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THE EFFECTS OF A PHYSICAL EDUCATION PROGRAM
ON THE STANDING LONG JUMP PERFORMANCE
OF PRESCHOOL-AGED CHILDREN WITH COGNITIVE DELAYS

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THE EFFECTS OF A PHYSICAL EDUCATION PROGRAM ON THE STANDING LONG JUMP PERFORMANCE OF PRESCHOOL-AGED CHILDREN WITH COGNITIVE DELAYS

By

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ABSTRACT

THE EFFECTS OF A PHYSICAL EDUCATION PROGRAM
ON THE STANDING LONG JUMP PERFORMANCE
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The purpose of this study was to investigate whether children with cognitive delays such as mental retardation would improve standing long jump skills better through a program of physical education instruction or through natural growth. The participants consisted of 34 children from 3 to 7 years of age with cognitive delays as classified by the ABILITIES Index (Simeonsson & Bailey, 1991) from two schools that serve preschool children with disabilities. The experimental group from School A received play-oriented instruction, while the control group at School B did not receive any instruction. The Test of Gross Motor Development (Ulrich, 1998) and Fundamental Motor Skill Stage Characteristics from the Motor Performance Study at Michigan State University (Seefeldt & Haubenstricker, 1976) were the instruments used to assess the motor skill selected for this study, namely the standing long jump. This study was conducted during the course of a 9-week period. The statistical tests (independent t test and paired-sample t test) were performed at the .05 alpha level. The results of this study indicated that the motor skill improvement in jumping was more attributed to the intervention than to natural growth. This suggests that instructional programs for children with cognitive delays should be designed to improve other fundamental motor skills in addition to jumping.

DEDICATION

This thesis is dedicated to my parents, Jong-Hun Kim and Jung-Ja Park, and my wife, Ji-Won Chang, for all of their support.

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Chapter I

INTRODUCTION

All children, regardless of their abilities or disabilities, are involved in movement activities, as movement is fundamental to human life. Movement activities in preschool aged children involve and rely upon the use of fundamental motor skills (Riggs, 1980; Williams, 1991). These fundamental motor patterns are elementary forms of movement activities which provide the physical development necessary for more complex movement activities. Through the acquisition of fundamental motor skills, children constantly increase their physical and cognitive potential for learning more advanced skills for sports (Eichstaedt & Lavay, 1992; Ignico, 1994; Seefeldt & Haubenstricker, 1982) and various leisure activities. In addition, learning fundamental motor skills helps children develop a stronger self-concept as well as various social skills (Gallahue, 1989; Williams, 1983). Because fundamental motor skills play an important role in so many areas of the child's development (their acquisition has, in fact, been called basic to the development of all children), early childhood physical education should emphasize instruction in these skills (Gallahue, 1989).

Overview of the Problem

Because motor development follows a uniform sequence in children (Seefeldt, 1980), many educators and parents believe children will develop physical skills on their own through natural maturation. Of course, for some children this is true, but many others need to be challenged with developmentally appropriate instruction programs to

help them develop even such fundamental skills as jumping and throwing (Sander, 1992). This is especially true of the fundamental motor skills instruction of children with special needs, including those with developmental delays or those at risk of developmental delay, who may lag behind their non-disabled peers of the same chronological age (Mindes, 1982; DiRocco, Clark, & Phillips, 1987; Bouffard, 1990; Rousey & Eyman, 1995). Thus, it is important for adapted physical education specialists or preschool special education teachers to recognize the effectiveness of various instructional programs and select those that will allow each student to learn fundamental motor skills as efficiently and completely as possible.

Although there may be many effective and meaningful ways to help children with disabilities learn fundamental motor skills, two basic types of teaching methods are generally used in physical education programs for preschoolers with disabilities. That is, physical education instruction programs generally tend toward either a teacher-centered program of direct instruction or toward a student-centered program of indirect instruction. Much of the recent research has compared the relative effectiveness of direct instruction and indirect instruction programs for young children with disabilities, and has examined advantages and disadvantages of each teaching method (Willert & Kamii, 1985; Cole, Mills, & Sale, 1989; Rimmer & Kelly, 1989; Bredekamp, 1992; Bricker & Cripe, 1992; Cole, Dale, Mills, & Jenkins, 1993; Hanline & Fox, 1993; Linder, 1993; Novick, 1993; Hickson, Blackman, & Reis, 1995; Rich, 1995; Bender, 1996; Block & Davis, 1996). For example, while direct instruction in a teacher-centered program has benefits in terms of time-on-task, there have been some criticisms of this teaching method for children, such as overly strict behavior management, limited freedom to explore the environment, and

difficulty in maintaining class control. On the other hand, while indirect instruction permits the child to take an active role in the learning process through experimentation and self-discovery, this method has been criticized for its relative lack of structure, the great amount of time required for students to show progress, and the absence of an absolute outcome. Therefore, some researchers (Cole, Mills, & Sale, 1989; Cole, Dale, Mills, & Jenkins, 1993) have indicated that neither teaching method has a distinct advantage, and have suggested that both teaching methods improve performance to approximately the same extent. As a result, some researchers (Bricker & Cripe, 1992; Linder, 1993; Block & Davis, 1996) have introduced a relatively new teaching method, called play-oriented instruction or activity-based instruction, which is a hybrid of direct instruction and indirect instruction, and have provided a good theoretical background for the superiority of this new teaching method (play-oriented instruction).

However, to date, there are few empirical studies that have investigated whether the application of this mixed teaching method can help children with disabilities, especially those with cognitive delays, acquire fundamental motor skills. Therefore, this study attempts to demonstrate and evaluate the effectiveness of a program combining the direct and indirect instruction methods in teaching a fundamental motor skill to preschool children with cognitive delays.

Need for the Study

There is a strong need for more effective physical education programs for children with cognitive delays (Block & Davis, 1996). Children with cognitive delays such as mental retardation lag on the average of two to four years behind their peers without

disabilities in motor development, including the standing long jump (Rarick, 1973; DiRocco, Clark, & Phillips, 1987). This emphasizes the crucial need for physical education programs for such children to include motor development instruction. Unfortunately, it may be the case that the most commonly used teaching approach in physical education for children with cognitive delays, the teacher-centered approach, does not sufficiently allow the children to explore the environment and create activities that guide their learning in a developmentally appropriate way (Block & Davis, 1996). On the other hand, though the student-centered approach allows the student to "play and explore the environment on their own terms," in a way that may more effectively and completely facilitate learning of fundamental motor skills (Block & Davis, 1996), this approach may be hard to understand for students functioning at a severe/profound level of cognitive deficit. Therefore, greater understanding of the method of instruction including an evaluation of the effectiveness of play-oriented instruction is important because it is part of the ever-necessary development of better approaches to teaching fundamental motor skills to children with disabilities.

Studying a mixed instructional method of this type in a physical education program could have several important benefits for adapted physical education specialists or preschool special education teachers, for children with cognitive delays and other disabilities, and for society in general. Teachers could benefit from an investigation of this instructional method because they would be able to expand the possible techniques that they could use, and be able to improve the efficiency of teacher interaction with preschool children having cognitive delays or other disabilities (Bricker & Cripe, 1992). More importantly, children with cognitive delays (and perhaps all other children as well)

could benefit from such research, because developing a better instructional method could allow children to participate more fully in their own learning and to experience a variety of situations which develop their physical, cognitive and social skills to the highest level possible (Bredekamp, 1992; Bricker & Cripe, 1992).

Further, society could also benefit from such research, because if this mixed instructional method had these positive effects on physical, social, and cognitive development, it might help children with cognitive delays and other disabilities gain greater competence and independence physically, mentally, and socially than that possible through other methods. This could serve to help children with cognitive delays grow into adults who are able to not only overcome dependence on society, but are in fact able to become independent, productive members of that society. Therefore, the potential benefits of the mixed instructional method for teachers, children, and society make further research and development of this method important.

Statement of Problem

The purposes of this study were to examine: (a) the differences in standing long jump performance between children from one school who received physical education instruction and children from another school who did not receive any special instruction; and (b) the differences in standing long jump performance before and after the treatment period for the children of both schools.

Hypotheses

The general hypothesis of this study was that children with cognitive delays in an experimental group (E) who learned a selected fundamental motor skill (standing long jump) through a program of physical education instruction would show a greater improvement in that skill than members of a control group (C) who were not directly instructed in the standing long jump. The tests used in this study were the jumping components of the Test of Gross Motor Development which will be referred to as TGMD and the Fundamental Motor Skill Stage Characteristics from the Motor Performance Study at Michigan State University which will be referred to as MPS throughout the study. The following specific hypotheses were evaluated:

1. Preschool children with cognitive delays in the E group will display statistically equivalent MPS scores on the pretest to preschool children with cognitive delays who are assigned to the C group.

2. Preschool children with cognitive delays in the E group will display statistically equivalent TGMD scores on the pretest to preschool children with cognitive delays who are assigned to the C group.

3. Preschool children with cognitive delays who receive a program of physical education instruction will display statistically higher MPS posttest scores in jumping than those who receive no special instruction.

4. Preschool children with cognitive delays who receive a program of physical education instruction will display statistically higher TGMD posttest scores in jumping than those who receive no special instruction.

5. Preschool children with cognitive delays in the E group who receive a program of physical education instruction will display statistically higher MPS posttest scores in jumping than MPS pretest scores in jumping.

6. Preschool children with cognitive delays in the E group who receive a program of physical education instruction will display statistically higher TGMD posttest scores in jumping than TGMD pretest scores in jumping.

7. Preschool children with cognitive delays in the C group who receive no special instruction in jumping will display statistically equivalent MPS posttest scores to MPS pretest scores.

8. Preschool children with cognitive delays in the C group who receive no special instruction in jumping will display statistically equivalent TGMD posttest scores to TGMD pretest scores.

Overview of Research Methods

The participants in this study were preschool children aged three to seven years selected from eight PPI (pre-primary impaired) classes in two special education schools. Within those classes, the ABILITIES Index (Simeonsson & Bailey, 1991) was used to determine which students have cognitive delays. This included those having a score of 2 or higher on the behavior/social skills, intellectual functioning, or intentional communication components of the ABILITIES Index. The classroom teacher in each class used the ABILITIES Index to assess the cognitive level of each student.

The participants were assigned to E or C groups based on pre-existing school units. Children in School A were assigned to the E group, while students in School B

were assigned to the C group. The children in the E group were taught the standing long jump through a physical education program which was based on materials contained in the Michigan's Exemplary Physical Education Curriculum (MI-EPEC) (1995), and was modified in consideration of the developmental and cognitive levels of the participants in this study. These lesson plans were made in an attempt to represent current theory with respect to optimal teaching methods (i.e., both effective and enjoyable) for such student populations. This E group intervention consisted of 15-minute lessons, delivered three times a week over a total intervention period of seven weeks. On the other hand, the children in the C group did not receive any special instruction to learn jumping skills during this period.

The relative effectiveness of, and difference between, the treatment conditions was assessed based on pre- and posttest scores of jumping performance, using the MPS and TGMD tests. Videotaped performances of three trials of the standing long jump by each participant were analyzed, with the best performance used as the participant's score. This research plan is described in detail in Chapter III of this thesis.

Limitations

1. The sample selected for this study was not a random sample. Participants came from two schools providing instruction in a special education program. Also, this study was conducted using intact groups pre-designed by the schools and not the researcher. Therefore, generalization may be limited by characteristics unique to the participants and schools that participated in this study.

2. The sample used in this study may not proportionately represent age or gender groups found in society in general. The sample size was not large enough to analyze differences due to age. Also, as the participants selected for this study consisted of 27 boys and 7 girls, both schools' gender ratios were skewed disproportionately.

3. Due to the need to tailor the goals of the study to the schools' curricula and teachers' objectives, only the locomotor movement skill of jumping was investigated; there was no opportunity in this study to investigate object control skills.

4. Factors such as prior environmental conditions and experiences of which the researcher was unaware may have influenced individual performance differentially. For example, one of the schools studied had a physical education program while the other school did not.

5. Although the focus of this study was only on children with cognitive delays, it was necessary to include all children in the PPI classes of the two schools as participants in the study. Some of these children did not have cognitive delays. Therefore, although all children who were given permission to participate by their parents or guardians performed a pretest and posttest, (with children in the E group also receiving the treatment), the study focused only on the results of children classified as having cognitive delays.

6. The determination of particular students as having cognitive delays was made independently of the principal researcher. The teachers of each class used the ABILITIES Index to assess the cognitive levels of their students. IQ scores were not available to determine the students with cognitive delays.

7. Due to the schedule limitations of each school, both the pretest and posttest were administered in the gymnasium of each participating school, according to each school's schedule. Also, because of time limitations and students' absences, three separate testing sessions had to be conducted for both the pretest and posttest administrations at each school.

8. The intervention and testing portion of this study were confined to the duration of the spring term in the school calendar.

Definition of Terms

1. Preprimary impaired - In the terminology of the Michigan Department of Education (1998), preprimary impaired (PPI) means:

> a child through five years of age whose primary impairment cannot be differentiated through existing criteria of other defined impairments and who manifests an impairment in one or more areas of development equal to or greater than 1/2 of the expected development for chronological age, as measured by more than one developmental scale which cannot be resolved by medical or nutritional intervention.

2. Direct instruction - a traditional teacher-centered approach of teaching where the teacher follows a hierarchy of instructional steps in each lesson, also called "behavior analytical" approach (Bricker & Cripe, 1992)

3. Indirect instruction - a student-centered approach of teaching where the child takes an active role in the learning, also called "mediated/cognitive process training" (Cole, Dale, Mills, & Jenkins, 1993; Hickson, Blackman, & Reis, 1995).

4. Play-oriented instruction - a mixed teaching style of direct instruction and indirect instruction, also called "activity-based intervention" (Bricker & Cripe, 1992), or "using play as a teaching context" (Hanline & Fox, 1993).

5. Cognitive delay - impairment of intellectual functioning (e.g., mental retardation).

6. Fundamental motor skill - a skill that involves two or more bodily segments and results in the transfer or reception of the body or some external object, e.g., running, jumping, hopping, throwing, striking, or kicking.

Chapter II

REVIEW OF LITERATURE

The following topics pertinent to this investigation are reviewed: (a) the learning, physical/motor, and social/emotional characteristics of children with mental retardation; (b) the importance of fundamental motor skills in children with mental retardation; (c) the importance of play-oriented instruction in preschool adapted physical education; and (d) play-oriented programming for children with mental retardation.

Characteristics of Children with Mental Retardation

Children with mental retardation generally demonstrate delays in developmental areas, although not all children with mental retardation display the same characteristics. Krebs (1995) categorized the developmental delays of children with mental retardation into learning, physical/motor, and social/emotional characteristics.

Learning characteristics. Learning characteristics can be summarized by stating that children with mental retardation learn more slowly and inefficiently than those without disabilities (Ford & Mirenda, 1984; Gearheart, Weishahn, & Gearheart, 1996). This difference between children with and without mental retardation is usually explained by cognitive behavior. Inhelder (1968) and Hickson, Blackman, and Reis (1995) used Piagetian theory to explain that children with mental retardation follow the same cognitive developmental sequence as children without disabilities, but they acquire skills at a slower rate. They also indicated that individuals with mental retardation may not reach all levels of development, and they predicted that there would likely be a level

beyond which an individual will not progress. Kahn (1979) showed that children with mild/moderate mental retardation usually function at the preoperational period, which is characterized by egocentism and a time when symbolism (i.e., language, play, and mental imagery are mastered) is learned to master a task. Therefore, an understanding of the preoperational stage may be an essential prerequisite to understanding the learning characteristics of preschool aged children with mental retardation.

Much of the research being conducted today in the field of mental retardation deals with weaknesses in learning processes, such as attention, memory, retention, or generalization, that underlie deficiencies in learning. Nugent and Mosley (1987) studied the attentional allocation and capacity of individuals with mental retardation and without disabilities. The subjects for this study consisted of 18 individuals with mental retardation and 40 individuals without disabilities. Their mean chronological age was 25.75 years, and their mean mental age was 7.08 years. Previous research found that establishing tasks that require the same amount of automaticity was difficult to provide. Therefore, in this study, the researchers attempted to eliminate the factors of automaticity by creating an auditory detection task that utilized very familiar or equally unfamiliar stimuli. They concluded that individuals with mental retardation were less efficient at attentional allocation and have a more limited attentional capacity than those without disabilities. Although this study included adults with mental retardation, additional studies should be conducted to examine the learning processes of preschool age children.

Furthermore, as Hoover and Horgan (1990) described, children with mental retardation suffer short-term memory deficits during rehearsal strategies, though their long-term memory approach is usually nearly normal. Also, as Porretta (1988) pointed

out, children with mental retardation experience difficulty in retaining and transferring skills. In addition, Krebs (1995) indicated that because children with mental retardation have more difficulty generalizing and applying previous learning to new situations than those without disabilities, they are more likely to view each task as a novel one.

All of the above problems are due to the fact that the most significant learning characteristic of children with mental retardation is diminished intelligence, a predictably and generally poor ability to learn (Kail, 1992). Watkins, Boyd, and Cavalier (1982) found that learning, memory, and transfer of training were positively correlated with IQ in students with mental retardation. It follows that the lower IQ scores of children with mental retardation will be reflected by slower learning, impaired memory, and less efficient transfer of training, and this will cause such students to fall farther and farther behind their non-disabled peers (Ellis & Dulaney, 1991).

