THE EFFECTS OF SELECTED PHYSICAL EDUCATION TEACHING STYLES ON THE LEARNING OF A KINESIOLOGICAL CONCEPT BY SECOND GRADE CHILDREN

By

LETA ELIZABETH HICKS

Bachelor of Science in Education
University of Tulsa
Tulsa, Oklahoma
December, 1976

Master of Science
Oklahoma State University
Stillwater, Oklahoma
July, 1982

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF EDUCATION
July, 1986

THE EFFECTS OF SELECTED PHYSICAL EDUCATION TEACHING STYLES ON THE LEARNING OF A KINESIOLOGICAL CONCEPT BY SECOND GRADE CHILDREN

Thesis Approved:

Thesis Adviser

Dean of Graduate College

ACKNOWLEDGEMENTS

I would like to acknowledge my appreciation to the members of my committee. I would like to thank Dr. Steve Moyer, director of my study, and Dr. John Bayless and Dean Donald Robinson, members of my committee. A special thank you goes to Dr. Steven Edwards for his advice on the research design and assistance with the statistical analysis of the data. My sincere appreciation is gratefully extended to Dr. Betty Abercrombie, chairman of my committee, for her assistance, support and encouragement during the preparation of this dissertation and for her personal interest in my career. Her example and her confidence in me have had a special influence on my professional growth.

I would like to thank all the students who were the sujects in this study. A sincere thank you to Shawnee Public Schools, Stillwater Public Schools and the physical education teachers who allowed me to teach and test their classes. They were Mr. Dennis Cyr, Mrs. Leesa Adams, Mr. Byron Monroe, Mrs. Angie Cyr and Dr. Linda McElroy. A special thank you goes to Mr. Matthew Croka for posing for the pictures in the testing instruments.

There have been many friends and family members who have given me encouragement and support throughout this project.

I want to dedicate this dissertation to my parents and best friends Virginia L. and William D. Hicks. Their unconditional love for me and belief in my abilities are the basis for my hopes and dreams. Their material and spiritual support makes my endeavors possible, and this accomplishment I share with them.

Finally, I would like to thank the greatest teacher who has ever lived, Jesus Christ, for by his example I can strive to serve God's purpose for my life. Jesus taught his students to be servants of others, saying in The Living Bible (1971):

> Anyone wanting to be a leader among you must be your servant. And if you want to be right at the top, you must serve like a slave. Your attitude must be like my own, for I, the Son of Man, did not come to be served, but to serve, and to give my life as a ransom for many.
>
> Matthew 20:26-28

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Physical education is concerned about the total development of the student. As part of the process of education, the physical education program includes cognitive and affective, as well as psychomotor and physical, objectives. It is activity-based learning that includes knowledge, understandings and values related to student development.

In 1969, The American Association for Health, Physical Education and Recreation published a manual identifying the body of knowledge in physical education. Objectives were organized into these five categories: physiological, motor skill, intellectual, aesthetic, and social. The intellectual component is fundamental to the entire physical education process. Concepts and knowledge basic to accomplishing objectives in each of the categories were identified in the manual. The teaching of concepts to develop understandings in physical education was stressed.

Current physical education curricula have been developed with a conceptual approach to teaching and learning. The purpose is to apply theoretical concepts to

practical situations. Teachers are admonished to structure lessons which incorporate the "why" with the "how" of movement. The task is both complicated and enriched by the growing body of knowledge of human movement.

One attempt to translate theory into operation is the Basic Stuff series. According to Bain and Poindexter (1981), this physical education curriculum can be applied to the theory-to-practice problem with different approaches. They describe four approaches:

1. Physical educators can focus on concepts from the subdisciplines, such as kinesiology, humanities and motor learning. An example from kinesiology is to demonstrate the concept of production of force while practicing the skill of throwing.

2. College and university teacher education programs can emphasize the need for public school teachers to incorporate scientific knowledge into physical education lessons.

