	30	5.023*

\*Significant at .05, with a critical value of 1.96.

Table 4 presents the comparison of z scores for all three test items. A z score greater than the critical value of 1.96 was necessary for significance at the .05 level. The z score for the component of running was equal to 3.407, with an actual probability of .0003. This was significant at the .05 level, indicating a difference between groups. The z score of .432 for the component throwing was below the critical value of 1.96, therefore not significant. The z score for the component skipping was equal to 5.023, with an actual probability greater than .0003. This was significant at the .05 level indicating a difference between the two groups.

## CHAPTER V

### SUMMARY, CONCLUSION, DISCUSSION, AND RECOMMENDATIONS FOR FURTHER STUDIES

#### Summary

Children have an insatiable appetite for moving, performing, and being active. They run for the sheer joy of running, and activity for them is the essence of living.

Movement or motor activity is a major component of the preschool child's life. Because the motor skills of early childhood form the foundation for the fine and gross motor skills refined during the school years, the young child needs a broad range of early sensory and motor experiences (Rarick, 1976; McClenaghan & Gallahue, 1978; Luebke, 1981).

Despite agreement by authorities from diverse educational fields on the importance of early motor activity, research has not verified many assumptions about the movement capabilities and needs of young children. In fact, very little research has been done with this population. (Flinchum, 1975; Rarick, 1980).

The review of related literature indicated that the present study did not duplicate any previous investigations. Research in the gross motor skill area of lower elementary

school children is negligible. Several studies, however, have been conducted at the upper elementary school level to analyze the gross motor ability of these children. Whittle (1955) reported that participation in good physical education programs at the elementary school level contributed to superior performance in various skills. Such effective elements included basic strength, motor fitness, motor educability, and muscular explosive power. Sinclair (1971) identified the following seven characteristics as significant in the movement development of the young child: (a) dynamic balance, (b) opposition and symmetry, (c) total body assembly, (d) rhythmic locomotion, (e) eye-hand efficiency, (f) agility, and (g) postural adjustment. Masche (1960) concluded that participation in a structured program of motor skills effectively improved performance. A structured program of instruction was found to be more challenging and interesting than a program of low organization play and movement exploration.

Hanson (1961) found that kindergarten boys and girls could learn to modify and improve their pattern of the overhand throw and that throwing patterns developed in a specific manner with regard to efficiency. Mahmoud (1979) concluded that a 4-week experimental period had an effect on the throwing ability and pattern of preschool children and

that boys exhibited better throwing ability and a more mature throwing pattern than girls. Miller (1954) concluded that the accuracy of a throw could be improved through instruction.

Mackes (1971) concluded that there was a sequence of emergence of the elements in the movement pattern of sliding. There was no relationship, however, between the number and degree of elements or the number and degree of deviations in the movement pattern of sliding. Gordon, Thompson, and Alspaugh (1973) reported that a well-rounded physical education program was needed at the elementary school level. The program should involve mental development, social development, and physical development. Nestroy (1978) concluded that those children who participated in physical education programs taught by physical education specialists increased their fitness performance levels far more than children taught by nonspecialists. Hanson (1961), Miller (1954), and Nestroy (1978) concluded that girls benefit more from instructional physical education programs than boys.

The literature (Whittle, 1955; Masche, 1960; Nestroy, 1978) also revealed that children who experience structured physical education programs during the elementary school years exhibited higher gross motor performance levels than children who did not. Therefore, physical education

programs should be a part of the preschool education program.

The present study entailed a comparison of the status of three motor performance components (running, throwing, and skipping) of 6-year-old first-grade children who had previous physical education instruction, with that of 6-year-old first-grade children who had no previous physical education instruction. The subjects were enrolled in the Lamp-lighter School Inc., Dallas, Texas, and the Rayburn Elementary School, Grand Prairie, Texas. Both groups consisted of 30 subjects. Data were collected through the administration of the Ohio State University Scale of Intra-Gross Motor Assessment (OSU-SIGMA) in October of 1980. Following the administration of the test, the raw data were analyzed.