Physical/motor characteristics. The physical health of children with milder levels of mental retardation is not likely to be much different from that of their peers without disabilities; however, physical health problems are much more likely among those with more severe mental retardation. For example, as Silliman and French (1995) pointed out, there is a much higher incidence of ambulatory deficiencies in children with severe mental retardation than in those who are normal or who have milder forms of mental retardation. Further, children with severe retardation may have multiple disabilities including such conditions as cerebral palsy, hydrocephalus/spina bifida, or sensory impairments, making physical/motor development all the more difficult (Sherrill, 1998).

The motor ability and performance of children without disabilities generally exceeds that of children with only mild mental retardation. DiRocco, Clark, and Phillips

(1987) investigated the developmental sequence of coordination for the propulsive phase of the standing long jump with 39 children with mild mental retardation and 90 children without disabilities, ages 4 to 7 years. They determined that the patterns of leg and arm coordination were similar, but the distances jumped by children with mild mental retardation were similar to the distances jumped by children who were 2 to 3 years younger without disabilities, rather than the same distances jumped by children of the same chronological ages without disabilities.

Holland (1987) studied qualitative fundamental motor skill performances of children with mild mental retardation and those without disabilities. The subjects for this study consisted of 170 children without mental retardation and 138 children with mild mental retardation. All subjects were in the age range of 6 years to 9 years old. Seven fundamental motor skills including run, vertical jump, overhand throw, catch, ball bounce, kick, and two-hand sidearm strike were tested. Each skill was divided into four qualitative components of mature skill level, and the children were assigned a 2 for each component of the skill demonstrated to criterion and a 1 for each component not met. The results showed that children without disabilities perform better than children with mild mental retardation on each of the seven skills.

Further, Eichstaedt, Wang, Polacek, and Dohrmann (1991) stated in their book that as the degree of disability increases, children exhibit greater deficiency in motor performance. Rousey and Eyman (1995) supported this statement with their study. They estimated the development of ambulation and speech over a 6-year period of 3- to 10-year-old ambulatory children with moderate to profound mental retardation. The results showed that improvements in basic skills, across all levels of mental retardation, occur far

past the normative age for development of speech and ambulation. They also stated that the degree of mental retardation has a negative effect on initial skill levels and on the probability of improvement.

Krebs (1995) summarized the work of other researchers that the developmental delays demonstrated by children with mental retardation could be associated with their cognitive ability, and explained that the more severe the intellectual deficit, the greater the deficit in motor performance. Bankhead and MacKay (1982) found the prevalence of fine motor problems to be inversely proportional to intelligence. They also reported that the performance levels of individuals with "subnormal" intelligence were inferior to those of "normal" intelligence in the areas of task complexity and reaction time.

Bouffard (1990) demonstrated that educable mentally handicapped children lag well behind their peers without disabilities in the development of both fine and gross movement skills, and that their lack of proficiency is related to their inability to solve problems. Citing research conducted mainly in cognitive developmental psychology, Bouffard (1990) reviewed the five sources of this lag in movement skill development for those with mental retardation: (a) deficiencies in the knowledge base, such as a lack in the amount of knowledge a person has; (b) deficiencies of spontaneous use of strategies, for example, lack of technique to overcome problems; (c) inadequate metacognitive knowledge and understanding, such as the lack of the person's ability to consider the requirements of the task, the environmental conditions, and the resources available to cope with the situation; (d) lack of executive control, including the lack of strategic processing to solve the problem; and (e) inadequate motivation and practice. Based on these problem areas, helpful guidelines were given for teaching cognitive-motor skills to

children with mental retardation. It is also encouraging that research has found that effective training can help students at all cognitive levels improve their performance (Watkins, Boyd, & Cavalier, 1982) and hopefully could do so in the areas of deficiency mentioned by Bouffard (1990).

Social/emotional characteristics. Although children with mental retardation exhibit the same range of social behavior and emotion as children without disabilities (Krebs, 1995), they frequently demonstrate inappropriate responses to social and emotional situations (Jansma & French, 1994; Zetlin & Murtaugh, 1988). Jansma and French (1994) indicated that students with mental retardation are easily frustrated, often have an inadequate self-image, and often lack motivation and aggressiveness. Kopp, Baker, and Brown (1992) found that preschool students with mental retardation show significant deficiencies in social development.

Regarding social relationships, Zetlin and Murtaugh (1988) studied the friendship patterns of 32 high school students with mild mental retardation and 32 high school students without disabilities. Three features of friendship were examined: intimacy, empathy, and stability over time. Observations were made during class time, lunch hour, and free time before and after school. Interviews were also conducted with the students about their social relationships. The results from observational data and self-reports indicated that students with mild mental retardation have fewer friendships than students without disabilities. Their friendships are less stable and more conflict-ridden than are those of students without disabilities, and they show less intimacy and empathy toward their peers. Further studies should be conducted to examine whether or not similar results would be obtained from preschool age children.

Children with mental retardation often do not fully comprehend what is expected of them, and they may respond inappropriately because they have misunderstood the situation rather than because of a lack of appropriate responses. In this sense, it is not surprising that children with more severe levels of mental retardation are more likely to exhibit social and behavioral problems than those with milder levels of mental retardation (Gearheart, Weishahn, & Gearheart, 1996).

The Importance of Fundamental Motor Skills in Children with Mental Retardation

Children's motor patterns greatly expand during early childhood. At this time children no longer have to rely on rudimentary motor behaviors to explore and manipulate their environment. They begin to develop and use fundamental motor skills which are classified into two categories: (a) locomotor skills, such as walking, running, jumping, hopping, sliding, leaping, and skipping, and (b) object control skills including catching, throwing, striking, kicking, and bouncing (Gallahue, 1989). Therefore, there should be considerable support for the inclusion of fundamental motor skill instruction in early childhood physical education programs.

Researchers have stated several reasons why the development of fundamental motor skills is an integral part of children's lives. First of all, the development of fundamental motor skills may contribute to the preschool child's ability to interact with the environment. Riggs (1980) mentioned that children spend many hours actively exploring and examining both their bodies and the physical environment that surrounds them. Such activities necessarily involve and rely on the use of fundamental motor skills. Therefore, he advocated that fundamental motor skills are necessary for children to

function effectively in the environment. Also, Wickstrom (1983) proposed that the development of fundamental motor skills is an underlying factor critical to the success of more complex movement. Development of these skills provides added insight into other body actions and is the foundation to successful performance of more complex movements.

Similarly, Haubenstricker and Seefeldt (1986) referred to fundamental motor skills as the "building blocks" for transitional motor skills, which in turn should lead to advanced skills such as sports, games, and other leisure activities to be developed in later childhood. It can be assumed that if children with mental retardation are to experience success in sports, such as a Special Olympics soccer game, they need to acquire some proficiency in fundamental motor skills such as running, jumping, sliding, and kicking. However, if children have not acquired any proficiency in these fundamental motor skills, their games could very easily turn into failures that lead to a frustrated state of mind and a reluctance to continue participating (Lavay, 1985). Therefore, acquiring these fundamental motor skills can increase a child's potential for learning more advanced sports and lifetime physical activity skills, and can lead to an improvement in the ability to interact with others through games and sports in a socially acceptable manner (Rimmer & Kelly, 1989).

The learning of fundamental motor skills in children with mental retardation also can have the powerful effect of positively influencing physical, cognitive and affective domains. Although it is true that fundamental motor skills are specific in nature and uniquely different from the skills used in physical fitness activities, the two often directly affect one another. That is, children with mental retardation seem to be able to improve

significantly in movement components such as strength, coordination, speed, agility, balance, and endurance due to a correlated improvement in fundamental motor skills performance (Rarick, 1973). In addition, once children with mental retardation learn fundamental motor skills, they are prepared to learn the rules and strategies involved in various games and sports, enabling the child to become more involved in the activity either as a participant or as a spectator (Eichstaedt & Lavay, 1992). Moreover, when children with mental retardation master fundamental motor skills, they can achieve a stronger self-concept and gain a more positive sense of self-esteem. Therefore, fundamental motor skill development is a major component of physical activity programs for children in special education (Ulrich, 1998).

Jumping. This literature review section will only focus on the fundamental motor skill selected for this study (standing long jump), which is a locomotor movement. Jumping is defined as taking off from either one foot or both feet simultaneously, but landing on two feet. It includes preparatory, takeoff, flight, and landing phases (Payne & Isaacs, 1991). In the beginning, jumping is usually performed in a stiff manner. However, as children progress, jumping skills and processes become increasingly more complex. For example, for a child to successfully complete jumping performance, the child needs to know how much to bend the knees and crouch the body to get ready for the takeoff phase. The child needs to know how far to extend the arms into the air as the feet leave the floor for the flight phase. Also, for the landing phase the child needs to know how far apart the feet are supposed to be and how to position the body. Good jumping skills can be acquired only after success in complex learning situations (e.g., development

of strength to provide sufficient force and balancing adjustments to maintain acceptable body position).

Some other studies have suggested that jumping is a good example for the study of the development of fundamental motor skills in early childhood. Poe (1976) stated that as jumping is an action that is maintained throughout the life span and is required in a number of athletic pursuits, it is considered to be a universal behavior that emerges early in childhood. Horita, Kitamura, and Kohno (1991) noted that body configuration, takeoff angle, and reflex activity are all components of the standing long jump which can be reached at an early age (6 or 7 years). Therefore, the standing long jump should be one of the common motor skills focused on in early childhood physical education.

Dummer, Connor-Kuntz, and Goodway (1995) developed a physical education curriculum that included 160 objectives for all preschool children and generally advocated teaching only introductory levels of skills to preschoolers. They also presented a sample core curriculum that includes the 31 highest-rated program objectives from their curricula for preschool children. Jumping was included among these objectives, and so seems worthy of examination in any study of the development of fundamental motor skills in preschoolers.

Degree of disability, age, and gender differences in jumping performance in children. DiRocco, Clark, and Phillips (1987) showed a significant difference between the jumping performance of children with mild mental retardation and that of children without disabilities. Jumping patterns and distance jumped were recorded on film. The results indicated that the children with mild mental retardation exhibited the same patterns of arm and leg coordination as the children without disabilities. However, the

means for distance jumped by the children with mild mental retardation were similar to the distances jumped by children without disabilities who were 2 to 3 years younger. Therefore, children with mental retardation who were 7 years old performed similar jumping distances as children without disabilities who were 5 years old. The authors gave two possible explanations for these results, which were a difference in coordination between the arm and leg action and differences in control mechanisms. Also, Sherrill (1998) reported that jumping is a difficult skill for severely mentally retarded children because of its demand for good balance and bilateral integration.

It is generally assumed that as one gets older, the performance of the fundamental motor skills naturally improves because the child gradually becomes taller, broader, and stronger. Morris, Williams, Atwater, and Wilmore (1982) conducted an investigation to assess age and gender differences in motor performance (including standing long jump) of children three to six years of age. Their results indicated that on all tasks except balance, the older children displayed increasing motor performance scores. They reported that performance generally was related more to age than to gender.

Several researchers (Seefeldt & Haubenstricker, 1976; Haubenstricker, Seefeldt, & Branta, 1983; Roberton, 1984) have proposed age-related staging sequences for the standing long jump. Their developmental stages for jumping skills have been arranged on a continuum ranging from immature to mature performance. Clark and Phillips (1985) ascertained that as a child's age progresses, there are qualitative changes in jumping (e.g., different arm and leg patterns). In addition, they reported that at about 3 years of age the jumping is in its most immature form and the most mature form is evident at 9 years of age.

Phillips, Clark, and Peterson (1985) studied age-related changes in mechanical parameters of jumping. They explored changes in takeoff parameters by filming 102 children from 5 age groups (3, 4, 5, 6, and 7 years). It was found that the shoulder angle increases in flexion as children get older. There were significant differences in all segmental angles of inclination, relative to the horizontal, when comparing the three year olds to the other age groups. A greater lean toward the jumping direction with increasing age was also shown. However, although Branta, Haubenstricker, and Seefeldt (1984) showed data for age as being a factor for change in performance in the standing long jump, they noted that these differences may be due to environmental influence (e.g., opportunity for practice, interest, and motivation) more than to chronological age.

According to the review of Toole and Kretzschmar (1993), many studies have been reported for gender differences in motor performance and in activity level during childhood. They concluded that boys have generally been considered to be superior to girls in power/force tasks as well as in running speed and agility; whereas, girls usually perform better on balance and flexibility tasks. Specifically, the investigations of some researchers (Milne, Seefeldt, & Reuschlein, 1976; Morris, Williams, Atwater, & Wilmore, 1982; Rudisill & Toole, 1993) supported the above contention that gender differences exist for the standing long jump.

The Importance of Play-Oriented Instruction in Preschool Adapted Physical Education

Children in the preschool years (3 to 6 years old) have demonstrated a desire to move, and curiosity and eagerness to try everything (Fowler, 1981). Through movement activities, they are learning, making decisions, exploring, experimenting, and creating in

their world of present and past experiences. Therefore, effective early childhood motor programming and intervention are necessary for all preschool children, regardless of their abilities or disabilities.

Direct, indirect, and play-oriented instructions. Although there are several approaches to develop motor skills for children with disabilities, the two teaching methods known as direct instruction and indirect instruction are most widely used in physical education programs for such children (Bricker & Cripe, 1992). Much of the research has compared the relative effectiveness of direct instruction and indirect instruction in physical education, and has described advantages and disadvantages of each instruction method.

According to the explanation given by Rich (1995), direct instruction is based on a teacher's control of instruction and close supervision of student work. Also, the teacher can give the student direct cueing and feedback regarding the student's errors or, as they need, information regarding lesson content. For example, if a teacher targets preparation motions to jump horizontally for a child with cognitive delays, s/he might develop a plan that has the child perform correct arm and leg motions. The teacher might even give the child direct feedback as to the quality of preparation motions of jumping such as, "This time when you jump, I want you to concentrate on putting your arms way back and bending your knees."

Ainsworth and Fox (1989) reported that direct instruction may be less time-consuming in early stages than indirect instruction. They proposed that direct instruction has produced good results in low-achieving students (e.g., those with severe disabilities). Similarly, Hickson, Blackman, and Reis (1995) stated that direct behaviorally oriented

instruction is the method of choice at more profound levels of mental retardation. However, in spite of these advantages, some researchers (Bricker & Cripe, 1992; Linder, 1993) reported several limitations of direct instruction. They indicated that in the direct instruction approach, children have limited freedom to explore and experience the environment on their own, opportunities for choice, and interaction with peers.

On the other hand, Hildebrand (1985) and Rich (1995) pointed out that indirect instruction is more student-centered and it can permit the children to take an active role in the learning process through problem solving, experimentation, and self-discovery. For example, in the gymnasium, a teacher might set up play centers such as box jumping and hoop jumping, and then the children choose the center they want to go to. Therefore, the children explore their environment on their own terms and have fun and learn through play. Swanson (1994) also noted that this teaching method (indirect instruction) encourages more interaction among peers rather than between children and teachers. Further, Ainsworth and Fox (1989) proposed that indirect styles are most beneficial for high-functioning adapted physical education students, preschool infants and toddlers, or those learning basic motor skills. Similarly, Hickson, Blackman, and Reis (1995) stated that cognitive strategy training (indirect instruction) is more widely used for educating children at milder levels of mental retardation.

However, the indirect instruction approach also has some limitations, as does direct instruction. Bricker and Cripe (1992) pointed out the lack of specific goals or objectives of indirect instruction and criticized the absence of an absolute outcome. For example, in the indirect instruction approach, children with disabilities may only be expected to play and have fun; and not have any specific gross motor goals, such as

increasing jumping distances. Therefore, children with disabilities who need to work on critical gross motor skills may not get the needed practice or feedback. Also, Ainsworth and Fox (1989) found that indirect instruction requires a great amount of time for students to show progress. Therefore, some researchers (Cole, Mills, & Sale, 1989; Cole, Dale, Mills, & Jenkins, 1993) have indicated that neither instructional approach has a distinct advantage, and have suggested that both instructional approaches improve performance to approximately the same extent.

Recently, play-oriented intervention, which is a combination of direct and indirect instruction approaches, has begun to receive greater attention in early childhood physical education literature, and has been said to follow the "best practice" in educating young children with disabilities (Linder, 1993; Novick, 1993; Block & Davis, 1996). Block and Davis (1996) compared the effectiveness of traditional teacher-directed methods with that of more recently developed play-based approaches in physical education for preschool children with disabilities. The authors advocated that while direct instruction has its benefits in terms of time-on-task and focus on critical IEP objectives, it is not consistent with current developmentally appropriate philosophies of early childhood education. On the other hand, play-oriented intervention, a relatively new teaching approach, utilizes individual goals and objectives that have been found to be critical in the successful education of children with disabilities.

Hanline and Fox (1993) referred to play-oriented instruction as "play as a teaching context." They found that teaching children with disabilities in natural play environments is effective for teaching specific skills, and tends to result in better generalization of these skills within the instructional setting. Also, Ignico (1994) pointed out that preschool

teachers must provide appropriate teaching methods to develop fundamental motor skills and movement concepts, and reported that play-oriented instruction not only promotes regular physical activity but also provides a place to practice fundamental motor skills. In particular, he proposed that a play environment, which is large enough for children to move freely and safely while learning these skills, will encourage children to remain active.