3. In activity courses, conceptual information related to skill development can be organized into units of study. Units can be structured around an activity or a concept. For example, a basketball unit may coordinate such skills as dribbling, shooting, and passing with such concepts as balance, trajectory, timing, and spatial awareness. Or, the subtheme of flexibility in a physical fitness unit can be

made more explicit in activities such as gymnastics, weight lifting and track and field.

4. Physical education concepts can be integrated with other subjects such as science, mathematics and music. For example, the concept of rhythm is basic to music and movement.

The implementation of conceptually-based physical education poses the following questions:

1. How do physical educators know if their students are learning conceptually? That is, are students acquiring understandings and meanings from physical education lessons?

2. Do students acquire greater conceptual understandings from lessons based on movement concepts than from lessons based on motor skill development?

3. Do lessons that require cognitive as well as psychomotor responses result in the students acquiring those broad understandings of movement that form the structure of the physical education curriculum?

Statement of the Problem

The primary purpose of this investigation was to compare the effects of selected physical education teaching styles on the learning of a kinesiological concept by second grade children. The problem was to determine if there was a statistically significant difference on post test knowledge

scores between two groups of second grade students who participated in either the guided discovery style or practice style of instruction for developing the skill of catching. The concept was absorption of force. A second purpose was to determine the possible effects of the pretest on learning the concept.

Need for the Study

The need to teach a body of knowledge in physical education is well-established, but the effects of conceptually-based programs are less certain. Most current physical education curricula is based on a conceptual organization. They are designed on the premise that physical education should include knowledge and understandings as well as skill development. Curriculum designers claim that conceptually-based programs cause students to learn concepts. However, there is very little research to support this claim.

Physical education learning experiences should be investigated to identify the application of cognitive learning to physical performance. Although it is agreed that students must understand basic movement concepts before they can apply them, there seems to be little instructional effort directed toward conceptual learning. The most prevalent methods of teaching physical education are teacher-directed approaches using explanations, demonstra-

tions and practice. These require minimal cognitive involvement on the part of the student. It cannot be assumed that students are learning physical education concepts by participating in physical education activities. Instructors should use strategies which cause students to think about concepts. Researchers should investigate instructional approaches to determine the extent to which they stimulate the cognitive processes of inquiry and discovery in regard to understanding concepts.

It is believed that the significance of this study is that it provides experimental data regarding the value of the guided discovery style of teaching as an alternative to the practice style of teaching. In addition, this study provides a means of evaluating student learning. The results of the study might suggest instructional procedures that facilitate learning of concepts. Teachers could use this information to structure learning experiences that help their students to become physically educated.

Null Hypotheses to be Tested

Hypothesis I: There will be no statistically significant difference between the guided discovery style group and the practice style group for all physical education classes combined when their post test scores are compared.

Hypothesis II: There will be no statistically significant difference between the pretested group and the nonpretested group for all physical education classes combined when their post test scores are compared.

Delimitations

This study was restricted in the following ways:

1. The subjects were second grade students in selected elementary schools in Shawnee, Oklahoma, and Stillwater, Oklahoma. Intact second grade physical education classes were randomly assigned to the treatment groups.

2. The length of the treatment and testing was two consecutive physical education class periods. Each lesson lasted approximately thirty minutes. Testing lasted approximately ten minutes. The treatments and testing were conducted in February and March, 1986.

3. The two guided discovery style and the two practice style lessons were developed by the investigator.

4. The pretest and post test were developed by the investigator.

5. Only two physical education teaching styles were used. They were the guided discovery and practice styles.

6. The investigation was restricted to the learning of one concept from one physical education subdiscipline.

Limitations

The study was limited in the following ways:

1. No attempt was made to change the regular patterns of the physical education classes. The time between the two lessons varied from two to five days, according to the physical education class schedule of each school.