To determine if there were any significant differences in motor performance scores between the two groups, the Mann-Whitney U-test with correction for ties was used. All three variables were analyzed at the .05 level.

The following findings were obtained from the study:

1. Analysis of the running scores between the two groups revealed that the group who had previous physical education instruction was significantly superior, at the .05 level, to the group who had no previous physical education instruction.

2. Analysis of the skipping scores between the two groups revealed that the group who had previous physical education instruction was significantly superior, at the .05 level, to the group who had no previous physical education instruction.

3. Analysis of the throwing scores between the two groups revealed that there was no significant difference between the group who had previous physical education instruction and the group who had no previous physical education instruction.

Based upon the findings of the study, the investigator rejected the following hypothesis at the .05 level of significance: There is no significant difference in the gross motor performance scores of first-grade children who have received previous physical education instruction and first-grade children who have not received previous physical education instruction.

#### Conclusion of the Study

The findings in this study appeared to justify the following conclusion: Within the limitations of this investigation, 6-year-old first-grade children who participate in a preschool physical education program appear to increase their motor skill performance more by 6 years of age than children who have not participated in preschool physical

education. Running and skipping were more easily learned by the preschool child than throwing which is a more complex skill that is mastered at a later age.

### Discussion

Although several factors may have affected the findings of this study, the most influential factor appeared to be the assessment tool. The OSU-SIGMA was easy to administer, but allowed the rating of test components on a scale of only 0 to 4. This did not provide a broad enough range to adequately distinguish between skill levels. It appears, therefore, that the OSU-SIGMA would be more useful as a screening device than an assessment tool. More specific information regarding the three motor variables would probably have been obtained if an assessment tool which rated motor performances on a scale 0 to 10 had been used. Such an instrument would result in a wider range of scores and, thus, would more adequately differentiate between skill levels.

Motivation was a factor which may have affected the findings. Primary grade school children have not reached the competitive age. They are primarily interested in personal performance. Testing at this age level may be very time-consuming because of the lack of activity for those waiting to be tested. Therefore, testing three to four children at a time would make the testing procedure less

time consuming and less monotonous for the children waiting to be tested.

These findings appear to support the value of providing early developmental motor experiences for preschool and primary age children. The early development of skillful gross motor performance prepares the child for successful participation in sport-related activity throughout life.

#### Recommendations for Further Studies

Further research is needed in all phases of elementary school physical education, particularly at the primary-grade level and in such areas as gross motor performance testing, levels of motor skill ability, physical fitness testing, and the influence that a preschool physical education program has on gross motor performance. The following recommendations are suggested for further studies:

1. A follow-up of the present study using a larger sample of the population.
2. A study similar to the present one using an assessment tool which provides a more accurate description of each child's level of motor skill performance.
3. A study similar to the present one in which the gross motor ability levels of kindergartners involved in a preschool physical education program are examined.

4. A study to determine the ideal age level at which gross motor skills can be taught through physical education instruction.

5. A survey study to determine the status of pre-school physical education programs in the state of Texas.

APPENDIX A  
PERMISSION LETTERS

Grand Prairie  
Independent School

OFFICE OF THE PRINCIPAL  
(214) 264-8900

District

RAYBURN ELEMENTARY SCHOOL  
2800 Reforma  
Grand Prairie, Texas 75051

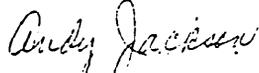
December 19, 1980

Dear Mr. Thomas,

It was a pleasure to see you were able to fulfill  
our agreement with the testing of our first grade  
students this year.

If we can be of further assistance to you and  
your project, please let us know.