The contributions of play to child development. Although not all experts concur on a definition of play, many would agree that play, a dominant developmental activity in a young child, is an important medium for all areas of the child's development. A number of studies have been reported concerning the effects of play on children. Bennett (1980) stated that play is the foundation for children's motor development. Play involves fundamental movements of the body that are naturally and progressively performed (Seefeldt, 1984), and such practice of fundamental movements in play activities results in motor skills that are swift, fluid, and accurate (Bundy, 1991). As Athey (1984) mentioned, in gross motor play the child learns mastery over larger and more mobile objects along with an understanding of how the body moves through space, while fine motor skills and eye-hand coordination are developed through play with small objects.

Play also has a significant role in promoting cognitive growth. Piaget (1962) divided play into three stages, representing points where major changes in the child's growth become evident. Sensorimotor play involves the deliberate repetition of the application of some motor scheme to an object, for example, when a child shakes a rattle over and over again. As children develop, they begin to apply action schemes to objects which are more and more remote from the initial object of focus. This leads to the

emergence of symbolic play, in which children develop the ability to represent an absent object or experience through their own actions. Finally, in the period of concrete operations, games with rules replace individual symbolic make-believe, as individual symbols and beliefs are modified by collective discipline and cooperation with others.

Play activities in groups also contribute to children's affective/social development. Bradtke, Kirkpatrick, and Rosenblatt (1972) defined affective behavior as the feelings and reactions of individuals toward other individuals and their environment, and stated that play is used for building affective behaviors by breaking through the barriers of unawareness, fearfulness, and unresponsiveness. Play gives children the opportunity to practice life skills and also helps them to establish behaviors that facilitate successful integration into their society (Barnett, 1990).

Play is also used as one of the modes of therapy for children with disabilities. According to Landreth (1982), play therapy should be conducted in a clinical setting in which children with disabilities are permitted to progress at their own pace by interacting with various toys provided to them. The therapist creates a safe atmosphere in which the children can express themselves. As a warm relationship between child and therapist develops, the child may begin to express fears, doubts, and other feelings through play. Additionally, as Barnett (1990) mentioned, play enhances language development as well as development of cultural awareness.

Play Oriented Programming for Children with Mental Retardation

Although children with mental retardation appear to progress through the same play sequences (Sigman & Ungerer, 1984), play skills are qualitatively and quantitatively

less developed in such children than in those without disabilities. Knox (1974) found the play of children with mild/moderate mental retardation to be two years behind the play of children without disabilities. The play behavior of 4-year-old mentally retarded children involved wandering or parallel play, which would typically be representative of 1- to 3-year-old children without disabilities. Li (1981) surveyed the literature on play activities of children with mental retardation and concluded that their activities were characterized by a restricted repertoire of play skills, including less language during play, less sophisticated play, and limited selection of play material. Thus, physical education for children with mental retardation should be approached with extra awareness and an understanding that curricula and intervention programs designed to facilitate play behavior in such children can contribute to their development of various skills.

The most difficult problem faced in the development and facilitation of play in children with mental retardation is the design and implementation of the class. The design of the classroom for play activities should take into account the size and shape of the room, the needs of the children being served, the proper positioning and handling of the equipment, and, most importantly, the materials and supplies necessary for any educational environment, such as mats or toys (Eichstaedt & Lavay, 1992). One such design is given by Montessori (1964), who showed evidence of preschool program success with the use of her didactic materials. The Montessori approach was based on the idea that motor development is a product of interaction between the structure of the organism and the structure of the environment. The Montessori method of education is basically an unique approach to learning. Rather than teaching the child concepts, the

main purpose of the Montessori method is to develop an environment where the child can unfold spontaneously and manifest the greater person within.

The Montessori classroom has been called a child-size world. Whatever is in the world outside can be incorporated meaningfully in the Montessori classroom. To a child, the world is unmanageable—it is too big, too complex, and too confusing. By careful selection of materials by the teacher, an environment is set up that allows the child a place to explore life on a level the child can handle. The prepared environment entices the child to proceed at his or her own pace, from simple activities to more complex ones. Furthermore, the child's motor development occurs as the child learns to use the materials and apparatus in the prepared environment. Therefore, appropriate equipment needs to be provided to elicit development in children. This equipment must take into account the unique needs of the child, and create an environment that will allow the child to find his or her own pace in discovering the world around him or her. Many studies based on observation of children over a period of time have shown that the environment used in the Montessori theory has a positive effect on the development of children.

Lillard (1996) explained that Montessori made a clear distinction between the play of the child and the play of the adult. In their play, adults work to change the environment; while children use the environment to change themselves. According to Lillard, Montessori also observed that in a prepared environment children will naturally choose play activities which serve to develop various skills and are thus part of learning. Therefore, it was proposed that Montessori saw the free choice of children's activities in the prepared environment as work, the proper work of the child.

Krogh (1982) proposed that specific aspects of the Montessori method (e.g., shelves, materials for learning, furniture, and teacher) can be adapted to any classroom for the purpose of developing affective and social skills in children with and without disabilities. In particular, he stressed the role of the teacher in the classroom. Krogh mentioned that in contrast to most early childhood classrooms, the Montessori classroom has a high teacher-pupil ratio, and that teachers are facilitators rather than directive teachers. In essence, the teachers help the child practice individual objectives, but the child directs the teachers when, where, how, and how long to work on a particular objective. According to Chattin-McNichols (1992), in Montessori theory, the curriculum and teaching methods must follow the child; that is, they must fit the developmental nature of the child, rather than outside needs. Therefore, it can be assumed that the Montessori approach is similar to play-oriented teaching, which will promote the development of both cognitive and affective skills.

Chattin-McNichols (1992) pointed out that Piaget and Montessori, despite different methods and goals, arrived at several similar conclusions about children's development. Piaget's theories are useful in helping teachers understand children, especially some curious limitations of the child at the preoperational and concrete stages. Likewise, the Montessori system delineates a series of stages through which each child must travel to overcome the limitation of a particular stage. The Montessori system, especially if nondestructive exploration with materials is allowed, provides an excellent base for the child to acquire experiences needed to move from one stage to the next. Both the variety of materials and the mixed age group setting should facilitate this development. She also noted that Montessori and Piaget agree that real learning occurs

through action (e.g., physical manipulation through play), rather than passive listening to a teacher's instruction.

The above-mentioned theoretical and empirical data suggest that the Montessori method is one that would be very effective and useful in creating and facilitating a play-oriented program for teaching fundamental motor skills to mildly/moderately retarded preschoolers. Therefore, the treatment used in this study will incorporate such an approach.

Summary

The literature presented here describes the critical role of the teaching of fundamental motor skills in special education for young children with cognitive delays, and factors (e.g., ages and gender) affecting the difference in motor performance in children. It also mentions the importance of providing preschool children with adequate and meaningful instruction (Ignico, 1994). Specifically, the literature used in this study indicates the common concept that the play-oriented instruction approach may be an appropriate medium by which preschool-age children can learn fundamental motor skills (Novick, 1993; Block & Davis, 1996), and play is an avenue by which motor, social, and cognitive skills can be advanced (Barnett, 1990; Eichstaedt & Lavay, 1992). Following the Montessori method, the benefits of a play-oriented program in this study will be maximized by combining developmentally appropriate equipment and materials with adult supervision to support child-initiated learning of motor skills.

Chapter III

METHODS

The purpose of this study was to investigate whether children with cognitive delays improve jumping skills to a greater degree through a program of physical education instruction or through natural growth (i.e., no program of physical education instruction). The participants in this investigation were children with cognitive delays from two Michigan schools serving preschool children with disabilities. Participants, after being divided by school units into E (instruction) and C (no instruction) groups, completed jumping tests (MPS and TGMD) before and after a seven-week intervention period.

Research Design

For this study, the pretest-posttest design was used to observe the effects of a program of physical education instruction combining the best features of the direct and indirect instruction methods on the development of a selected fundamental motor skill (standing long jump) in preschool-age children with cognitive delays. Children who attended School A formed the E group and participated in a pretest, an intervention which included a program of physical education instruction to improve jumping skills, and a posttest. The C group, that is those students who attended School B, only performed the pretest and posttest; they received no special instruction in jumping over the same time period. In this design the differences between the pretest and posttest scores were evaluated (see Table 1).

Table 1

Research Design

	Week 1	Weeks 2-8	Week 9
E group	Pretest	Instruction period	Posttest
	5-min per student	7-wks x 15-min x 3 days/week	5-min per student
C group	Pretest	No instruction	Posttest
	5-min per student	No sessions	5-min per student

Independent variable. The independent variable of primary interest in this study was the type of intervention. The children in the E group received physical education instruction, which provided a variety of play activities combined with direct instruction, in order to learn jumping skills. This intervention took place in 15-minute sessions, 3 days a week, for 7 consecutive weeks. The children in the C group did not receive any instruction on jumping skills at their school during this same time period. The pretests and posttests were conducted for both E and C groups in the week immediately prior to and following the intervention period, respectively.

Dependent variables. The dependent variables for this design were the pre-and posttest scores of a selected fundamental motor skill (standing long jump), using the TGMD (Ulrich, 1998) and MPS (Seefeldt & Haubenstricker, 1976) tests. The data were

analyzed to determine if significant differences in performance existed between the E and C groups, and if significant differences in performance existed between the pretest and posttest scores within both the E and C groups.

Validity. There were some factors, extraneous to the pretest-posttest design, which may have had unforeseen effects on the results of the study. The most serious threat to internal validity (Campbell & Stanley, 1966) for this study was history. Occasionally, some subjects in a group had unusually high or low scores on the pretest, which could have been caused by external factors, such as prior environmental conditions and experiences of which the researcher was unaware. This may particularly have been a problem because School A had a physical education program while School B did not. While the students in School A did not directly receive instruction in jumping before the experimental period, they may have performed and experienced jumping tasks indirectly through their physical education program. In addition, for both School A and School B, the researcher cannot account for activities the students may have participated in outside of school. For example, even though the students from School B did not receive instruction in jumping, some of them may have learned jumping from their parents.

Selection was also a potential threat which may have appeared because of the lack of randomization of participants. This researcher was unable to divide the subjects on a purely random basis for the purpose of this study. Therefore, the fact that the sample used in this study was conducted using intact groups pre-designed by the schools and not the researcher may have left the study open to the effects of previous instruction-related experience, and may have also been a potential threat to creating a random selection for the study.

Furthermore, generalizability could have been a potential threat to external validity. The schools were predominately made up of one racial group, limiting the generalizability of this study's results to all racial groups (e.g., in this study, all participants at School B were Caucasian). There was also the possibility that the composition of the schools may not have been proportionately representative of gender (e.g., in both schools in this study, there were many more boys than girls) and socio-economic groups found in society in general. These factors could have limited this study's generalizability to all children with cognitive delays. However, since the schools that were investigated were public, it can be assumed that the students were a representative sample of the population of the area in which they were located.

Participants

Potential sample. The focus of this study was on a population of preschool-aged children with cognitive delays. The participants in this study were students aged three to seven years from eight PPI classes in two schools that serve preschool children with disabilities. Two classes were in one school in an urban school district region (School A), and six were in a school located in a neighboring community (School B) of Michigan. Permission was obtained from the University Committee on Research Involving Human Subjects (UCRIHS) (Appendix A) and the school districts where the schools were located, as well as from the classroom/physical education teachers involved, before any part of this study was conducted. In addition, a letter describing the study and a consent form for student involvement in the study was sent home, via the students, to the parents or guardians of the children who would participate in this research (Appendix B). There

were two versions of the consent form. The E group received instruction, so their consent form asked for permission to test and instruct their children. The C group did not receive instruction, so their consent form only asked for permission to test their children. Informed consent was obtained from 75% of the parents or guardians of children who were potential members of the E group and 83% of the parents or guardians of children who were potential members of the C group.

Within these eight classes, the ABILITIES Index (Simeonsson & Bailey, 1991) (Appendix C) was used to determine which children have cognitive deficits. The classroom teachers completed the ABILITIES Index for students in their respective classes. Children who scored 2 points or higher on the behavior and social skills (B), intellectual functioning (I), or intentional communication (I) sections of the ABILITIES Index were designated as having cognitive delays. These sections of the ABILITIES Index were used because they measure more cognitively-based areas of a child's functioning; the other sections deal with more purely physical areas such as hearing, muscle tone, overall health, vision, and overall body form. Although all children in the PPI classes who provided informed consent were involved in the study, the results of this study focused only on those designated as having cognitive delays. Therefore, children from the potential sample who had physical or health problems (determined by a score of 2 or higher on the limbs/use of hands (L), tonicity/muscle tone (T), integrity of physical health/overall health (I), structural status/shape, body form and structure (S) sections of the Index and a score of 3 or higher on the audition/hearing (A), eye/vision (E) sections of the Index) were excluded from the results of the study. Although students who scored 2 points on audition/hearing (A) or eye/vision (E) of the index indicated "suspect"

problems, they were included in the study because it was felt that "suspect" problems of these two categories would not affect jumping performance. On the other hand, it was assumed that a score of 2 or higher on other areas of physical and health problems (L, T, I, S) would affect jumping performance. Thus, from a total of 43 children who provided informed consent, this study included only 34 children (i.e., at School A 15 out of 20 students were included; at School B 19 out of 23 were included). Table 2 provides a summary of the average score across the ABILITIES categories for these 34 children, divided into E and C groups.

Table 2

The Mean ABILITIES Index Scores by Category Across Groups of Participants

ABILITIES Index	E group	C group
A -- Audition/hearing	1.1	1.1
B -- Behavior and social skills	3.4	2.7
I -- Intellectual function/thinking and reasoning	2.1	1.9
L -- Limbs/use of hands, arms and legs	1.0	1.0
I -- Intentional communication/communicating with others	3.9	3.5
T -- Tonicity/muscle tone	1.0	1.0
I -- Integrity of physical health/overall health	1.0	1.0
E -- Eyes/vision	1.1	1.2
S -- Structural status/shape, body form and structure	1.0	1.0

Note. Ratings in each area are made on a scale from 1 to 6, with 1 indicating normal ability, 3 representing mild disability, and 6 showing extreme or profound lack of ability.

Assignment of participants to groups. The children from the eight PPI classes in the two schools were assigned by school units to either the E or C group. To make proper decisions of assignment of participants to groups, it was important to understand the structure of the school system, such as the existence or non-existence of an adapted physical educator, as well as the school's philosophy of fundamental motor skills instruction. In this sense, School A's structure fit well with the purpose of this study as the E group. In addition, since School B did not have an adapted physical education program, its students functioned better as the C group for this study. Therefore, children from School A were assigned to the E group, and those from School B were assigned to the C group. It is noted that the participants in the E and C groups did not receive any instruction in jumping prior to this study.

Table 3 illustrates the number, gender, and age of the E and C participants in the two schools. For this study, if there would have been significant differences in age and gender between the two groups, these variables would have been included as the covariates in the data analysis, because an analysis of covariance (ANCOVA) could have been used to analyze possible correlations among the dependent variables. However, age was not associated with differences between the two groups, χ^2 (1, $\underline{N}$ = 34) = 2.03, $\underline{p}$ = .15, and gender was also not associated with differences between the two groups, χ^2 (1, $\underline{N}$ = 34) = .86, $\underline{p}$ = .35. Therefore, age and gender were not analyzed in this study.

Table 3

Number, Gender, and Age of Participants Attending the Treatment Sessions

Group	Gender		Age	
	Male n	Female n	Under 6 yrs n	6 yrs and over n
Experimental	13	2	5	10
Control	14	5	11	8

Instrumentation

The subtests for the standing long jump from the Test of Gross Motor Development (TGMD) (Ulrich, 1998) and Fundamental Motor Skill Stage Characteristics in the Motor Performance Study at Michigan State University (MPS) (Haubenstricker, Seefeldt, & Branta, 1983; Seefeldt & Haubenstricker, 1976; Seefeldt & Haubenstricker, 1982) were used as instruments for collecting motor skill data for this study. In this study both of these tests were used to assess qualitative performance on the standing long jump. The TGMD assesses components of mature fundamental motor skills; whereas, the MPS is designed to determine developmental stages in learning fundamental motor skills.

In order to assess the jumping skill of children, the TGMD consists of four performance criteria: (a) preparatory movement including flexion of both knees with arms extended behind the body, (b) arms extended forcefully forward and upward reaching full

extension above the head, (c) take off and landing on both feet simultaneously, and (d) arms pushed downward during landing. In the TGMD, students' scores are rated according to the quality of performance they displayed. When one of the four skill components is correctly performed, a score of "1" is given; if it is absent, a score of "0" is given. Therefore, a maximum score of 4 is possible.

The MPS test has a more developmental focus. To determine the quality of performance of jumping, the MPS test includes four developmental stages, and each stage has three to four skill components which must be displayed in order to demonstrate mastery of that stage. Examples are provided in Table 4. Furthermore, transitional stages of development are also distinguished by the MPS test. Students get 1 point for each stage of complete mastery exhibited, with 0.5 points being used to indicate transitional stages. Therefore, a perfect score for jumping (i.e., mastery of Stage 4 of the development skill) in the MPS test is 4 points, while, for example, a student in transition between Stages 2 and 3 has a score of 2.5.