2. No attempt was made to control the acceptance of the instructor and the teaching style by the students.

Selection of Elements

The investigation focused on the elementary physical education curriculum. Selection of the elements of the study was based on the following rationales:

1. Selection of second grade students was based on Piaget's theory of cognitive development. Children enter the stage of concrete operations at about age seven. Conceptual thought begins to develop at this age. The thinking processs becomes more systematic as the child begins to organize the information gained from concrete experiences into dynamic structures (Piaget, 1961).

2. The skill of catching a ball was chosen because it is a fundamental manipulative movement that is developed and refined in preschool and primary grades (Gallahue, 1975).

3. The concept of absorption of force is inherent in the skill of catching. The mechanical principle is to

absorb the force of the ball by receiving it over as long a distance as possible. When receiving an object, joints should "give" at impact in order to absorb its momentum (Bunn, 1972).

Definitions

1. Concept: "A concept is a broad and abstract generalization which conduces to an organization of related ideas, facts, and experiences" (Pollock, 1971, p. 280). According to Martorella (1972):

> A concept is a continuum of inferences by which a set of observed characteristics of an object or event suggests a class identity, and then additional inferences about other unobserved characteristics of the object or event (p. 5).

A variety of definitions of "concept" in the literature make its operational meaning unclear. In the discipline of physical education the term "principle" is often used. The distinction between the terms is that concepts are used to form principles. In order to avoid confusion, the terms "concept" and "principle" are used interchangeably to denote the cognitive constructs that form the framework of the curriculum.

2. Conceptual Learning: According to Gagne (1979),

> An individual is said to have learned a defined concept when he can demonstrate the "meaning" of some particular class of objects, events, or relations . . . Demonstration of the meaning is emphasized in order to establish a distinction between this kind of mental processing and the kind involved in memorized verbal information (p. 66).

3. Conceptual Teaching: According to Pollock (1971), conceptual teaching is:

> the planned arrangement of learning opportunities that afford the learner the kinds of perceptions that logically result in groupings of facts, which in turn lead to new groupings at increasingly higher levels of generalization, and ultimately to the concept (p. 285).

4. Motor Skill Learning

Learning is "the relatively permanent change in behavior due to experience or training" (Hilgard and Marquis, 1961, p. 2).

Motor skill learning "is the integration of movements into a pattern for some purpose" (Hilgard and Marquis, 1961, p. 2).

According to Robb (1972):

> Skill learning refers to a change in effector behavior which occurs as a result of practice. The resultant change in behavior will continue to be evident with each repetition of the skill, and is, therefore, consistent and more or less permanent (p. 7).

5. Kinesiological Concept -- Absorption of Force: Kinesiology is the study of the mechanics of human movement. Greenlee, Heitmann, Cothren, and Hellweg (1981) defined these terms in the following ways:

Kinesiology involves "understanding how the body moves and the effect that gravity, friction, and the laws of motion have on it" (p. xi). Conceptual learning in kinesiology is "to understand the 'how' and 'why' of efficient movement" (p. xi). To do this "one needs to know

the kinds of force, their origins, their effects, and how we can utilize them to our advantage" (p. xi). Absorption of force is an integral part of the knowledge base for concepts in kinesiology. The basic concept according to Greenlee, Heitmann, Cothren, and Hellweg (1981) is the following:

> The moving object should be slowed by increasing the distance through which the object moves after contact, and/or increasing the size of the area which is absorbing the force of the object (p. 28).

Students should understand that to absorb force one can "give" with the force to receive it over a greater distance.

6. Catching: Catching is a manipulative skill which involves the absorption of force of a moving object. Students should learn to catch a ball by increasing the distance over which the force of the ball is to be absorbed. These are the methods one can use to absorb force while catching a ball:

> 1. Reaching for the ball and 'giving' at the elbow and shoulder as the ball makes contact.
> 2. Bringing the ball and hands in toward the body.
> 3. Allowing the ball to come along the side of the body.
> 4. Having the body weight primarily over the forward foot when the ball contacts the hands and shifting the weight to the rear foot as the ball is brought in toward the body (Greenlee, Heitman, Cothren, Hellweg, 1981, p. 28).