Sincerely,



H. A. Jackson, Principal  
Rayburn Elementary School

# The Lamplighter School

11611 Inwood Road, Dallas, Texas 75229 214/369-9201



Director:  
Miss Pat Mattingly

December 12, 1980

Graduate Committee  
Texas Woman's University  
Denton, Texas

Re: Donald Tomas

Mr. Tomas has been granted permission to pursue the testing program connected with his thesis proposal at The Lamplighter School, Dallas, Texas and to involve only the students in first grade for whom he has received permission forms.

He also has been instructed to work within the framework of the information listed in the letter/form that was sent to parents on November 11, 1980

Pat Mattingly  
Director

PM/de

*Board of Trustees:* Erik Jonsson, Chairman, Mrs. George V. Charlton, Vice Chairman, Mrs. Lillian M. Bradshaw, Mrs. Henri Bromberg, A. Earl Cullum, Jr., Mrs. Robert Dennard, Leo Fields, Lee Fikes, Gerald Fronterhouse, Mrs. Charles Harris, Arthur Hewitt, Dr. Donald Jackson, Mrs. H. D. Johnson III, Miss Nelle Johnston, Mrs. Bryce Jordan, Barron Kidd, Lester Lew, Dr. George McCracken, Mrs. Conrad McEachern, Dr. Carmen Michael, Dr. George Moushegian, Mrs. Reese Overcash, Mrs. George Seav, Mrs. Edward Stalcup, Barney Young  
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Consent Form  
TEXAS WOMAN'S UNIVERSITY  
HUMAN RESEARCH REVIEW COMMITTEE

Consent to Act as a Subject for Research and Investigation:

The following information is to be read to or read by the subject. One copy of this form, signed and witnessed, must be given to each subject. A second copy must be retained by the investigator for filing with the Chairman of the Human Subjects Review Committee. A third copy may be made for the investigator's files.

I hereby authorized Donald Lee Tomas to perform the following procedure(s) or investigation(s):

To test your child in running, throwing, and skipping by means of a formal observation period which will take no more than 10 to 15 minutes. The testing will be done inside the building. Your child's scores will remain confidential and will not be shown to anyone else. To retain confidentiality, all children will be given a number. Your child is free to withdraw his consent and to discontinue participation in the project at any time. The results of the data collected and the final written report will be available to you upon request.

If you have any questions concerning the specific testing procedures, please feel free to contact Don Tomas at the following telephone numbers:

Lamplighter School (214) 369-9201  
Home (214) 934-8677

The procedure or investigation listed above has been explained to me by Donald L. Tomas.

I understand that the procedures or investigation described above involve the following possible risks or discomforts:

There are no potential risks to your child involved in the study.

I understand that the procedures and investigation described above have the following potential benefits to myself and/or others:

The ability to enhance the superior performance of your child's gross motor ability in running, throwing, and skipping.

I understand that: No medical service or compensation is provided to subjects by the university as a result of injury

from participation in the research.

An offer to answer all of my questions regarding the study has been made. If alternative procedures are more advantageous to me, they have been explained. I understand that I may terminate my participation in the study at any time.

\_\_\_\_\_  
(Subject's signature)

\_\_\_\_\_  
(Date)

(If the subject is a minor, or otherwise unable to sign, complete the following):

Subject is a minor (age \_\_\_\_\_), or is unable to sign because:

Signatures (required):

\_\_\_\_\_  
Father

\_\_\_\_\_  
Date

\_\_\_\_\_  
Mother

\_\_\_\_\_  
Date

\_\_\_\_\_  
Guardian

\_\_\_\_\_  
Date

\_\_\_\_\_  
Witness (one required)

\_\_\_\_\_  
Date

TEXAS WOMAN'S UNIVERSITY  
 Box 23717 TWU Station  
 Denton, Texas 76204

## HUMAN SUBJECTS REVIEW COMMITTEE

Name of Investigator: Donald Lee Tomas Center: Denton  
 Address: 5621 Spring Valley Rd. #228 Date: October 22, 1980  
Dallas, TX 75240

Dear Donald Lee Tomas

Your study entitled A Comparison of the Gross Motor Performance  
of Selected First Graders

has been reviewed by a committee of the Human Subjects Review Committee and it appears to meet our requirements in regard to protection of the individual's rights.