Table 4

MPS Stages of Development for Standing Long Jump

Stage	Description
1	Arms act as brakes, large vertical component, legs not fully extended
2	Arms act as wings, vertical component still great, legs near full extension
3	Arms move forward/elbows in front of trunk on takeoff, hands to head height, takeoff angle still above 45 degrees, legs often fully extended
4	Complete arm and leg extension at takeoff, takeoff near a 45 degree angle, thighs parallel to surface when feet contact for landing

Ulrich (1984) determined the reliability of classification decisions regarding 12 fundamental motor skills (including jumping) using the TGMD in an investigation of children aged 3 to 10 years with moderate mental retardation. The reliability estimates for the mentally retarded group using an 85% criterion are P = .87 (the proportion of agreement) and K = .62 (Kappa) and for the 70% criterion P = .93 and K = .83. It is assumed that the TGMD is a reliable instrument capable of classifying mastery or nonmastery of fundamental motor skills for the subjects (children with cognitive delays) in the study because of the higher proportion of agreement for children with mental retardation. Some studies (Haubenstricker, Seefeldt, & Branta, 1983; Seefeldt & Haubenstricker, 1976) have determined that the MPS test has been validated on a mixed longitudinal sample and used extensively to assess jumping skills in children. Skill level was determined by applying descriptive criteria for each of the three trials performed for

each skill including standing long jump. Percentage scores of the children performing at various stages by age and gender for jumping were obtained, and were examined for appropriately increasing value. The results of these studies indicated that a developmental Stage 1 jumping pattern was found to be the most prominent in children under 42 months of age. In contrast, a Stage 2 jumping pattern was found to be the most prevalent between 48 and 84 months of age, whereas a Stage 3 jumping pattern was dominant by 96 months of age. Only about 10 percent of the older subjects were found to exhibit the most mature Stage 4 pattern of jumping.

Treatment

During the intervention period, the children in the E group were taught the selected fundamental motor skill (standing long jump) through a combination of indirect instruction, which emphasized student-centered learning through physical activity, and traditional direct instruction using a more teacher-centered approach. The children in C group, on the other hand, received no special physical education instruction during the intervention period. More specifically, children in E group received 7-wks ×15-min sessions delivered three times a week (minus 2 sessions which did not meet due to pre-existing school activities); children in C group spent the same time period developing only through natural growth. Because it takes a lot of time for special education students to master a new skill (270 minutes according to Wessel & Kelly, 1986) and probably even more time for students with cognitive delays, the resulting intervention period of approximately 280 minutes focused only on the level of mastery of performance the students attained in the selected skill of jumping. Moreover, in consideration of the

issues of fatigue and preschoolers' limited attention span, instruction was limited to 15-minutes a day.

Experimental group intervention. In the experimental intervention, the researcher was the primary instructor. He created lesson plans in consultation with School A's adapted physical education teacher and professors in motor development from Michigan State University. Lesson plans were adapted from pre-existing lesson plans developed by the Michigan's Exemplary Physical Education Curriculum (MI-EPEC) (1995), and then combined with elements of the curriculum developed by the school's adapted physical education teacher to create lessons easily understood by preschool children with cognitive delays. These lesson plans were divided into one-week sections and can be found in Appendix D. The opening 1 to 2 min of each lesson consisted of a preparatory phase reviewing the last class's lesson as well as the new lesson's objectives. The next 10-12 min of each lesson focused on improvement of jumping skills, and the remainder of each session involved a lesson summary re-emphasizing that day's objective. Because school A had two PPI classes, care was taken to ensure uniform instruction by strictly adhering to the lesson plan for that day in both classes.

For each E group lesson, the researcher set up play centers related to the learning of jumping; these play centers were designed to meet each week's different objectives in improving jumping skills. The children then received direct instruction on executing jumping or developing jumping skills, with either the researcher or the adapted physical educator performing demonstrations of the relevant skills. The children were then told to select a play center and play with the equipment there as they wished (e.g., jumping off a box, jumping inside hoops, and jumping over ropes). The materials and organization of

instruction for this study are consistent with the Montessori principles for the affective development of children in the classroom. Krogh (1982) stated that "the materials should be of two kinds: those that provide structured, directed learning and those that offer more freedom and self-direction" (p.58). These types of materials help in building self-confidence and creativity. Therefore, this is one way in which the Montessori approach to the learning environment is applied in the intervention setting in this study.

The researcher, teacher, and teacher aides moved around the play environment, reinforcing the children in their play and occasionally showing the children specific ways to interact with the equipment. The combination of researcher, teacher, and teacher aides yielded a 3:1 student-teacher ratio for each class. Attendance for intervention lessons was recorded for all students, with an average absence of 1.5 intervention sessions.

Verification of intervention procedures. Two randomly selected sessions were videotaped to verify that interventions were being implemented as described in the study's research proposal. The sixth and seventh week sessions were videotaped and Figure 1 shows the general layout of the gym for these sessions. The videotape focused on the lesson content and the teacher, not on individual students. In addition, a panel of experts (one special education teacher and one adapted physical education teacher from the schools involved, as well as one adapted physical education professor from Michigan State University) watched the videotape and compared it to the lesson plans for this study to confirm the content validity and consistency across class groups. The panel of experts found that the lessons were consistent and valid.

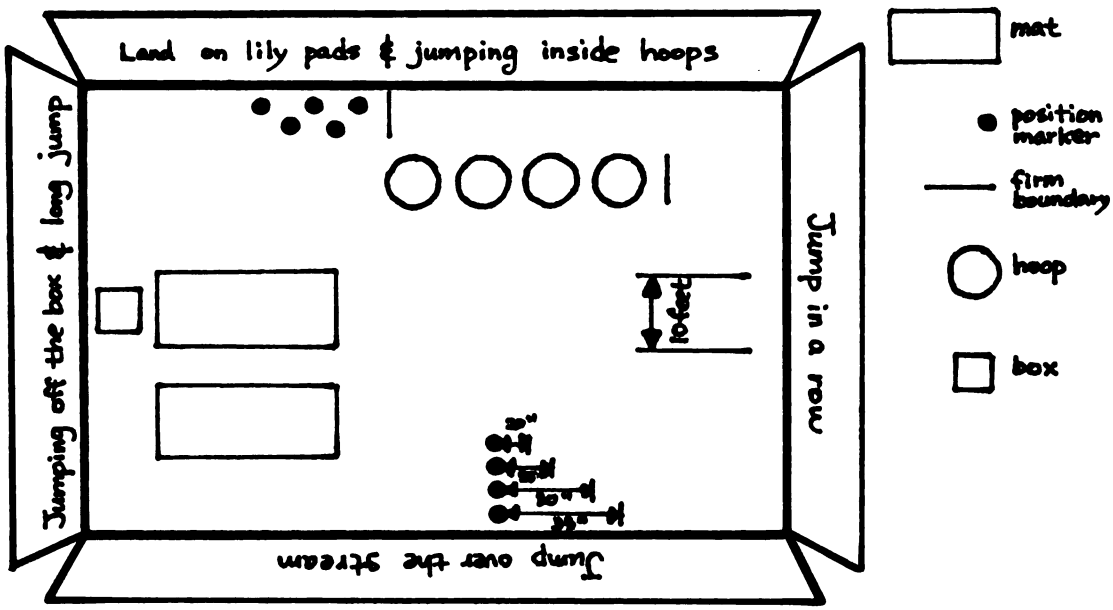

Figure 1 The General Layout of the Gym for the Sixth and Seventh Weeks

Data Collection Procedures

Test administration. Motor performance testing for jumping skills was conducted during the weeks before and after the seven-week intervention period. Because it was not possible to test both groups at once (due to the schedule limitations of each school), both the pretest and posttest were administered in the gymnasium of each participating school as school schedules allowed. Furthermore, three separate testing sessions had to be conducted for both the pretest and posttest administrations at each school, because of time limitations, student absences, and other such practical issues. Each student was tested

individually (taking approximately five minutes per student). As each child's jumping skill was being assessed, the other students were allowed to play under the supervision of teacher aides at other stations set up around the gymnasium.

A physical demonstration of the standing long jump was provided by the researcher prior to testing, which was conducted on a safety mat. Participants were instructed to place their toes on the starting line and jump correctly as far forward as possible, and were permitted to practice up to three times. Each participant then performed three trials of the standing long jump, as per the TGMD test protocol. Verbal feedback was given to a participant if the child had some difficulty in understanding the task, or to encourage the participant to jump farther on the next trial.

The pretest and posttest for both the E and C groups were videotaped, with the video equipment being positioned on a tripod at approximately 3 meters from the mat at a perpendicular angle to the performer's line of travel and 1 meter from the ground. This allowed a single angle of the camera to record the participant from a side view during each of the three trials. Participants wore stickers marked with identification numbers to protect participant confidentiality, ensuring that it would not be possible for anyone unconnected with this study to associate a participant's name with the data. The researcher has a list of the students' names correlated to their identification numbers; however, this list is being kept under the strictest care to protect student confidentiality. Finally, the videotapes will be kept in a locked cabinet with only the researcher having access. The list will be destroyed and the videotape will be erased two years following the publication of these results.

Rater qualification criteria and procedures. The researcher was trained in order to become qualified to administer and score the TGMD and MPS tests. The researcher first read instructional manuals and watched videos about the TGMD and MPS tests. This allowed the researcher to become acquainted with the performance criteria for each skill item. Furthermore, the researcher successfully completed coursework and practica in using the MPS test assessment. Training in use of the TGMD test was also provided by a doctoral student (recommended by a professor) who had used the TGMD in her own graduate work. Both the researcher and the previously mentioned graduate student performed practice assessments using these tests. When an 80% level of agreement in scoring was achieved between the researcher and the already qualified graduate student, after two such practice sessions, the researcher was deemed as qualified to administer the test independently.

Upon reaching this level of agreement, the researcher watched the videotapes from the actual study, and scored each child's performance according to the respective criteria of the TGMD and MPS tests. The scoring form for the selected fundamental motor skill (standing long jump) using the TGMD and MPS tests is located in Appendix E. In this scoring form, the researcher also recorded each participant's background information, such as age in months, gender, school attended, and the level of disability according to the ABILITIES Index. Out of the three trials for each child, the best performance was used as the basis for that participant's score. Appendix F provides each student's raw data, such as level of disability and jumping scores.

Intra- and inter-rater reliability. In order to confirm the validity of the scores obtained by the researcher, two types of reliability coefficients were used. First, the

researcher (Rater 1) and the doctoral student (Rater 2) checked intra-rater reliability in assessing performance. This was done by scoring the performances once (Time 1), then re-scoring the performances on another occasion (Time 2), without looking at the first set of scores. The researcher then compared each rater's set of scores in order to determine an intra-rater reliability. As can be seen in Table 5, the lowest level of intra-rater agreement for either rater between Time 1 and Time 2 for pretest and posttest scores of MPS and TGMD tests was 89%. Therefore, it can be said that intra-rater reliability was high for each rater's scores, and that there is a high stability and consistency of scoring.

Table 5

Intra-Rater Reliability Coefficients between Time 1 and Time 2 for Pretest and Posttest Scores of MPS and TGMD Tests

		Reliability Coefficients	
Rater	Pretest/Posttest	MPS	TGMD
Rater 1	Pretest	.97	.91
	Posttest	.97	.89
Rater 2	Pretest	.93	.89
	Posttest	.94	.90

Second, to determine the objectivity of the researcher, the inter-rater reliability statistics for Time 2 (second trial) scores using the MPS and TGMD tests were established. The means of both raters' test scores at Time 2 were ranked higher than or equal to those at Time 1 (Table 6 and Table 7). This phenomenon may be due to a greater level of familiarity and concentration at Time 2. The inter-rater reliability measures for the Time 2 pretest scores for the MPS and TGMD tests were .93 and .83, respectively. The posttest inter-rater reliability measures for the Time 2 scores of the MPS and TGMD tests were .96 and .87, respectively (Table 8). These high inter-rater reliability coefficient values would seem to indicate that the researcher was able to achieve objectivity in rating. Based on the evidence of both intra- and inter-rater reliability measures described above, the decision was made to use only Rater 1's Time 2 scores for further analyses to resolve hypotheses in this study and to report results.

Table 6

Rater 1's Jumping Scores for Pretest and Posttest at Time 1 and Time 2

		Jumping Scores		
Pre/Posttest	Trial	M	SD	n
Pretest	Time 1 of MPS	1.73	.63	34
	Time 2 of MPS	1.83	.67	34
	Time 1 of TGMD	1.94	.74	34
	Time 2 of TGMD	2.00	.74	34
Posttest	Time 1 of MPS	2.40	.75	34
	Time 2 of MPS	2.44	.69	34
	Time 1 of TGMD	2.60	.86	34
	Time 2 of TGMD	2.60	.79	34

Table 7

Rater 2's Jumping Scores for Pretest and Posttest at Time 1 and Time 2

		Jumping Scores		
Pre/Posttest	Trial	M	SD	n
Pretest	Time 1 of MPS	1.76	.57	34
	Time 2 of MPS	1.81	.62	34
	Time 1 of TGMD	2.06	.74	34
	Time 2 of TGMD	2.12	.81	34
Posttest	Time 1 of MPS	2.35	.68	34
	Time 2 of MPS	2.41	.76	34
	Time 1 of TGMD	2.56	.96	34
	Time 2 of TGMD	2.56	.86	34

Table 8

Inter-Rater Reliability Coefficients for Pretest and Posttest Scores at Time 2

	Reliability Coefficients	
Pretest/Posttest	MPS	TGMD
Pretest	.93	.83
Posttest	.96	.87

Data Analyses

The collected data were coded to SPSS (Norusis, 1993). At first, descriptive statistics, including means and standard deviations, were calculated for the jumping skill performances of children with cognitive delays in the two schools, as assessed by the MPS and TGMD tests. Then, data analysis procedures were designed to address the hypotheses posed in Chapter I. An alpha level of .05 was used for all statistical tests.

Hypothesis 1. Preschool children with cognitive delays in the E group display statistically equivalent MPS scores on the pretest to preschool children with cognitive delays who are assigned to the C group. To examine this hypothesis, an independent sample t test was conducted to determine differences in the MPS pretest scores of the E and C groups.

Hypothesis 2. Preschool children with cognitive delays in the E group display statistically equivalent TGMD scores on the pretest to preschool children with cognitive delays who are assigned to the C group. In reference to this hypothesis, an independent sample t test was conducted to determine differences in the TGMD pretest scores of the E and C groups.

Hypothesis 3. Preschool children with cognitive delays who receive a program of physical education instruction display statistically higher MPS posttest scores in jumping than those who receive no special instruction. To investigate this hypothesis, an independent sample t test was conducted to determine differences in the MPS posttest scores of the E and C group.

Hypothesis 4. Preschool children with cognitive delays who receive a program of physical education instruction display statistically higher TGMD posttest scores in

jumping than those who receive no special instruction. Regarding this hypothesis, an independent sample t test was conducted to determine differences in the TGMD posttest scores of the E and C group.

Hypothesis 5. Preschool children with cognitive delays in the E group who receive a program of physical education instruction display statistically higher MPS posttest scores in jumping than MPS pretest scores in jumping. To address this hypothesis, a paired-sample t test was conducted to determine differences between the MPS pretest and posttest scores of the E group.

Hypothesis 6. Preschool children with cognitive delays in the E group who receive a program of physical education instruction display statistically higher TGMD posttest scores in jumping than TGMD pretest scores in jumping. In reference to this hypothesis, a paired-sample t test was conducted to determine differences between the TGMD pretest and posttest scores of the E group.

Hypothesis 7. Preschool children with cognitive delays in the C group who receive no special instruction in jumping display statistically equivalent MPS posttest scores to MPS pretest scores. To investigate this hypothesis, a paired-sample t test was conducted to determine differences between the MPS pretest and posttest scores of the C group.

Hypothesis 8. Preschool children with cognitive delays in the C group who receive no special instruction in jumping display statistically equivalent TGMD posttest scores to MPS pretest scores. Regarding this hypothesis, a paired-sample t test was conducted to determine differences between the TGMD pretest and posttest scores of the C group.

Chapter IV

RESULTS

The results are presented according to the hypothesis tested. The data supported Hypotheses 1 and 2 that stated that preschool children with cognitive delays in both E and C groups would be equal in jumping ability before the treatment period. Similarly, Hypotheses 3 and 4 were supported by the data that, after the treatment period, preschool children with cognitive delays in the E group would have higher jumping scores than those in the C group. In addition, the data supported Hypotheses 5 and 6 that preschool children with cognitive delays in E group, who received the intervention of seven weeks using play-oriented instruction, would have higher MPS and TGMD jumping scores after the treatment than before the treatment. However, the data did not support Hypothesis 7 that stated that preschool children with cognitive delays in C group, who did not receive intervention during a seven-week period, would not have different MPS jumping scores before and after the treatment. The results showed that the children in C group had slightly improved MPS jumping scores. Conversely, the data did supported Hypothesis 8 that stated that preschool children with cognitive delays in C group would not have different TGMD jumping scores before and after the treatment.

Descriptive Statistics

For the readers' information, Table 9 shows the MPS pretest and posttest raw scores according to age and gender, and Table 10 shows the TGMG pretest and posttest raw scores according to age and gender. Although age and gender might have been

influential independent variables, these cannot be analyzed because of the small sample size.

Hypothesis 1

An independent sample t test was used to compare the MPS pretest scores of the E group with those of the C group. The mean of MPS pretest scores for the E group was 1.86 (SD = .74); whereas, the mean of MPS pretest scores for the C group was 1.79 (SD =.56). The data are presented in Table 9, which summarize the number of children and the means and standard deviations of MPS raw scores for the pre- and posttests with a breakdown for age and gender. The t test results showed that the children in both groups had similar MPS test scores at pretest, t (32) = .35, p =.38, one-tailed. Therefore, there was significant evidence to support Hypothesis 1, which states that preschool children with cognitive delays in the E group display equivalent MPS scores on the pretest to preschool children with cognitive delays who are assigned to the C group.