7. Practice Style of Teaching Physical Education: In the practice style the teacher explains what to do and shows a level of intended performance. Then the class is presented with a task or tasks to practice. During this

execution phase the students are permitted some control in setting their pace, duration, quality, and quantity of performance. The role of the teacher is to present the tasks, observe the performances of the students, and offer feedback to the students (Mosston, 1981).

8. Guided Discovery Style of Teaching Physical Education: Guided discovery is an indirect method of teaching which proceeds from the general to the specific. (This is a process of convergent thinking.) The teacher arranges a sequence of problems which, when solved, lead to a particular response. When solving a problem or problems, the learner is obliged to make cognitive responses as well as motor. Guided discovery infers teacher assistance through questioning, cueing and designing steps that will aid the student in reaching the planned learning goal (Mosston, 1981).

CHAPTER II

REVIEW OF LITERATURE

The present emphasis in educational literature is on teaching the basic concepts of the disciplines. The conceptual approach is applied to the development of programs, units, lessons and methods of instruction.

Theories of Learning and Development

Methods of teaching are derived from theories of learning. According to Robb (1972), physical educators generally use instructional methods based on a combination of association and cognitive learning theories. Association theories explain learning in terms of the responses made to stimuli, emphasizing the connection of the stimuli to the response and the reinforcement of the response. An example in physical education is learning a sports skill by trial and error. In contrast, cognitive theories view learning as "a process through which the learner discovers and understands relationships" (Robb, 1972, p. 24). Experiences in one's environment result in changed perceptions and new insights. In physical education, teaching game strategies is often approached using cognitive methods of instruction.

Jean Piaget's work on cognitive development was based on the idea that one understands reality by cognitively structuring it into concepts. Knowledge is "a construction resulting from the child's actions" (Wadsworth, 1984, p. 22). Mental and physical actions determine how knowledge is constructed into intellectual concepts. Learning results from actively exploring and manipulating the world.

Developmental and learning theories suggest the need for elementary age children to understand the concepts of subjects through concrete experiences. According to Piaget (Wadsworth, 1984), cognitive development is a process that takes place in phases. Between the ages of seven and eleven, most children are in the period of concrete operations. They are developing logical thought processes that can be applied to concrete problems. Abstractions are not meaningful. During the period of concrete operations, children need to manipulate objects. This phase prepares the learner to be able to manipulate ideas in the next phase of development. Development proceeds from concrete experiences to the mastery of abstract concepts. This implies the need to provide elementary children with observable learning experiences rather than verbal abstractions.

Jerome Bruner's theory of learning suggested that the learning process should be designed to produce broad understandings of the structural concepts of subjects. This

would enable the student to learn relationships with other ideas, making knowledge useful. After learning a fundamental idea, it is related to others as the knowledge base goes through a process of "continual broadening and deepening" (Bruner, 1966, p. 17). The student is then able to apply the ideas and principles mastered. As the child becomes an adult, understandings mature. Bruner (1966) noted the need for elementary school teachers to provide concrete, intuitive learning experiences for children.

The learner acquires concepts in a variety of ways. Current instructional methods tend to stress forms of inquiry. According to Martorella (1972, p. 11) inquiry methods "refer to instructional settings in which students are encouraged to volunteer or arrive at inferences and implications from observed subject matter." Martorella drew parallels between inquiry processes and John Dewey's idea of "reflective thinking." In reflective thought, an individual is in a process of conceptualizing or "categorizing, organizing, and relating observations into an overall pattern, as well as inferring, and eventually verifying" (Martorella, 1972, p. 12). What was meaningless becomes meaningful. The process of learning a concept is "triggered by the confrontation and delineation of puzzling, disturbing, curious, or problematical situations" (Martorella, 1972, p. 12).