Please be reminded that both the University and the Department of Health, Education, and Welfare regulations typically require that signatures indicating informed consent be obtained from all human subjects in your studies. These are to be filed with the Human Subjects Review Committee. Any exception to this requirement is noted below. Furthermore, according to DHEW regulations, another review by the Committee is required if your project changes.

Any special provisions pertaining to your study are noted below:

       Add to informed consent form: No medical service or compensation is provided to subjects by the University as a result of injury from participation in research.

       Add to informed consent form: I UNDERSTAND THAT THE RETURN OF MY QUESTIONNAIRE CONSTITUTES MY INFORMED CONSENT TO ACT AS A SUBJECT IN THIS RESEARCH.

       The filing of signatures of subjects with the Human Subjects Review Committee is not required.

       Other:

  X   No special provisions apply.

cc: Graduate School  
 Project Director  
 Director of School or  
 Chairman of Department

Sincerely,

*Marilyn Hinson*

Chairman, Human Subjects  
 Review Committee

at Denton

APPENDIX B  
DESCRIPTION OF TEST ITEMS

TEST EQUIPMENT: None

LEVEL I	LEVEL II	LEVEL III	LEVEL IV
When in a standing position and with the examiner approximately twenty-five feet in front of him,	Same	NOTE: This behavior is best observed from behind.	NOTE: This behavior is best observed from the side.
The child walks with a rapid or increased pace for at least five feet in two out of three trials. Characteristics of this behavior are quick up and down movements of the knees.	The child attempts to run and demonstrates the following behaviors in two out of three trials: a. holds arms in a slightly bent position with hands at approximately waist level and moves them back and forth partially across the front of his body, b. moves arms in opposition (right arm forward when left leg is forward), c. swings knee outward when bringing leg forward to give appearance of toeing out, d. requires a broad base of support when running, i.e., feet appear to land outside of hips.	The child runs and demonstrates the following behaviors in two out of three trials: a. holds arms in a clearly bent position with hands just below shoulder level and swings them across in front of his body and then back and away just below shoulder level, b. moves arms in opposition to the legs (right arm forward when left leg is forward), c. swings knee under hip when bringing leg forward, d. swings leg backwards across mid-line of body before moving leg forward (NOTE: trunk may twist back and forth to assist in crossing the mid-line during the backward swing of leg).	The child runs and demonstrates the following behaviors in two out of three trials: a. moves arms, held at approximately right angles, in opposition to the legs (right arm forward when left leg is forward) with large movements forward and backward along side of body, b. swings leg forward causing the heel to pass close to the buttock; the knee is raised to approximately waist level, c. swings forward leg well ahead of body before foot lands on the floor, d. places foot of forward swinging leg on the floor in a nearly flat manner and in a straight line, e. runs with total non-support--both feet off the floor together.

TEST CONDITIONS

PERFORMANCE

Burnett and Johnson, 1971  
Espenshade, 1967  
Halverson (Personal Interview), 1975