Hypothesis 2

An independent sample t test was also utilized to compare the TGMD pretest scores of the E group with those of the C group. The mean of TGMD pretest scores for the E group was 2.07 (SD = .88); whereas, the mean of TGMD pretest scores for the C group was 1.89 (SD =.57) (see Table 10). For the TGMD pretest scores, the difference of means between groups is .18. The results indicated that the children in both groups did not have significantly different TGMD test scores at pretest, t (32) = .69, p =.25, one-tailed. Therefore, the data supported Hypothesis 2, which states that preschool children

with cognitive delays in the E group display equivalent TGMD scores on the pretest to preschool children with cognitive delays who are assigned to the C group.

Table 9

MPS Pretest and Posttest Raw Scores on Dependent Variables

	Pretest			Posttest		
	n	M	SD	n	M	SD
E Group	15	1.86	.74	15	2.83	.52
Girls age 3-4	1	1.50	-	1	3.00	-
Boys age 3-4	4	1.63	.85	4	3.00	.41
All 3-4 year old children	5	1.60	.74	5	3.00	.35
Girls age 5-7	1	1.00	-	1	2.00	-
Boys age 5-7	9	2.10	.70	9	2.83	.56
All 4-7 year old children	10	2.00	.75	10	2.75	.59
C Group	19	1.79	.56	19	2.13	.66
Girls age 3-4	3	2.00	.50	3	1.67	.58
Boys age 3-4	8	1.63	.64	8	2.19	.70
All 3-4 year old children	11	1.73	.61	11	2.05	.69
Girls age 5-7	2	1.50	.71	2	2.25	.35
Boys age 5-7	6	2.00	.45	6	2.25	.76
All 5-7 year old children	8	1.87	.52	8	2.25	.65

Table 10

TGMD Pretest and Posttest Raw Scores on Dependent Variables

	Pretest			Posttest		
	n	M	SD	n	M	SD
E Group	15	2.07	.88	15	2.93	.59
Girls age 3-4	1	2.00	-	1	3.00	-
Boys age 3-4	4	1.75	1.26	4	3.25	.50
All 3-4 year old children	5	1.80	1.10	5	3.20	.45
Girls age 5-7	1	1.00	-	1	2.00	-
Boys age 5-7	9	2.33	.71	9	2.89	.60
All 5-7 year old children	10	2.20	.79	10	2.80	.63
C Group	19	1.89	.57	19	2.31	.88
Girls age 3-4	3	1.67	.57	3	2.00	.00
Boys age 3-4	8	2.00	.53	8	2.38	.92
All 3-4 year old children	11	1.91	.54	11	2.27	.79
Girls age 5-7	2	1.50	.71	2	2.50	.71
Boys age 5-7	6	2.00	.63	6	2.67	1.03
All 5-7 year old children	8	1.87	.64	8	2.62	.92

Hypothesis 3

To compare the difference between the MPS posttest scores of the E group and those of the C group, an independent sample t test was also used. The mean of MPS posttest scores for the E group was 2.83 (SD = .52); whereas, the mean of MPS posttest scores for the C group was 2.13 (SD =.66) (see Table 9). For the MPS posttest scores, the difference of means between the two groups is .70, and is higher than that for the MPS pretest scores. The t test results revealed significant differences in MPS posttest scores between groups, t (32) = 3.35, p =.00, one-tailed. Therefore, the data supported Hypothesis 3, which states that preschool children with cognitive delays who receive a program of physical education instruction display higher MPS posttest scores in jumping than those who receive no special instruction.

Hypothesis 4

An independent sample t test was also used to compare the TGMD posttest scores of the E group with those of the C group. The mean of TGMD posttest scores for the E group was 2.93 (SD = .59); whereas, the mean of TGMD posttest scores for the C group was 2.31 (SD =.88) (see Table 10). For the TGMD posttest scores, the difference of means between groups is .62, and is higher than that for the TGMD pretest scores. The results indicated that children in both groups have significantly different TGMD test scores at posttest, t (32) = 2.31, p =.02, one-tailed. Therefore, the data were sufficient evidence to support Hypothesis 4, which states that preschool children with cognitive delays who receive a program of physical education instruction display higher TGMD posttest scores in jumping than those who receive no special instruction.

Hypothesis 5

A paired sample t test was utilized to test the significance of differences between pretest and posttest scores of the MPS test for the children within the E group. Before children in the E group received the seven-week intervention, the mean of MPS pretest scores for the E group was 1.86 (SD =.74). After children in the E group received physical education instruction during the seven-week intervention program, the mean of MPS posttest scores for the E group was 2.83 (SD =.52) (see Table 9). The t test results showed that there was a significant difference between pretest and posttest scores on the MPS test for standing long jump, t (14) = -5.21, p =.00, one-tailed. Therefore, the data were sufficient evidence to support Hypothesis 5, which states that preschool children with cognitive delays in the E group who receive a program of physical education instruction display statistically higher MPS posttest scores in jumping than MPS pretest scores in jumping.

Hypothesis 6

A paired sample t test was utilized to test the significance of differences between pretest and posttest scores of the TGMD test for the children within the E group. Before children in the E group received the seven-week intervention, the mean of TGMD pretest scores for the E group was 2.07 (SD =.88). After children in the E group received physical education instruction during the seven-week intervention program, the mean of TGMD posttest scores for the E group was 2.93 (SD =.59) (see Table 10). The results indicated that there was a significant difference between the pretest and posttest scores on

the TGMD test for standing long jump, t (14) = -3.39, p =.00, one-tailed. Therefore, these data supported Hypothesis 6 of this study, which states that preschool children with cognitive delays in the E group who receive a program of physical education instruction display statistically higher TGMD posttest scores in jumping than pretest scores.

Hypothesis 7

A paired sample t test was utilized to test the significance of differences between pretest and posttest scores on the MPS test for the children within the C group. Before the seven-week treatment period, the mean of MPS pretest scores for the C group was 1.79 (SD =.56). After children in the C group spent the seven-week treatment period with no intervention, the mean of MPS posttest scores for the C group was 2.13 (SD =.66) (see Table 9). The results showed that children in the C group, who did not receive any instruction in the standing long jump, had higher posttest scores on the MPS test for standing long jump than the pretest scores, t (18) = -2.17, p =.02, one-tailed. Therefore, this result did not support Hypothesis 7, which states that preschool children with cognitive delays in the C group who receive no special instruction in jumping display statistically equivalent MPS posttest scores to MPS pretest scores.

Hypothesis 8

A paired sample t test was utilized to test the significance of differences between pretest and posttest scores on the TGMD test for the children within the C group. Before the seven-week treatment period, the mean of TGMD pretest scores for the C group was 1.89 (SD =.57). After children in the C group spent the seven-week treatment period with

no instruction (intervention), the mean of TGMD posttest scores for the C group was 2.31 (SD =.88) (see Table 10). The results indicated that children in the C group, who did not receive any instruction in the standing long jump did not show a significant difference between the pretest and posttest scores of the TGMD test for standing long jump, t (18) = -1.91, p =.06, one-tailed. Therefore, the data were sufficient evidence to support Hypothesis 8, which states that preschool children with cognitive delays in the C group who receive no special instruction in jumping display statistically equivalent TGMD posttest scores to TGMD pretest scores.

Chapter V

DISCUSSION

The first two hypotheses investigated the common assumption that preschool children with cognitive delays in two schools are likely to have equal fundamental motor skill performance prior to receiving intervention. The findings revealed that children with cognitive delays in the two schools did not have significantly different performance scores on the standing long jump using the MPS and TGMD tests before the two set of children were provided with different treatment conditions. The facts that the schools being investigated were both public schools and the students did not have an instruction program for the standing long jump supported these results of the first two hypotheses.

However, it should be pointed out that the researcher was concerned about internal validity, because there may have been factors that could have affected jumping performances between the E and C groups before the treatment (Campbell & Stanley, 1966). First, as this study was conducted using intact groups pre-designed by the schools, the researcher was unable to divide the subjects on a purely random basis. As a result, this left the study open to the effects of previous instruction-related experience. This might have been a particular concern, because School A had a physical education teacher and physical education classes, while School B did not. It was possible to assume that students in School A may have performed and experienced jumping tasks through their physical education program. Second, some subjects had unusually high or low scores on the pretest due to time or schedule limitations of each school and students' absences. Three separate testing sessions had to be conducted for the pretest, and it could have been

possible that changes to the testing conditions could have affected the measuring, such as location of mats or the fact that another class entered the gymnasium in which the test was conducted. However, it was found that because the jumping scores of the children in the two schools were statistically equivalent before the treatment, these factors did not threaten the assumption of this study.

Before the third and fourth hypotheses were investigated, the researcher considered other variables which could have affected improvement in fundamental motor skills. First, age differences were anticipated in this study because, generally, as one gets older, the performance of fundamental motor skills improve (Morris, Williams, Atwater, & Wilmore, 1982; Branta, Haubenstricker, & Seefeldt, 1984). Second, gender difference was also anticipated in this study, because several researchers reported gender differences in motor performance (Milne, Seefeldt, & Reuschlein, 1976; Morris, Williams, Atwater, & Wilmore, 1982; Haubenstricker & Seefeldt, 1986). The average performance for boys usually exceeds the average performance of girls on power-dependent or force production tasks such as throwing and jumping; whereas, girls usually perform better on balance, flexibility, and control tasks. Therefore, the descriptive data of this study were broken down by age and gender for both the E and C groups. However, age and gender differences were not analyzed because of insufficient sample size to conduct inferential statistical procedures. The sample size used in this study was not large enough to distinguish age differences, and the gender ratios were skewed disproportionately for both groups though it is not known why there seems to be more boys than girls in both schools. As a result, the researcher was not able to consider the effects of age and gender.

According to the data analyses of the third and fourth hypotheses, after preschool children in each school received different treatment conditions, children with cognitive delay in the E group (i.e., School A) who received physical education instruction had greater performance scores in the standing long jump than those in the C group (i.e., School B) who received no special instruction. Therefore, these findings revealed that the intervention of using a play-oriented instruction program would be more effective in improving jumping skills than using natural growth. Previous studies (Kelly, Dagger, & Walkley, 1989; Connor-Kuntz & Dummer,1996) suggested that appropriate instructional activities could be developed to maximize learning at a rate faster than that of normal physical maturation. Similar to the previous research, this study targeted preschool age children, focused on fundamental motor skills, and tried to develop activities that would enhance the learning process. Therefore, considering the similarities between the studies, it was expected and found that the results from this study were consistent with the suggestions regarding instruction mentioned above.

The fifth and sixth hypotheses were both supported by the data, with differences between the pretest and posttest scores of the MPS and TGMD tests within the E group's children. Children in the E group who received the intervention of seven weeks using play-oriented instruction had higher jumping scores after the treatment than before. These findings agree with the statement of Wessel and Kelly (1986) that children with disabilities require approximately 270 minutes of instruction to develop and improve a new skill. Therefore, the time spent during the seven weeks (i.e., about 280 minutes) using the play-oriented instruction was significant for improving jumping scores. It is

noted that the seven-week time period and the number of days each week were selected according to the schools' schedules.

Further, the findings of the fifth and sixth hypotheses should allow this study to validate the effectiveness of play-oriented instruction in a fundamental motor skill program for children with cognitive delays. These findings agree with the previous findings from Bricker and Cripe (1992), Linder (1993), and Block and Davis's (1996) theoretical background and support for the play-oriented instruction. In this study, the lesson plans were based on and modified by materials contained in the MI-EPEC curriculum (1995), which should be considered as an appropriate instructional program for teaching preschool age children. These plans attempted to combine the best features of the direct and indirect instruction methods. In other words, they not only included developmentally appropriate practice for children with cognitive delays, but also provided children opportunity to create their own activities. Thus, these lesson plans were able to successfully put into practice what the literature has repeatedly suggested.

Because the time period between testing was only nine weeks (one week for the pretest, seven weeks for the treatment, and one week for the posttest), it was hypothesized that the children without intervention would not improve their jumping skills. However, unexpectedly, the analyses of differences between pretest and posttest scores within the C group showed some improvement from pretest to posttest. It might be assumed that maturation and the familiarity with the jumping test that resulted from the pretest may have influenced the posttest scores of the C group. The findings of the final two hypotheses indicated that, as assessed by MPS test, the children who did not receive a physical education program of play-oriented instruction showed improvement of their

performance on the standing long jump. On the other hand, they did not show improvement on standing long jump using the TGMD test. A comparison of both assessment instruments shows that the TGMD test assessed only mature skill performance; whereas, the MPS test assessed four stages of development for jumping. Therefore, the MPS test is more sensitive to small changes in performance that are associated with a child's motor development. Although the MPS test provided data that statistically showed improvement in the group without instruction, this improvement was to only 0.34 points in the rating of the MPS test (refer to Table 9), and therefore only a slight improvement.

In summary, the development of jumping performance in children with cognitive delays indicates that children could benefit from a program using the play-oriented instruction, which more effectively teaches jumping skills than no instruction at all. Thus, the researcher believes that these lesson plans including play-oriented instruction may be applicable to physical education programming for preschool children with cognitive delays to improve fundamental motor skills.

Chapter VI

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to investigate whether children with cognitive delays would improve standing long jump skills better through a program of physical education instruction than through natural growth (i.e., no program of physical education instruction). The participants were 34 students (from 3 to 7 years of age) selected from eight pre-primary impaired (PPI) classes in two special education schools. Within those classes the ABILITIES Index (Simeonsson & Bailey, 1991) was used to determine which students have cognitive delays (e.g., those having a score of 2 or higher on the Behavior/Social Skills, Intellectual Functioning, or Intentional Communication components of the ABILITIES Index). The classroom teacher in each class used the ABILITIES Index in order to assess the cognitive level of each student. The participants were divided by school units into experimental (n = 15) and control (n = 19) groups.

The Test of Gross Motor Development (TGMD) and Fundamental Motor Skill Stage Characteristics in the Motor Performance Study at Michigan State University (MPS) were the instruments used to assess the fundamental motor skill (standing long jump) selected for this study. This study was conducted during the course of a nine-week period. After one week of administering the pretest, the experimental group received a program of physical education instruction, which provided a variety of activities combining direct instruction and indirect instruction (also referred to as play-oriented instruction) in order to teach the standing long jump, during 15-minute sessions three

times a week for seven weeks (7wks × 15-min ×3 days/week); the control group, over the same time period, received no special instruction in physical education. The posttest was administered during the 9th week. Also, data were gathered after the administration of the pretest and the posttest for both the E and C groups.

An independent sample t test was first conducted to determine if significant differences in performance existed between the E and C groups. Then, a paired-sample t test was conducted to determine if significant differences in performance existed between the pretest and posttest scores within both the E and C groups. For all statistical tests, an alpha level of .05 was used.

Conclusions

Based on the findings and within the limitations of this study the following conclusions were reached:

1. Preschool children with cognitive delays in the E group displayed statistically equivalent MPS and TGMD scores on the pretest to preschool children with cognitive delays who were assigned to the C group. Therefore, it can be concluded that preschool children with cognitive delays in both E and C groups were equal in jumping ability at the outset of the study.

2. Preschool children with cognitive delays in the E group displayed statistically higher MPS and TGMD posttest scores in jumping than those in the C group. Therefore, it can be concluded that the intervention using a play-oriented instruction program was more effective in improving jumping skills than that using natural growth.

3. Preschool children with cognitive delays in the E group had statistically higher MPS and TGMD scores on the posttest than on the pretest. Therefore, it can be concluded that preschool children with cognitive delays, who received the intervention of seven weeks using play-oriented instruction, had higher jumping scores after the treatment than before the treatment. In other words, intervention using the play-oriented instruction affected the improvement of jumping skills.

4. Preschool children with cognitive delays in the C group did not reveal any statistical differences between TGMD pretest and TGMD posttest scores. However, they displayed statistically higher MPS scores on the posttest than on the pretest. Therefore, it can be concluded that there was some maturation in the jumping performance by the C group subjects across a seven-week period as demonstrated by the MPS jumping scores, but not enough to reach mature skill levels.

Recommendations

Some suggestions for further research include:

1. A study using a greater number of subjects within each grouping, because the relatively low number of subjects within each group made statistical results difficult to interpret. Using a larger sample size would allow the researcher to use other factors, such as age and gender, which can affect the improvement of jumping performances. This might give more accurate results of the effectiveness of play-oriented instruction.

2. A study comparing each week's difference in performance to analyze change in greater detail, during the intervention period. This would give a better idea as to how the students improve over time.

3. A study examining the effect of play-oriented instruction on the various fundamental motor skills such as throwing, hopping, and galloping. Given that the play-oriented instruction produced an improvement in jumping skills, applying it to other fundamental motor skills would probably also show an improvement.

4. A study examining children with different types of disabilities to determine the effectiveness of play-oriented instruction on the standing long jump in all preschool children with disabilities. Because if the play-oriented instruction benefited children with cognitive delays, it might benefit children with other disabilities.

5. A study to investigate the differences in segments of the standing long jump (e.g., ready, crouch, straightening, takeoff, and landing phases) to find more precise differences between both groups. It might be helpful to indicate exactly how the children perform the activity, so that teachers can further assist them with improving their jumping skills.

6. A study examining teacher effects on a student's jumping scores through positive reinforcement. The researcher questions what affect encouraging comments have on a student's performance and this could be an area for further research.