Inquiry and exploration methods are used by the learner to discover concepts. Both Bruner and Piaget included the idea of discovery in learning. Bruner viewed the discovery process as a means to increase the student's motivation to learn and enhance the memory of the idea discovered. Piaget theorized that learning is an "equilibration process" of moving from a state of not understanding to one of cognitive satisfaction (Wadsworth, 1984, p. 17).

In Theory of Cognitive Dissonance, Festinger (1957) proposed that an individual will endeavor to reduce cognitive dissonance. When a problem is presented, the resulting cognitive discomfort motivates the individual to seek a solution in order to achieve consonance. In his explanation of Festinger's theory, Mosston (1981) described it as a process in which the individual, motivated by the dissonance, used the cognitive process of inquiry to discover the solution. The result of discovery is cognitive acquiescence.

Impact of Learning Theories on Physical Education

The influence of Bruner and Piaget is evident in the cognitive structure of much elementary physical education curricula. The concepts of the discipline form the cognitive base of the curriculum. The content provides active experiences which facilitate conceptual learning.

Concepts are introduced to young learners and are reintroduced sequentially and with increasing complexity and abstraction throughout the students' education. The conceptually-organized curriculum recognizes that what students need from physical education is to understand the bases for effective movement. The purpose of teaching concepts is to develop "a meaningfully physically educated individual" (Seidel, Biles, Figley, and Newman, 1980, p. 8).

Another result of the cognitive orientation is a focus on the discovery process. In elementary physical education pedagogy, instructional approaches which stimulate students to inquire, explore and create are advocated. The direct method of teaching is yielding to indirect, conceptually-oriented emphases. Lessons that elicit both movement and cognitive responses from students produce active learning. Present movement education programs emphasize problem solving and creativity. Teachers use this problem-solving approach to guide the child as "he explores, discovers, and uses space, time, force, and flow to move within his unique physical environment" (Rekstad, 1969, p. 39). The focus is on individual involvement and inquiry to enhance understanding of effective and efficient movement.

Mosston's theory of teaching addresses the need for discovery learning in physical education. His "Spectrum of Teaching Styles" included some styles that emphasize

cognitive involvement and invoke the process of inquiry, based on Festinger's theory. According to Mosston (1981), in the guided discovery teaching style students use a convergent thinking process to discover and understand principles and concepts of physical education.

> The discovery of these principles and concepts by the learner creates a more complete understanding of the activity, and this understanding provides the learner with the tools and motivation for further search, for broader learning and better performance. This level of insight and comprehension can be reached only through cognitive involvement (Mosston, 1981, p. 181).

Cognitive Concepts in Motor Skill Learning

Physical educators should struture learning experiences that enhance the performance and understanding of motor skills. The physically educated person should be able to analyze movement, apply mechanical concepts and principles to new learning and movement problems and use them to improve skill performance. Robb (1972) described an example of motor skill learning. A student wanted to increase the distance he could throw a ball. He used information provided in instruction and practice to learn to release the ball at a forty-five degree angle. By learning a different throwing pattern, he increased the distance he could throw. The improvement in his performance was evidence that he had learned.

Motor skill learning takes place in phases. Fitts (1962) identified these phases as cognitive, fixation and automatic. The purpose of the initial phase is for the learner to understand the movements to be done. In the later stages there is less cognitive involvement as the learner "transforms mental images into corresponding executive motor acts" (Jokl, 1966, p. 17). The effective teacher selects instructional methods appropriate for the learner's stage. It is theorized that the cognitive phase of skill learning should include the discovery of the movement concepts. Understanding the concepts of the skill is critical in order for learning to be meaningful. This is supported by the evidence of the importance of cognitive functions in motor skill acquisition. Lindquist (1972) found that the learning of a motor skill included the cognitive processes of "labelling, concept formation, and the application of principles" (p. 80).