Wickstrom, 1970

Wickstrom, 1970  
Fortney, 1963  
Wickstrom, 1970

TEST EQUIPMENT: 6" Rubber Playground Ball and Tennis Ball

LEVEL I	LEVEL II	LEVEL III	LEVEL IV
Standing in front of and five feet from the examiner,	Same	Standing in front of and ten feet from the examiner,	Standing in front of and fifteen feet from the examiner,
The child throws the 5" ball in the direction of the examiner and demonstrates the following behaviors in two out of three trials: a. uses a two-handed push or throw with both arms in unison, b. no twisting of the upper body	The child throws the tennis ball in the direction of the examiner and demonstrates the following behaviors in two out of three trials: a. uses a single-handed throw with the arm swinging in a sidearm (right to left or vice versa) motion, and the direction of swing is either downward or flat, b. twists upper body backwards to side of throwing arm during backswing then forward to side opposite throwing arm during throw, c. no movement of feet.	The child throws the tennis ball in the direction of the examiner and demonstrates the following behaviors in two out of three trials: a. uses a single-handed throw with the arm swinging in a sidearm (right to left or vice versa) motion, and the direction of swing is downward, b. twists upper body backwards and shifts weight to foot on side of throwing arm during backswing, c. steps with leg on side opposite throwing arm, d. twists upper body forward after shifting weight to foot opposite throwing arm, e. snaps wrist in process of releasing ball.	The child throws the tennis ball in the direction of the examiner and demonstrates the following behaviors in two out of three trials: a. uses a single-handed throw with the arm swinging in a sidearm (right to left or vice versa) motion, and the direction of swing is downward, b. twists upper body backwards and shifts weight to foot on side of throwing arm during backswing, c. steps with leg on side opposite throwing arm, d. twists upper body forward after shifting weight to foot opposite throwing arm, e. snaps wrist in process of releasing ball.
Gutteridge, 1939	Wild, 1936	Wild, 1938	Wild, 1938

TEST CONDITIONS PERFORMANCE

C.S.U. SIGMA

SKILL OF Skipping

TEST EQUIPMENT: None

LEVEL I	LEVEL II	LEVEL III	LEVEL IV
When in a standing position and with the examiner approximately 25 feet in front of him,	Same	Same	Same
The child cannot skip but will likely demonstrate any of the following behaviors in two out of three trials: a. running, b. hopping, c. leaping--take off made from one foot and landing on the alternate foot, d. galloping-- combination of walk and leap.	The child <u>attempts</u> to do 4 or more consecutive skips while doing a normal walking or running pattern and demonstrates the following behaviors in two out of three trials: a. performs skip more often than not on the same leg though not necessarily consecutively, b. holds arms sideways and slightly bent with hands at approximately chest level.	The child skips 4 or more times consecutively and demonstrates the following behaviors in two out of three trials: a. alternates feet, b. does not use arms in opposition, if at all, c. does skipping pattern slowly, and it appears segmented (the child may walk or run for brief periods).	The child skips 4 or more times consecutively and demonstrates the following behaviors in two out of three trials: a. alternates feet, b. uses arms in opposition (right arm forward when left leg is forward), c. executes skip with ease and good coordination.
Gutteridge, 1939	Wellman, 1937	Godfrey and Kephart, 1969 Gutteridge, 1939 McCaskill and Wellman, 1939 Wellman, 1937	Godfrey and Kephart, 1969 Gutteridge, 1939 Sinclair, 1973 Wellman, 1937