APPENDIX A

HUMAN SUBJECTS APPROVAL

MICHIGAN STATE
UNIVERSITY

March 17, 1998

TO: Gail M. Dummer
132 IM Sports Circle

RE: IRB#: 98-190
TITLE: THE EFFECTS OF A PLAY PROGRAM ON A SELECTED FUNDAMENTAL MOTOR SKILL OF PRESCHOOL-AGED CHILDREN WITH COGNITIVE DELAYS
REVISION REQUESTED: N/A
CATEGORY: 1-B
APPROVAL DATE: 03/17/98

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete. I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the UCRIHS approved this project and any revisions listed above.

RENEWAL: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Investigators planning to continue a project beyond one year must use the green renewal form (enclosed with the original approval letter or when a project is renewed) to seek updated certification. There is a maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for complete review.

REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB # and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

PROBLEMS/ CHANGES: Should either of the following arise during the course of the work, investigators must notify UCRIHS promptly: (1) problems (unexpected side effects, complaints, etc.) involving human subjects or (2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of any future help, please do not hesitate to contact us at (517)355-2180 or FAX (517)432-1171.

Sincerely,

David E. Wright, Ph.D.
UCRIHS Chair

DEW:bed

cc: Ji Tae Kim

OFFICE OF
RESEARCH AND GRADUATE STUDIES

University Committee on Research Involving Human Subjects (UCRIHS)

Michigan State University
246 Administration Building
East Lansing, Michigan
48824-1046

517/355-2180
FAX: 517/432-1171

MICHIGAN STATE
UNIVERSITY

March 27, 1998

TO: Gail M. Dummer
132 IM Sports Circle

RE: IRB#: 98-190
TITLE: THE EFFECTS OF A PLAY PROGRAM ON A SELECTED FUNDAMENTAL MOTOR SKILL OF PRESCHOOL-AGED CHILDREN WITH COGNITIVE DELAYS
REVISION REQUESTED: 03/24/98
CATEGORY: 1-B
APPROVAL DATE: 03/17/98

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete. I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the UCRIHS approved this project and any revisions listed above.

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APPENDIX B

INFORMED CONSENT FORMS

OOOO School
Consent Form

Dear Parent or Guardian:

My name is Ji-Tae Kim. I am a graduate student majoring in adapted physical education at Michigan State University. I have assisted the physical education program as a volunteer at _____ in _____. For my master thesis from the Department of Kinesiology at Michigan State University, I would like to study the way that preschool children learn the standing long jump.

Children from _____ who participate will be given a pretest in which they are asked to perform the standing long jump three times. This test will be given the week before actual instruction begins. They will receive physical education instruction for 15 minutes, 3 times a week, for 7 consecutive weeks. Finally, all children will take the same jumping test again. This posttest will occur on the week following the end of the instruction phase. Children will be videotaped during both pre-and posttest. All information collected will be treated with the strictest confidence, and the children will remain anonymous to all but the principal investigator (me), and the school teachers related to administering the tests for this study. You are free to withdraw your child at any time without penalty, and your decision will have no effect on your child's physical education experience.

Despite the many precautions (e.g., the use of safety mats for jumping) which will be used in this study, there could be a slight risk of minor injury such as scrapes, bruises, and small cuts. Any such minor injuries would be taken care of, as normal, by the school medical staff. Therefore, please read the attached consent form and indicate your consent of all conditions by signing at the bottom.

I hope that you will allow your child to participate in my study. I believe that the knowledge gathered will be valuable to all preschool teachers, physical educators, adapted physical educators, parents, and most importantly, for children. Please sign and return the attached consent form indicating whether or not your child may participate in the study to me as soon as possible. If you have any questions about this project, you may contact Ji-Tae Kim at 133 Rampart Way #304, E.Lansing, MI 48823, Tel (517) 351-1898 or Gail M. Dummer at 132 IM Sports Circle, Michigan State University, East Lansing, MI 48823, Tel (517) 355-4744.

Sincerely,
Ji-Tae Kim

PARENT/GUARDIAN CONSENT FORM

The goals, procedures, and duration of my child's participation in the research project "The Effects of a Physical Education Program on Standing Long Jump Performance in Preschool-Aged Children in a Pre-Primary Program" have been explained to me. I understand that the researcher will be teaching physical education to my child, following standard teaching practices.

By giving permission for my child to participate in Mr. Kim's project, I understand the following:

1. I consent to having my child participate in 15 minutes of group physical activity three times a week for 7 weeks, and be videotaped randomly during that time.

2. I consent to having my child's standing long jump performance videotaped and assessed once in early April and again in late May.

3. The data collected will be used for Mr. Kim's master thesis project, and may be used for articles, presentations, and instruction.

4. All data collected for this study will be confidential, and my child's name and identity will not be revealed to anyone.

5. I understand that if my child is injured as a result of his/her participation in this research project, Michigan State University will provide emergency medical care if necessary. I further understand that if the injury is not caused by the negligence of MSU I am personally responsible for the expense of this emergency care and any other medical expenses incurred as a result of this injury.

Please sign the form below, and return as soon as possible.

CUT HERE

I agree to allow my child to participate in the project "The Effects of a Physical Education Program on Standing Long Jump Performance in Preschool-Aged Children in a Pre-Primary Program"

Child's Name:_____ Signature of Parent/Guardian:_____

Date:_____

*If you do not wish to consent to participation, please fill in your child's name and return the form unsigned.

Thank you for your patience.

OOOO School
Consent Form

Dear Parent or Guardian:

My name is Ji-Tae Kim. I am a graduate student majoring in adapted physical education at Michigan State University. I have assisted the physical education program as a volunteer at _____ in _____. For my master thesis from the Department of Kinesiology at Michigan State University, I would like to study the way that preschool children learn the standing long jump.

Children from _____ who participate will be given a pretest in which they are asked to perform the standing long jump three times. Seven weeks after the pretest is administered, the same test will be given to measure the natural development in your child's jumping skills (s/he will receive no special instruction). The scores from students at Sunshine Meadows School will be compared to the scores from students at another school who will experience direct instruction in this skill. Children will be videotaped during both pre-and posttest. All information collected will be treated with the strictest confidence, and the children will remain anonymous to all but the principal investigator (me), and the school teachers related to administering the tests for this study. You are free to withdraw your child at any time without penalty, and your decision will have no effect on your child's physical education experience.

Despite the many precautions (e.g., the use of safety mats for jumping) which will be used in this study, there could be a slight risk of minor injury such as scrapes, bruises, and small cuts. Any such minor injuries would be taken care of, as normal, by the school medical staff. Therefore, please read the attached consent form and indicate your consent of all conditions by signing at the bottom.

I hope that you will allow your child to participate in my study. I believe that the knowledge gathered will be valuable to all preschool teachers, physical educators, adapted physical educators, parents, and most importantly, for children. Please sign and return the attached consent form indicating whether or not your child may participate in the study to me as soon as possible. If you have any questions about this project, you may contact Ji-Tae Kim at 133 Rampart Way #304, E.Lansing, MI 48823, Tel (517) 351-1898 or Gail M. Dummer at 132 IM Sports Circle, Michigan State University, East Lansing, MI 48823, Tel (517) 355-4744.

Sincerely,
Ji-Tae Kim

PARENT/GUARDIAN CONSENT FORM

The goals, procedures, and duration of my child's participation in the research project "The Effects of a Physical Education Program on Standing Long Jump Performance in Preschool-Aged Children in a Pre-Primary Program" have been explained to me.

By giving permission for my child to participate in Mr. Kim's project, I understand the following:

1. I consent to having my child's standing long jump performance videotaped and assessed once in early April and again in late May.

2. The data collected will be used for Mr. Kim's master thesis project, and may be used for articles, presentations, and instruction.

3. All data collected for this study will be confidential, and my child's name and identity will not be revealed to anyone.

4. I understand that if my child is injured as a result of his/her participation in this research project, Michigan State University will provide emergency medical care if necessary. I further understand that if the injury is not caused by the negligence of MSU, I am personally responsible for the expense of this emergency care and any other medical expenses incurred as a result of this injury.

Please sign the form below, and return as soon as possible.

CUT HERE

I agree to allow my child to participate in the project "The Effects of a Physical Education Program on Standing Long Jump Performance in Preschool-Aged Children in a Pre-Primary Program"

Child's Name:_____ Signature of Parent/Guardian:_____

Date:_____

*If you do not wish to consent to participation, please fill in your child's name and return the form unsigned.

Thank you for your patience.

APPENDIX C

THE ABILITIES INDEX

The ABILITIES Index

Rune J. Simeonsson
Donald B. Bailey

Child's Name: _____

Date of Birth: ____/____/____

Child's Program: _____

Today's Date: ____/____/____

INSTRUCTIONS: In each column, place an X in the space that best describes the child. Please note that multiple Xs should be recorded under A (Audition), B (Behavior), L (Limbs), I (Intentional Communication), T (Tonicity), & E (Eyes).

	A	B		I	L						I		T		I	E		S
	Audition (Hearing)		Behavior & Social Skills		Intellectual Functioning	Limbs (Use of hands, arms, & legs)					Intentional Communication		Tonicity (Muscle Tone)		Integrity of Physical Health	Eyes (Vision)		Structural Status
	Left Ear	Right Ear	Social Skills	Inappropriate Behavior	Thinking & Reasoning	Left Hand	Left Arm	Left Leg	Right Hand	Right Arm	Right Leg	Understanding others	Communicating with others	Degree of tightness	Degree of looseness	Overall Health	Left Eye	Right Eye	Shape, Body Form & Structure
1	Normal		All behaviors typical & appropriate for age		Normal for age			Complete normal use				Normal for age verbal & non- verbal (includes signs, gestures or symbol systems)		Normal		General good health	Normal		Normal
2	Suspected hearing loss		Suspected disability	Suspected inappropriate behaviors	Suspected disability			Suspected difficulty				Suspected disability		Suspected		Suspected health problems	Suspected vision loss		Suspected difference or interference
3	Mild hearing loss		Mild disability	Mildly inappropriate behaviors	Mild disability			Mild difficulty				Mild disability		Mild		Minor ongoing health problems	Mild vision loss		Mild difference or interference
4	Moderate hearing loss		Moderate disability	Moderately inappropriate behaviors	Moderate disability			Moderate difficulty				Moderate disability		Moderate		Ongoing but medically-controlled health problems	Moderate vision loss		Moderate difference or interference
5	Severe hearing loss		Severe disability	Severely inappropriate behaviors	Severe disability			Severe difficulty				Severe disability		Severe		Ongoing poorly-controlled health problems	Severe vision loss		Severe difference or interference
6	Profound hearing loss		Extreme disability	Extremely inappropriate behaviors	Profound disability			Profound difficulty				Profound disability		Totally tight	Totally loose	Extreme health problems, near total restriction of activities	Profound vision loss		Extreme difference or interference

APPENDIX D

INTERVENTION LESSON PLAN

INTERVENTION LESSON (1st Week)

Lesson Objective :

- Demonstrate correct arm and leg motions, and correct head position, when preparing to jump horizontally.

Equipment/Materials :

- Standing long jump graphics depicting "Ready" and "Crouch" positions, and mats.

Instruction (lesson):	
Prepare Students 1 min.	Seat the students in a semicircle. Tell the students: • "Jumping is fun, because you can use it in games, or when you play." • "We are going to practice jumping for the next 7 weeks." Tell the students the lesson objective. • "Let's learn where to put our arms and legs to jump. Let's learn how to bend our knees so we can jump really far, like a frog."
Explain/Demonstration 2 min.	Explain the crouch position using the standing long jump graphics showing "Ready" and "Crouch" positions. Tell the students: • "Doing this before you jump will help you jump far, like a rabbit." • "Here's how your arms should move when you get ready to jump." Demonstrate a jump. Tell the students as you demonstrate: • "I put my arms way back, and I bend my knees like this." • "I look out in front." • "My arms swing like this when I jump." Tell the students: "Stand and find a place where you have room to jump." Repeat the demonstration with students imitating your movement. Explain to the students: "Let's practice moving our arms without jumping. I will say some special words to help you."
Practice 3 min.	Start the practice from ready position, using the cue (helping) words "arms back," "look ahead," and "arms up." Provide feedback. Let students practice. Tell the students: • "Stop. Sit down right where you are." • "Now let's see how we can move our legs, so we can jump far, like a grasshopper."

INTERVENTION LESSON (1st Week)

Instruction (continued):	
Explain/Demonstration	Show the "Crouch" graphic to illustrate how the legs should bend as they crouch to jump.
2 min.	Tell the students: "Watch my legs when I jump."
	Demonstrate a jump.
	Tell the students as you demonstrate: • "My knees bend this much as my arms reach back. I will say "bend knees" to remind you." • "My legs get straight like this. I reach high. When I say "pop legs," make your legs straight and reach high." • "Keep looking forward with your head up."
	Tell the students: • "Stand and follow me. I will show you how to move your arms and legs. I will use the special words." • "Bend knees," "arms back," "pop legs," and "arms up."
	Repeat the demonstration, with students imitating your movement.
	Explain the practice procedure: • "Let's practice jumping. I will say the special words."
Practice	Start the practice at normal speed by saying "bend knees", then "pop legs."
4 min.	Provide feedback (focusing on bending the knees in crouch).
	Repeat the practice saying "arms back" and "arms up."
	Remind the students to look forward.
	Let students practice.
	Option to use: "Jump over a line or rope or hoop or small object."
	Tell the students: "Find a teacher aide if you need help."
Review	Tell the students: "Sit on the spots."
1 min.	Ask the students: • "Show me the right way to bend knees when you jump?"
Lesson Summary	Remind the students: • "We worked on getting ready to jump today."
2 min.	Emphasize the arm position (point back) and knee flexion as they demonstrate crouch, then ask the students to demonstrate straightening and pointing up.

INTERVENTION LESSON (2nd Week)

Lesson Objective :

- Demonstrate correct arm and leg motions, and head position when preparing to jump horizontally.
- Demonstrate forceful extension of ankles, knees and hips, with full arm extension when jumping horizontally.

Equipment/Materials :

- Standing long jump graphics showing "Ready," "Crouch" and "Straighten", and mats.

Instruction (lesson):	
Prepare Students 1 min.	Seat the students in a semicircle. Tell the students: • "Remember last week's class? We practiced bending knees and arms back when we jump." Demonstrate correct arm and leg motions with correct head position. Tell the students: • "When we bend our knees, we can use all our body parts to take off and jump a long way, like a frog." • "When we do this we can jump very far." Tell the students the lesson objectives. • "This week, let's wee where to put our arms and legs to get ready to jump." • "Let's also practice popping legs and arms up."
Explain/Demonstration 2 min.	Show students the standing long jump graphics about "Ready" and "Crouch" positions. Emphasize bending knees 80-100 degrees, arms back and eyes forward. Demonstrate a jump. Tell the students as you demonstrate: • "My arms move back before I jump (arms back)." • "My knees bend this much when I bend knees and put my arms back." Tell the students: "Stand up. Find a place where you have room to move." Repeat the demonstration with students imitating your movement.
Practice 3 min.	Tell the students: • "Let's bend our knees and move arms way back." • "Don't worry about how far you jump." Start the practice by saying special (cue) words. Provide feedback. Focus on crouch/point back.

INTERVENTION LESSON (2nd Week)

Instruction (continued):	
Explain/Demonstration 2 min.	Tell the students: "Sit down." Show the students the "Ready," "Crouch" and "Straighten" graphics to illustrate how the knees, ankles, hips, and arms all straighten from the crouch position. Emphasize the arm swing forward. Demonstrate a jump. Tell the students: "Stand up. Watch how my body moves when I jump. Then do the same thing." Repeat the demonstration with students imitating teacher's movement. Position the students evenly along the outside edge of the mats so all students have mat space to practice jumping.
Practice 4 min.	Tell the students: • "Practice jumping when I say the special word. First get ready, then bend knees and pop legs. Don't worry about how far you jump." • "Get your arms and legs straight when you jump." Start the practice by using special words. (e.g., "bend knees/arms back; pop legs/arms up") Option to use "Frogs and Lily Pads" game. Provide feedback. Focus on crouch/point back; straighten and point up. (Common errors associated with the preparation and action phases include crouching with the upper body while failing to bend the knees 90 degrees, failing to swing the arms behind the body, failing to take off from both feet, and failing to fully extend the body at takeoff. Correct these errors as while giving feedback.)
Review 1 min.	Tell the students: "Sit on the spots." Ask several students: "Show me how to move your arms and legs when you take off and jump." Provide feedback. (i.e., Re-emphasize crouch/point back and straighten/point up.)
Lesson Summary 2 min.	Remind the students: "We practiced jumping today, didn't we?" Re-Emphasize special words while demonstrating the correct crouch and straightening motions of the standing long jump. Congratulate students on their progress with the standing long jump.

INTERVENTION LESSON (3rd Week)

Lesson Objective :

- Demonstrate forceful extension of ankles, knees and hips with full arm extension when jumping horizontally.
- Demonstrate correct arm and leg motions and positions when landing from a horizontal jump.

Equipment/Materials :

- Standing long jump graphics depicting "Ready," "Crouch," "Straighten," "Land" and "Finish" positions, duct tape, box, and mats.

Instruction (lesson):	
Prepare Students 1 min.	Tell the students: • "Remember last week's classes We practiced how to jump like a frog or rabbit. Repeat the special words and show me how to do each thing (e.g., bend knees/arms back; pop legs/arms up)." Tell the students: • "It is important to land the right way after you jump." Tell the students the lesson objectives. • "This week, let's practice making our body straight when we jump." • "Then we will learn the right way to land when we jump."
Explain/Demonstration 2 min.	Show students the standing long jump graphics about the "Crouch" and "Straighten" to illustrate getting into a good crouch position, then extending the ankles, knees, hips, and arms as they jump. Demonstrate a jump. Tell the students as you demonstrate. • "My arms move back when I jump (arms back)." • "My knees bend this much (90 degrees) and I move my arms back." • "My arms move up when I jump (arms up)." • "My legs pop straight when I jump and I put my arms up." Tell the students: • "Stand up. Find a place where you have room to jump." Tell the students: • "Remember to make your arms and legs move like I showed you." • "Remember to look out in front."
Practice 3 min.	Start the practice by saying "bend knees and arms back" and "pop legs and arms up." Provide feedback. Focus on crouch, point back, straighten, and point up. Tell the students: "Sit down where you are." Acknowledge students who show improvement in their jumping skills.

INTERVENTION LESSON (3rd Week)

Instruction (continued):	
Explain/Demonstration 2 min.	Show the students the "Crouch," "Straighten," "Land," and "Finish" graphics to illustrate the completion phase of the standing long jump. Emphasize the arm and leg motions, and the correct position when landing. Demonstrate a jump. Tell the students as you demonstrate: • "I land on both feet, and bend my knees." • "I swing both arms forward when I land." • "If I do this, I finish softly, like a cat." Explain the practice procedure: • "Let's jump together when I say the special words." • "Do not worry about how far you jump." • "Remember to move your arms and legs like I showed you. Land on both feet, bend your knees, make your arms and legs move forward." • "Land softly, like a cat." Position the students evenly along the outside edge of the mats so all students have mat space to practice jumping.
Practice 4 min.	Start the practice by saying the special words. Also, say " don't worry about how far you jump. Option to use "Jumping on the box." Provide feedback. Focus on landing on both feet, knees bent, and arms forward. (Common errors associated with the completion phase include landing on one foot at a time, landing with the feet in line behind the center of gravity, landing with the knees locked, and failing to thrust the hands forward on the landing.)
Review 1 min.	Tell the students: "Sit on the spots." Ask the students: "Show me how to move your feet, knees, and arms when you land from your jump." Provide feedback. Re-emphasize landing with the knees bent and the arms and feet forward.
Lesson Summary 2 min.	Remind the students: "We practiced jumping today, didn't we?" Ask several students: "Tell me the special words when you land after you jump." Congratulate students on their progress with the standing long jump.

INTERVENTION LESSON (4th Week)

Lesson Objective :

- Demonstrate forceful extension of ankles, knees and hips with full arm extension when jumping horizontally.
- Demonstrate correct arm and leg motions and positions when landing from a horizontal jump.
- Demonstrate correct form when jumping as far as possible, working up to 30 inches.

Equipment/Materials :

- Duct tape, tape for marking lines (colored tape), and mats.
- Mark lines at 20, 25, 30, and 35 inches, parallel to short end of mat.
- Colored tape optional.

Instruction (lesson):	
Prepare Students	Demonstrate a horizontal jump and ask the students: • "What words help you remember how to jump?"
1 min.	Tell the students: • "Last week, we practiced jumping and landing the right way." • "If you jump the right way, you will jump farther and won't fall so much." Tell the students the lesson objectives. • "This week, we will practice jumping an landing the right way." • "We will also practice jumping as far as we can."
Explain/Demonstration	Review and demonstrate the preparation and action phases of jumping by telling the students:
2 min.	• "You have learned how to get your arms, legs, and head ready to jump." • "Reach your arms way back, bend your knees, and keep looking forward." • "Jump by making your arms and legs straight at the same time." • "Land on both feet, with your knees bent, so you don't get hurt." • "When you land, reach forward with your arms so you won't fall." • "If you do these things the right way, you will jump far." Repeat the demonstration with the students imitating your movement. Position students along the outside edges of the mats in groups of three or four (assisted by aides).
Practice	Start the practice by saying "bend knees/arms back" and "pop legs/ arms up," and land softly."
3 min.	Provide feedback. Focus on crouch, point back, straighten, and landing motions. Challenge those students who consistently jump with good form to jump their farthest while maintaining good form.

INTERVENTION LESSON (4th Week)

Instruction (continued):	
Explain/Demonstration 2 min.	Tell the students: • "When you play games you want to jump far." • "This time let's jump as far as we can." Explain and demonstrate the practice procedure: • "Jump as far as you can 3 times." • "Jump the way I showed you. Don't touch the lines on the mat." • "The aide will tell you how far you jumped. Remember what the aide says." • "While you wait to jump, be nice to the person jumping." Demonstrate three jumps on one of the mats. Tell the students: "Stand up. Make a line at he end of each mat." Remind the students they should try to jump as far as possible using the correct body positions and movements.
Practice 4 min.	Start the practice by encouraging students. Provide feedback on form. Emphasize crouching, straightening, looking ahead, reaching arms forward, and bending at the knees when landing. Repeat the practice as time permits, challenging students to clear more lines than they did previously.
Review 2 min.	Tell the students: "Sit on the spots." Ask the students: "Raise your hand if you jumped over the first line (20 inches)." Congratulate them for their effort and give feedback about forms. Repeat these questions for the second, third, and fourth lines (25, 30, 35 inches). Remind the students: • "You will jump very far if you jump the right way." Tell the students: • "Next week, we will learn to jump really far (at least 30 inches)."
Lesson Summary 1 min.	Remind the students "We practiced jumping today, didn't we?" Ask several students: "Tell me the special words that help you jump far without getting hurt (e.g., bend knees/arms back, pop legs/arms up, land softly)." Review any examples of good performance that took place in the class.

INTERVENTION LESSON (5th Week)

Lesson Objective :

- Demonstrate correct arm and legs motions and positions when landing from a jump.
- Demonstrate correct form when jumping as much as possible, working up to 30 inches.
- Demonstrate correct form while jumping at least 30 inches

Equipment/Materials :

- Duct tape, tape for marking lines, and mats.
- Mark lines at 20, 25, 30, and 35 inches, parallel to short end of mat.
- Colored tape optional.

Instruction (lesson):	
Prepare Students 2 min.	Demonstrate a standing long jump (landing on both feet). Tell the students: • "Last week, we practiced jumping really far." • "Today we will learn how to land again. Then, we will jump far again. We will jump the right way, too." Ask the students: "Can you tell me some animals that jump?" (e.g., frogs, crickets, grasshoppers, squirrels, rabbits, deer, etc.) Tell students: • "Pretend you are one of those animals. Jump, the way we learned." Tell the students the lesson objectives. • "This week we will see how to land like a cat after we jump." • "We will also see the right way to jump really far." • "We will also see the right way to jump, until you can jump from here to here (at least 30 inches)."
Explain/Demonstration 2 min.	Tell the students: "It's time to practice landing like a cat." Show the demonstration. Option to use "box jumping such as a 10-inch-high box." Tell the students the key elements as you demonstrate. • "Land on both feet." • "Arms forward when you hit the floor." • "Bend your knees." Tell the students: • "Find two friends to jump with (let the aides help you)." Position students along the outside edges of the mats in groups of three.
Practice 3 min.	Start the practice. Provide feedback on landing on both feet, reaching forward, and bending the knees to absorb the landing.

INTERVENTION LESSON (5th Week)

Instruction (continued):	
Explain/Demonstration	Tell the students: "Sit down where you are (i.e., group status)."
2 min.	Tell the students: • "Now, you will jump really far." • "Remember! You can jump farther if you jump the right way." • "The aide or teacher will show you how far you jumped. S/he will also tell you if you moved your arms and legs the right way."
	Explain and demonstrate the practice procedure: • "Jump as far as you can. Remember to jump the right way." • "The aide or teacher will watch you jump. They will count how many colored lines you jumped over." • "You should jump 3 times."
	Discuss ways they can show compassion (caring) for others and help everyone have fun.
	Remind the students: • "Try to jump as far as you can. Remember to move your body the right way when you jump." • "This will help you jump farther."
Practice	Start the practice.
3 min.	Provide feedback on form. Emphasize crouching, straightening, looking ahead, reaching arms forward, and bending the leg when landing.
	Repeat the practice as time permits, challenging students to clear more lines than they did previously.
Review	Tell the students: "Sit on the spots."
2 min.	Ask the students: "Raise your hand if you jumped over the third line 30 inches), even if you only did it one time."
	Ask these students if they had good form: "Did you jump the right way?"
	Congratulate them for their effort and give feed back about forms.
	Remind the students they will jump farther if they jump correctly.
Lesson Summary	Remind the students we practiced jumping far.
1 min.	Ask several students: • "Tell me the special words to get ready to jump." • "Tell me the special words to take off." • "Tell me the special words to finish jumping."
	Demonstrate each element.

INTERVENTION LESSON (6th Week)

Lesson Objective :

- Demonstrate correct form when jumping as possible, working up to 30 inches.
- Demonstrate correct form while jumping at least 30 inches
- Demonstrate correct form while jumping at least 30 inches when participating in plays and activities.

Equipment/Materials :

- Duct tape, tape for marking lines (colored tape), and mats.
- Hoops.

Instruction (lesson):	
Prepare Students	Ask the students "Tell me the special words for jumping." [Bend knee/arms back, pop legs/arms up, land and finish.]
2 min.	Ask the students the questions below. Use the jump graphic to provide feedback and reinforce students response. • "How do you get ready to jump?" [Swing arms back, bend knees, look at where you want to jump.] • "Where are your toes, legs, eyes, and arms when you leave the floor?" [Toes pointed, legs straight, eye looking at where you want to jump, arms straight above the head.] • "Where are your feet and hands when you land?" [Reaching out in front of you] • "How do you move your body when you land softly like a cat?" [Bend knees, arms forward] Tell the students the lesson objectives. • "This week, we will practice the right way to jump really far. Maybe, we can even jump to this line (up to 30 inches)." • "After we do that, we will use the right way to jump at least 30 inches three times in a row." • "Then, we will see how to jump the right way when we play."
Explain/Demonstration	Tell the students: • "Find two or three other friends. Let the aide help you."
2 min.	Explain and demonstrate the practice procedure. • "Stand behind the starting line. Then jump as far as you can." • "Remember to jump the right way." • "The aide or teacher will tell you how far you jumped." • "Jump 3 times. Then let one of your friends jump." Position students along the outside edges of the mats in groups of three.
Practice	Start the practice.
3 min.	Provide feedback on crouch, strengthen, land, and finish position.

INTERVENTION LESSON (6th Week)

Instruction (continued): Explain/Demonstration	Tell the students: "Sit down."
2 min.	Tell the students: • "You should look at one thing when you jump." • "Now lets jump. See the hoops here? They are in a line. Jump into each hoop, one at a time. Just look at the hoop you are jumping to." • "Remember how to jump and land." Explain and demonstrate the practice procedure: • "Let the aide show you where to go." • "See, there are 5 hoops. Jump from one hoop to the next." • "Remember! Take off with both feet. Land on both feet." • "Jump into the hoop. But, don't touch the side of the hoop." Remind the students: • "Start with both your arms behind you. Swing your arms forward when you jump." • "Take off with both feet. Land on both feet." Distribute the students evenly (as two groups).
Practice	Start the practice.
4 min.	Provide feedback on form. Emphasize crouching, straightening, looking ahead, reaching arms forward, and bending the leg when landing. Emphasize the necessity of a focus when practice jumping and landing.
Review	Tell the students: "Sit on the spots."
1 min.	Ask the students: "Raise your hand if you jumped into each hoop, without touching the hoops." Congratulate them for their effort and give feed back about forms. Remind the students: "Jumping into hoops like this helps us look at only one thing when we jump. It also helps us see how to jump and land."
Lesson Summary	Remind the students: "When you play, remember to jump the right way everytime."
1 min.	Ask several students: "How can you jump the right way?" Tell the students: "Remember some of the special words (like bend knees/arms back, pop legs/arms up, and land softly) each time you jump." Demonstrate each element.

INTERVENTION LESSON (7th Week)

Lesson Objective :

- Demonstrate correct form while jumping at least 30 inches when participating in plays and activities.

Equipment/Materials :

- Duct tape, four position markers, tape for marking lines (colored tape), and mats.
- Standing long jump graphics for "Ready," "Crouch," "Straighten," "Land," and "Finish."

Gym Setup (4 playgrounds):

- Long Jump - Use the mats as long jump stations.
- Jump Over the Stream - Place four position markers three feet apart. Mark a line in front of the position markers. Mark a second line that runs 25 inches from the front of the first position marker, 30 inches from the second, 35 inches from the third, and 40 inches from the fourth.
- Land on Lily Pads - Mark a starting line, three feet wide. Mark six circles, each 30 inches in diameter in a zig-zag pattern from the starting line, so the distance increases between each circle and the last two circles are 35 inches apart.
- Jumps in a Row - Mark a starting line approximately 12 feet long. Mark a line parallel to and 10 feet from the starting line.

Instruction (lesson):	
Prepare Students 2 min.	Seat the students in a semicircle. Tell the students: • "You have become very good at jumping." • "I want to do some games with jumping. But first, I need help. Tell me how I can jump better." • "I will jump four times. Each time I will do something wrong." • "Raise your hand if you know how I can jump better." [Toes pointed, legs straight, eyes looking at where you want to jump, and arms straight above the head.] Demonstrate incorrect form four ways: By jumping from a straight legged position, keeping the arms at he side of the body during the preparation phase, keeping the hips flexed during the jump, and landing on one foot. Demonstrate correct form after feedback from students. Emphasize bending the legs with arms reaching back during the preparation phase, extending (straightening) the hip joints during the jump, and landing on both feet with bent knees. Tell the students the lesson objective. • "This week, let's see how to jump the right way, when we play."
Explain/Demonstration 3 min.	Tell the students: • "Lets jump while we play a game!"

INTERVENTION LESSON (7th Week)

Instruction (continued):	
Explain/Demonstration 3 min.	Explain the activity: • "See, there are four playgrounds." • "You and some of your friends will jump at each playground." • "When you and your friends have all jumped at one playground, go to the next playground. Let the aide help you." • "You will get points for each jump. Let's see who can get the most points." Explain and demonstrate what to do at each station and how to determine points. 1. Long Jump: "Stand behind this starting line. You get one point for each line you jump over. Jump twice." 2. Jump over the Stream: "Now you have to jump over the water. Jump at the place where the stream is smallest. Jump over that, without touching the line - It's the water. You don't want to fall in and get wet, do you? - If you jump over the water without getting wet, you get one point. Then try to jump over place where the water is wider." 3. Land on Lily Pads: "Start behind this starting line. Jump onto each rock like a frog. You have to land on the rock in the middle of the circle, or you'll get wet. You get one point for each rock.. Remember to jump and land the right way." 4. Jumps in a Row: "Start behind this line. Jump over to that line over there, without walking. Jump as many times as you have to, but jump the right way. You get one point for each time you jump the right way. If you can get to this line in five jumps or less, you get two points." Distribute students evenly at the four playgrounds.
Practice 8 min.	Start the practice. Provide feedback on proper execution of the crouch, straighten, land and finish components of the jump. Continue practice until all students have completed jumping at each playground.
Review/Lesson summary 2 min.	Tell the students: "Sit on the spots." Tell the students: "Raise your hand if you got more points the second time you played." Encourage students to practice those parts of the jump they need to improve. • "Practice jumping the right way as much as you can. Then, maybe next year you will be really good at jumping!"