TEST CONDITIONS

REFERENCES

APPENDIX C  
SAMPLE SCORE SHEET

The Individual Motor Program  
O.S.U. SIGMA and P.B.C. Cumulative Data-Profile

Name of Child \_\_\_\_\_ Sex \_\_\_\_\_

Birthdate \_\_\_\_\_ Height \_\_\_\_\_ Weight \_\_\_\_\_

BASIC MOTOR TASK	Date			Date			Date			Date		
	SIGMA Level	P.B.C. Level	level B.O. T.L.	SIGMA Level	P.B.C. Level	level B.O. T.L.	SIGMA Level	P.B.C. Level	level B.O. T.L.	SIGMA Level	P.B.C. Level	level B.O. T.L.
1. WALKING	C			C			C			C		
	IT			IT			IT			IT		
	IB			IB			IB			IB		
2. STAIR CLIMBING	C			C			C			C		
	IT			IT			IT			IT		
	IB			IB			IB			IB		
3. RUNNING *	C			C			C			C		
	IT			IT			IT			IT		
	IB			IB			IB			IB		
4. THROWING *	C			C			C			C		
	IT			IT			IT			IT		
	IB			IB			IB			IB		
5. CATCHING	C			C			C			C		
	IT			IT			IT			IT		
	IB			IB			IB			IB		
6. JUMPING	C			C			C			C		
	IT			IT			IT			IT		
	IB			IB			IB			IB		
7. HOPPING	C			C			C			C		
	IT			IT			IT			IT		
	IB			IB			IB			IB		
8. SKIPPING *	C			C			C			C		
	IT			IT			IT			IT		
	IB			IB			IB			IB		
9. STRIKING	C			C			C			C		
	IT			IT			IT			IT		
	IB			IB			IB			IB		
10. KICKING	C			C			C			C		
	IT			IT			IT			IT		
	IB			IB			IB			IB		
11. LADDER CLIMBING	C			C			C			C		
	IT			IT			IT			IT		
	IB			IB			IB			IB		

Comments:

Scoring Subscripts: "C" -- Completes all behavior criteria and trial criteria for that level.  
 "IT" -- Refers to a performance in which trials criterion has not been completely accomplished.  
 "IB" -- Refers to performance in which the behavioral criterion(s) has not been completely accomplished.  
 "R" -- Indicates a child refuses to participate in the assessment procedure.

APPENDIX D

RAW DATA

Table A

OSU-SIGMA\* Ratings for Subjects with No  
Physical Education Experience  
(n=30)

---

Subject	Sex	Running	Throwing	Skipping
1	F	4	3	4
2	F	3	3	4
3	F	4	4	3
4	F	3	1	3
5	F	4	3	4
6	F	3	4	3
7	F	4	2	1
8	F	3	4	4
9	F	4	2	4
10	F	3	3	4
11	F	4	3	3
12	F	4	4	4
13	F	3	3	3
14	F	3	2	3
15	F	4	2	4
16	F	4	2	4
17	F	4	3	3
18	M	3	4	3
19	M	4	4	3
20	M	3	3	3
21	M	4	4	3
22	M	4	4	1
23	M	4	4	3
24	M	4	4	3
25	M	4	4	3

---

Table A Con't.

---

Subject	Sex	Running	Throwing	Skipping
26	M	4	3	3
27	M	4	4	1
28	M	4	4	1
29	M	4	2	4
30	M	3	3	3

---

\*Highest possible rating = 4;  
Lowest possible rating = 0.

Table B

OSU-SIGMA\* Ratings for Subjects with Previous  
Physical Education Experience  
(n=30)

---

Subject	Sex	Running	Throwing	Skipping
1	F	4	2	4
2	F	4	2	4
3	F	4	3	3
4	F	4	3	4
5	F	4	4	4
6	F	4	4	4
7	F	4	3	4
8	F	4	3	4
9	F	4	2	4
10	F	4	3	4
11	F	4	4	4
12	F	3	4	4
13	F	4	3	4
14	F	4	3	4
15	F	4	4	4
16	F	2	3	4
17	F	4	4	3
18	M	4	4	4
19	M	4	4	4
20	M	4	4	4
21	M	4	4	4
22	M	4	4	4
23	M	4	3	4
24	M	4	4	4
25	M	4	4	4

---

Table B Con't.

---

Subject	Sex	Running	Throwing	Skipping
26	M	4	4	4
27	M	4	4	4
28	M	4	4	4
29	M	4	4	4
30	M	4	4	3

---

\*Highest possible rating = 4;  
Lowest possible rating = 0.

BIBLIOGRAPHY

## BIBLIOGRAPHY

- Block, S. D. Me and I'm great: Physical education for children three through eight. Minneapolis: Burgess Publishing Co., 1977.
- Carlson, J. B. Listening to children: Fathoming feelings in physical. Journal of Physical Education and Recreation, 1981, 52, 19.
- Cratty, B. J. Perceptual-motor behavior and educational process. Springfield, Ill.: Chas. C. Thomas, 1969.
- Dauer, V. P., & Pangrazi, R. P. Dynamic physical education for elementary school children (6th ed.). Minneapolis: Burgess Publishing Co., 1979.
- Detweiler, G. R. The effect of various training frequencies on running endurance capacity of primary grade children. Unpublished master's thesis, East Straudsburg State College, 1973.
- Diem, L. Children learn physical skills (Vol. 2). Munich: Kosel-Verlag Gmbh & Co., 1974.
- Flinchum, B. M. Motor development in early childhood. St. Louis: C. V. Mosby, 1975.
- Flinchum, B. M., & Hanson, M. R. Who says the young child can't? Motor Activity for Early Childhood, 1971, 11, 10-11.
- Froebel, F. The education of man. New York: D. Appleton & Co., 1912.
- Gordon, L. A., Thompson, M. M., & Alspaugh, J. W. The relative importance of various physical education objectives for grades K-2. Research Quarterly, 1973, 44, 192-96.
- Gulick, L. Philosophy of play. New York: Chas. Scribners's Sons, 1920.
- Hanson, S. K. A comparison of the overhand throw performance of instructed kindergarten boys and girls. Unpublished master's thesis, University of Wisconsin, 1961.

- Hrkal, H. An experimental study of the development of the mature form of the overarm throwing pattern in preschool children. Unpublished master's thesis, University of Western Ontario, 1977.
- Hymes, J. L., Jr. Teaching the child under six. Columbus, Ohio: Chas. E. Merrill Publishing Co., 1968.
- International Council of Sport and Physical Education. Declaration on sport, UNESCO, Place de Fontenoy, Paris, 1964.
- Loovis, E. M., & Ersing, W. F. Assessing and programming gross motor development for children. Cleveland Heights, Ohio: Ohio Motor Assessment Associates, 1979.
- Luebke, L. L. A plan for action: Physical education in early childhood. Journal of Physical Education and Recreation, 1981, 52, 29.
- Mackes, B. E. Sequential development of the movement pattern sliding. Unpublished master's thesis, Centenary College, 1971.
- Mahmoud, W. L. The effects of instruction and practice on the overarm throwing patterns of preschool children. Unpublished doctoral dissertation, University of Oregon, 1979.
- Masche, K. A. Effects of two different programs of instruction on motor performance of second grade students. Research Quarterly, 1970, 41, 406-11.
- McClenaghan, B. A., & Gallahue, D. L. Fundamental movement: A developmental and remedial approach. Philadelphia: W.B. Saunders, 1978.
- Miller, J. L. Effect of instruction on development of throwing for accuracy of first grade children. Research Quarterly, 1957, 28, 132-37.
- Moran, J. M., & Kalakian, L. H. Movement experiences for the mentally retarded or emotionally disturbed child (2nd ed.). Minneapolis: Burgess Publishing Co., 1977.

- Nestroy, J. A. Fitness levels of children taught by the physical education specialist and classroom teachers. Unpublished master's thesis, Texas Woman's University, 1978.
- Rarick, G. L. Concepts of motor learning: Implications for skill development in children. In J. G. Albinson & G. M. Anderson (Eds.), Children in sport and physical activity. Baltimore: University Park Press, 1976.
- Rarick, G. L. Motor development--Its growing knowledge base. Journal of Physical Education and Recreation, 1980, 51, 26-7; 56-61.
- Siegel, S. Nonparametric statistics for the behavioral sciences. New York: McGraw-Hill Co., 1956.
- Sinclair, C. B. Movement and movement patterns of early childhood. Richmond, VA.: State Department of Education, 1971.
- Sutton-Smith, B. Child's play--Very serious business. Psychology Today, 1971, 5, 67-69, 87.
- Whittle, H. D. Effects of elementary school physical education upon aspects of physical, motor, and personality development. Research Quarterly, 1961, 32, 249-60.
- Winnick, J. P. Early movement experiences and development: Habilitation and remediation. Philadelphia: W. B. Saunders Co., 1979.