APPENDIX E

TEST SCORE FORMS FOR JUMPING

STANDING LONG JUMP

Name_____ Sticker number_____ Subject number_____ School_____ Date _____
Gender_____ ABILITIES Index scores_____ Trial #1_____ Trial #2_____ Trial #3 _____

Test of Gross Motor Development (TGMD)	MSU Fundamental Motor Stages (MPS)
Preparatory movement includes flexion of both knees with arms extended behind body Arms extend forcefully forward and upward reaching full extension above the head Take off and land on both feet simultaneously Arms are trust downward during landing	Stage 1 Arms act as brakes Large vertical component Legs not extended Stage 2 Arms act as "wings", elbows in line with trunk Vertical component still great Legs near full extension Stage 3 Elbows in front of trunk on takeoff Hands to head height Takeoff angle still above 45° Legs often fully extended Stage 4 Complete arm and leg extension Takeoff near 45° Thighs parallel to surface on landing
TGMD points earned _____	MPS jumping stage _____

APPENDIX F

RAW DATA

SUBJECT INFORMATION

ID#	Sticker #	School	Age (months)	Gender	A	B	I	L	I	T	I	E	S	Pre-MPS	Pre-TGMD	Post-MPS	Post-TGMD
01	32	A	56	M	2	3	2	1	4	1	1	1	1	2	2	2.5	3
02	33	A	61	M	1	3	2	1	4	1	1	1	1	2.5	3	3	3
03	34	A	61	M	1	3	3	1	4	1	1	1	1	3	3	4	4
04	37	A	63	M	1	4	1	1	2	1	1	1	1	2	2	3	3
05	38	A	64	M	1	6	5	1	5	1	1	1	1	1	1	2.5	2
06	39	A	64	M	1	4	3	1	4	1	1	1	1	2.5	3	3	3
07	40	A	66	F	1	1	1	1	4	1	1	1	1	1	1	2	2
08	41	A	52	F	1	3	1	1	3	1	1	2	1	1.5	2	3	3
09	42	A	62	M	1	3	1	1	4	1	1	1	1	2	2	2.5	3
10	45	A	63	M	2	4	2	1	3	1	1	1	1	1.5	2	2.5	3
11	46	A	56	M	1	3	2	1	4	1	1	1	1	0.5	0	3.5	4
12	47	A	52	M	1	3	2	1	4	1	1	1	1	1.5	2	3	3
13	48	A	65	M	1	3	2	1	4	1	1	1	1	1.5	2	2	2
14	49	A	64	M	1	4	2	1	5	1	1	1	1	3	3	3	3
15	44	A	50	M	1	5	4	1	4	1	1	1	1	2.5	3	3	3
16	7	B	43	M	1	3	1	1	4	1	1	1	1	0.5	1	1	1
17	13	B	42	M	1	1	1	1	3	1	1	1	1	1.5	2	2.5	2
18	5	B	53	M	2	1	1	1	5	1	1	1	1	1.5	2	3	4
19	6	B	58	M	1	4	1	1	5	1	1	2	1	2	2	2.5	3
20	2	B	48	M	1	1	1	1	2	1	1	1	1	1	2	1.5	2
21	4	B	54	M	1	1	1	1	5	1	1	2	1	2	3	3	3
22	8	B	53	F	2	4	3	1	4	1	1	1	1	1.5	1	1	2
23	3	B	56	F	1	3	1	1	3	1	1	1	1	2.5	2	2	2
24	18	B	76	F	1	4	3	1	3	1	1	2	1	2	2	2	2
25	10	B	66	M	1	6	2	1	4	1	1	1	1	1.5	2	1.5	1
26	15	B	71	M	1	1	3	1	4	1	1	1	1	2.5	3	2.5	3
27	12	B	68	M	1	3	3	1	4	1	1	1	1	1.5	1	2	3
28	23	B	68	M	1	3	3	1	5	1	1	1	1	2	2	1.5	2

29	16	B	69	F	1	3	3	1	4	1	1	2	1	1	1	2.5	3
30	20	B	59	F	1	3	1	1	3	1	1	1	1	2	2	2	2
31	14	B	64	M	1	3	1	1	3	1	1	1	1	2	2	3.5	4
32	19	B	63	M	1	1	1	1	2	1	1	1	1	2.5	2	2.5	1
33	11	B	52	M	1	3	3	1	3	1	1	1	1	2.5	2	2	2
34	21	B	57	M	1	3	3	1	3	1	1	1	1	2	2	2	2

REFERENCES

REFERENCES

Ainsworth, J., & Fox, C. (1989). Learning to learn: A cognitive process approach to movement skill acquisition. Strategies, 3(1), 20-22.

Athey, I. (1984). Contributions of play to development. In T. D. Yawkey & A. D. Pellegrini (Eds.), Child's play: Developmental and applied (pp. 9-28). Hillsdale, NJ: Erlbaum.

Bankhead, I., & MacKay, D. N. (1982). Fine motor performance in subjects of subnormal, normal, and superior intelligence: Reaction time and task complexity. Journal of Mental Deficiency Research, 26(2), 73-89.

Barnett, L. A. (1990). Developmental benefits of play for children. Journal of Leisure Research, 22(2), 138-153.

Bender, W. N. (1996). Teaching students with mild disabilities. Needham Heights, MA: Simon & Schuster.

Bennett, C. (1980). Planning for activity during the important preschool years. Journal of Physical Education, Recreation and Dance, 15(7), 30-34.

Block, M. E., & Davis, T. B. (1996). An activity-based approach to physical education for preschool children with disabilities. Adapted Physical Activity Quarterly, 13, 230-246.

Bouffard, M. (1990). Movement problem solutions by educable mentally handicapped individuals. Adapted Physical Activity Quarterly, 7, 183-197.

Bracken, B. A. (1987). Limitations of preschool instruments and standards for minimal levels of teaching adequacy. Journal of Psychoeducational Assessment, 5, 313-326.

Bradtke, L. M., Kirkpatrick, W. J., & Rosenblatt, K. P. (1972). Intensive play: A technique for building affective behaviors in profoundly mentally retarded young children. Education and Training of the Mentally Retarded, 7, 8-13.

Branta, C., Haubenstricker, J., & Seefeldt, V. (1984). Age changes in motor skill during childhood and adolescence. Exercise and Sport Science Reviews, 12, 467-520.

Bredekamp, S. (1992). What is developmentally appropriate and why is it important? Journal of Physical Education, Recreation and Dance, 63(6), 31-32.

Bricker, D., & Cripe, J. J. (1992). An activity-based approach to early intervention. Baltimore: Brookes.

Bundy, A. C. (1991). Play theory and sensory integration. In A. G. Fisher, E. A. Murray, & A. C. Bundy (Eds.), Sensory integration: Theory and practice (pp. 89-101). Philadelphia: F. A. Davis.

Campbell, D. T., & Stanley, J. C. (1966). Experimental and quasi-experimental design for research. Chicago: Rand McNally.

Chattin-McNichols, J. (1992). The Montessori controversy. NY: Delmar Publishers.

Clark, J. E., & Phillips, S. J. (1985). A developmental sequence of the standing long jump. In J. E. Clark & J. H. Humphrey (Eds.), Motor development: Current selected research (pp. 73-85). Princeton, NJ: Princeton Book.

Cole, K., Dale, N., Mills, P. S., & Jenkins, J. R. (1993). Interaction between early intervention curricular and student characteristics. Exceptional Children, 60, 17-28.

Cole, K. N., Mills, P. S., & Sale, P. S. (1989). A comparison of the effects of academic and cognitive curricula for young handicapped children one and two years post-program. Topics in Early Childhood Special Education, 9, 110-127.

Connor-Kuntz, F. J., & Dummer, G. M. (1996). Teaching across the curriculum: Language-enriched physical education for preschool children. Adapted Physical Activity Quarterly, 13, 302-315.

Cook, R. E., Tessier, A., & Klein, M. D. (1992). Adapting early childhood curricula for children with special needs. New York: Macmillan.

DiRocco, P. J., Clark, J. E., & Phillips, S. J. (1987). Jumping coordination patterns of mildly mentally retarded children. Adapted Physical Activity Quarterly, 4, 178-191.

Dummer, G. M., Connor-Kuntz, F. J., & Goodway, J. D. (1995). A physical education curriculum for all preschool students. Teaching Exceptional Children, 27(3), 28-34.

Eichstaedt, C. B., & Lavay, B. W. (1992). Physical activity for individuals with mental retardation. Champaign, IL: Human Kinetics.

Eichstaedt, C. B., Wang, P., Polacek, J., & Dohrmann, P. (1991). Physical fitness and motor skill levels of individuals with mental retardation. Normal, IL: Illinois State University.

Ellis, N. R., & Dulaney, C. L. (1991). Further evidence for cognitive inertia of persons with mental retardation. American Journal on Mental Retardation, 95(6), 613-621.

Ford, A., & Mirenda, P. (1984). Community instruction: A natural cues and correction decision model. Journal of the Association for Persons with Severe Handicaps, 9, 79-88.

Fowler, J. S. (1981). Movement education. Philadelphia: Saunders College.

Gallahue, D. L. (1989). Understanding motor development. Indianapolis: Benchmark.

Gearheart, B. R., Weishahn, M. W., & Gearheart, C. (1996). The exceptional student in the regular classroom. Englewood Cliffs, NJ: Prentice-Hall.

Hanline, F. M., & Fox, L. (1993). Learning within the context of play: Providing typical early childhood experiences for children with severe disabilities. Journal of the Association of Severe Handicaps, 18(2), 121-129.

Haubenstricker, J., & Seefeldt, V. (1986). Acquisition of motor skills during childhood. In V. Seefeldt (Ed.), Physical activity & well-being (pp. 42-102). Reston, VA: American Alliance for Health, Physical Education, Recreation & Dance.

Haubenstricker, J., Seefeldt, V., & Branta, C. (1983, April). Preliminary validation of a developmental sequence for the standing long jump. Minneapolis: Paper presented at the annual convention of the American Alliance for Health, Physical Education, Recreation & Dance.

Hickson, L., Blackman, L. S., & Reis, E. M. (1995). Mental retardation: Foundation of educational programming. Needham Heights, MA: Simon & Schuster.

Hildebrand, V. (1985). Guiding young children. New York: Macmillan.

Holland, B. (1987). Fundamental motor skill performance of non-handicapped and educable mentally impaired students. Education and Training in Mental Retardation, 21, 197-204.

Hoover, J. H., & Horgan, J. S. (1990). Short-term memory for motor skills in mentally retarded persons: Training and research issues. In G. Reid (Ed.), Problems in movement control (pp. 217-239). Amsterdam: North Holland.

Horita, T., Kitamura, K., & Kohno, N. (1991). Body configuration and joint moment analysis during standing long jump in 6-yr-old children and adult males. Medicine and Science in Sports and Exercise, 23, 1068-1077.

Ignico, A. (1994). Early childhood physical education: Providing the foundation. Journal of Physical Education, Recreation and Dance, 65(6), 28-30.

Inhelder, B. (1968). The diagnosis of reading in the mentally retarded. New York: John Day.

Jansma, P., & French, R. (1994). Special physical education: Physical activity, sports, and recreation. Englewood Cliffs, NJ: Paramount Communication.

Kahn, J. V. (1979). Applications of the Piagetian literature to severely and profoundly mentally retarded persons. Mental Retardation, 17(6), 273-280.

Kail, R. (1992). General slowing of information processing by persons with mental retardation. American Journal on Mental Retardation, 97(3), 333-341.

Kelly, L. E., Dagger, J., & Walkley, J. (1989). The effects of an assessment-based physical education program on motor skill development in preschool children. Education and Treatment of Children, 12(2), 152-164.

Knox, S. H. (1974). A play scale. In M. Reilly (Ed.), Play as exploratory learning (pp. 247-266). Beverly Hills, CA: Sage.

Kopp, C. B., Baker, B. L., & Brown, K. W. (1992). Social skills and their correlates: Preschoolers with developmental delays. American Journal of Mental Retardation, 96(4), 357-366.

Krebs, P. L. (1995). Mental retardation. In J. P. Winnick (Ed.), Adapted physical education and sport (pp. 93-109). Champaign, IL: Human Kinetics.

Krogh, S. L. (1982). Affective and social development: Some ideas from Montessori's prepared environment. Topics in Early Childhood Special Education, 2(1), 55-62.

Landreth, G. (1982). Play therapy: Dynamics of the process of counseling with children. Springfield, IL: Charles Thomas.

Lavay, B. (1985). Instruction of team sport strategies for the mild/moderate mentally handicapped. Palaestra, 2(1), 10-13.

Li, A. K. F. (1981). Play and the mentally retarded child. Mental Retardation, 19, 121-126.

Lillard, P. P. (1996). Montessori today: A comprehensive approach to education from birth to adulthood. New York: Schocken.

Linder, T. (1993). Transdisciplinary play-based assessment. Baltimore: Paul H. Brookes.

Michigan's Exemplary Physical Education Curriculum Project (MI-EPEC). (P. G. Vogel & C. T. Kuntzleman Co-Directors). (1995). Horizontal Jump. Michigan Fitness Foundation (P.O. Box 27187, Lansing, MI 48909).

Michigan Department of Education (1998). Office of special education and early intervention services [Online]. Available Internet: http://www.mde.state.mi.us/off/sped/marse/marse_frame.html

Milne, C., Seefeldt, V., & Reuschlein, P. (1976). Relationship between grade, sex, race, and motor performance in young children. Research Quarterly, 47, 726-730.

Mindes, G. (1982). Social and cognitive aspects of play in young handicapped children. Topics in Early Childhood Special Education, 2(3), 39-52.

Montessori, M. (1964). The Montessori method. New York: Bently.

Morris, A.M., Williams, J.M., Atwater, A.E., & Wilmore. J.H. (1982). Age and sex differences in motor performance of three through six year old children. Research Quarterly for Exercise and Sport, 53(3). 214-221.

Norusis, M. J. (1993). SPSS for windows: Base system user's guide. Chicago, IL: SPSS Inc.

Novick, R. (1993). Activity based intervention and developmentally appropriate practice: Points of convergence, Topics in Early Childhood Special Education, 13(4), 403-417.

Nugent, P. M., & Mosley, J. L. (1987). Mentally retarded and nonretarded individuals' attention allocation and capacity. American Journal on Mental Retardation, 91(6), 598-605.

Payne, V. G., & Isaacs, L. D. (1991). Human motor development. London: Mayfield.

Phillips, S., Clark, J. E., & Peterson, R. D. (1985). Developmental differences in standing long jump takeoff parameters. Journal of Human Movement Studies, 11, 123-143.

Piaget, J. (1962). Play, dreams, and imitation in childhood. New York: Norton.

Poe, A. (1976). Description of the movement characteristics of two year-old children performing the jump and reach. Research Quarterly, 47, 260-268.

Porretta, D. L. (1988). Contextual interference effects on the transfer and retention of a gross motor skill by mildly mentally handicapped children. Adapted Physical Activity Quarterly, 5, 332-339.

Rarick, G. L. (1973). Motor performance of mentally retarded children. In G. L. Rarick (Ed.), Physical activity: Human growth and development (pp. 225-256). New York: Academic Press.

Rich, S. M. (1995). Instructional styles and strategies. In J. P. Winnick (Ed.), Adapted physical education and sport (pp. 59-74). Champaign, IL: Human Kinetics.

Riggs, M. L. (Ed.). (1980). Movement education for preschool children. Reston, VA: Association of the American Alliance for Health, Physical Education, Recreation & Dance.

Rimmer, J. H., & Kelly, L. E. (1989). Gross motor development in preschool children with learning disabilities. Adapted Physical Activity Quarterly, 6, 266-279.

Roberton, M. A. (1984). Changing motor patterns during childhood. In J. R. Thomas (Ed.), Motor development during childhood and adolescence (pp. 48-90). Minneapolis, MN: Burgess.

Rousey, A. M., & Eyman, R. K. (1995). Probabilities of development of ambulation for mobile children with moderate to profound mental retardation. Mental Retardation, 33, 322-327.

Rudisill, M. E., & Toole, T. (1993). Gender differences in motor performance of 50- to 70- year-old adults. Perceptual and Motor Skills, 77, 939-947.

Sander, S. (1992). Designing preschool movement programs. Champaign, IL: Human Kinetics.

Seefeldt, V. (1980). Developmental motor patterns: Implications for elementary school physical education. In C. Nadeau, W. Holliwell, K. Newell, & G. Roberts (Eds.), Psychology of motor behavior and sport (pp. 314-323). Champaign, IL: Human Kinetics.

Seefeldt, V. (1984). Physical fitness in preschool and elementary school-aged children. Journal of Physical Education, Recreation and Dance, 55(9), 33-40.

Seefeldt, V., & Haubenstricker, J. (1976). Developmental sequence of fundamental motor skills inventory. Unpublished manuscript, Michigan State University, Department of Health and physical Education, East Lansing.

Seefeldt, V., & Haubenstricker, J. (1982). Patterns, phases, or stages: An analytical model for the study of developmental movement. In J. A. S. Kelso & J. E. Clark (Eds.), The development of movement control and coordination (pp. 309-318). New York: John Wiley & Sons.

Sherrill, C. (1998). Adapted physical activity, recreation and sport: Crossdisciplinary and lifespan (5th ed.). Madison, WI: WCB/McGraw-Hill.

Sigman, M., & Ungerer, J. (1984). Cognitive and language skills in autistic, mentally retarded and normal children. Developmental Psychology, 20(2), 293-302.

Silliman, L. M., & French, R. (1995). Influence of behavioral technology to improve the walking posture malalignment of individuals with severe and profound mental retardation. In A. Vermeer & W. E. Davis (Eds.), Physical and motor development in mental retardation (pp. 198-204). Basel: Karger.

Simeonsson, R. J., & Bailey, D. B. (1991). The ABILITIES Index. Chapel Hill: University of North Carolina at Chapel Hill.

Swanson, L. (1994). Changes: How our nursery school replaced adult-directed art projects with child-directed experiences and changed to an accredited, child-sensitive, developmentally appropriate school. Young Children, 49(4), 5-9.

Toole, T., & Kretzschmar, J. C. (1993). Gender differences in motor performance in early childhood and later adulthood. Women in Sport and Physical Activity Journal, 2(1), 41-71.

Ulrich, D. (1984). The reliability of classification decisions made with the objective-based motor skill assessment instrument. Adapted Physical Activity Quarterly, 1, 52-60.

Ulrich, D. (1998). Test of gross motor development (2nd ed.). Austin, TX: Pro-Ed.

Watkins, R. S., Boyd, B. D., & Cavalier, A. R. (1982). Learning, memory, and transfer in profoundly, severely, and moderately mentally retarded persons. American Journal on Mental Retardation, 87(2), 186-196.

Wessel, J. A., & Kelly, L. (1986). Achievement-based curriculum development in physical education. Philadelphia: Lea & Febiger.

Wickstrom, R. (1983). Fundamental motor patterns. Philadelphia: Lea & Febiger.

Willert, M. K., & Kamii, C. (1985). Reading in kindergarten: Direct vs. indirect teaching. Young Children, 5, 5-9.

Williams, H. G. (1983). Perceptual and motor development. Englewood Cliffs, NJ: Prentice-Hall.

Williams, H. G. (1991). Assessment of gross motor functioning. In B. A. Bracken (Ed.), The psychoeducational assessment of preschool children (pp. 284-316). Boston: Allyn & Bacon.

Zetlin, A. G., & Murtaugh, M. (1988). Friendship patterns of mildly learning handicapped and nonhandicapped high school students. American Journal on Mental Retardation, 92(5), 447-454.