Conceptually-Based Curricula

There are a variety of ways that the vast body of knowledge in physical education has been organized. Several books have been written that present conceptual approaches to teaching physical education. One example is the previously discussed Basic Stuff series. In this approach, the concepts to be learned are derived from physical

education subdisciplines. The following are other examples of conceptually-based curricula:

1. Gallahue, Werner, and Luedke (1975) designed a preschool-elementary physical education curriculum centered on movement and academic concepts. Goals of this program are the development of movement abilities along with cognitive abilities. In their book, A Conceptual Approach to Moving and Learning, they focused on the concepts that are a part of learning to move and learning through movement.

2. Corbin, Dowell, Lindsey and Tolson (1978) published Concepts in Physical Education: With Laboratories and Experiments. It includes twenty concepts derived from the physical education body of knowledge. It was designed to develop understanding and appreciation in college-level students.

3. Seidel, Biles, Figley and Newman (1980) attempted to integrate objectives from cognitive, affective and psychomotor learning domains through physical activities. In their book, Sports Skills: A Conceptual Approach to Meaningful Movement, the authors presented a concepts approach to teaching sports skills in order to emphasize intellectual understandings of movement.

Concepts Programs in Physical Education

There are a variety of ways to apply the conceptual approach to teaching physical education. The following are examples of concepts implemented in units and lessons:

1. John Hinds (1971), a coach and teacher, described a discovery approach to teaching understanding of the mechanics of movement. The students' self-awareness of movement is developed as they perform a specific movement several times using different techniques. They then decide how the body best works to provide effective movement. Hinds claimed that principles and concepts of sports skill performance are discovered using this approach.

2. Hartman and Clement (1973) described the conceptual emphasis of the Ohio Curriculum Guide Committee. The guide focused on the cognitive, affective and psychomotor learning domains, defining each in terms of physical education concepts. Subconcepts categorized in the areas of mechanics, physiology, psychology and sociology were identified and related to movement. The guide encouraged teachers to develop units and lessons which incorporate knowledge which gives meaning to movement.

3. At Bush School, Seattle, Washington, an innovative physical education program was implemented in 1973 (Lawson and Lawson, 1977). Instruction included skill training and a knowledge base for understanding performance. The intent

was to "enable students to learn how to learn" (Lawson and Lawson, 1977, p. 38). The program for grades six to nine introduced the knowledge base. Then, two types of elective classes were offered. Activity classes offered skills instruction and theory classes furthered the knowledge base.

4. Bowling Green, Ohio, physical education teacher Lori Stefoff designed a program that incorporates progressions from one unit to the next and from one grade level to the next (Sakola, 1982). Major concepts are developed as the tasks in each unit are presented in a progression. Concepts are broadened and deepened in each successive grade level. According to Sakola (1982), by relating new units with previous ones, the students are better able to understand and retain information and skills.

5. At the Pierce Terrace Elementary School in Fort Jackson, Columbia, South Carolina, the curriculum includes units organized around concepts common to physical education and music (Werner, 1982). Physical education teacher Tommie Bowling and music teacher Karen Delgado both teach a specific concept simultaneously. Concepts taught include space, force, time and rhythm.

6. At Seattle Preparatory School, teacher Dick Sandstrom developed a three-year physical education program (Placek, 1983). The ninth grade curriculum is organized into units which present concepts related to sports. Tenth and eleventh grade students select activities. The emphasis

is on using and increasing knowledge and understanding of the physical activities being learned.

7. At Westwood High School in Omaha, Nebraska, teachers Linda Adamski and Doug Adams have implemented a physical education program which teaches the effects of physical activity (Stewart, 1983). The program for tenth graders includes a one hour per week lecture developing concepts in such topics as stress and relaxation, individual exercise prescription and kinesiology. There are two activity classes each week which promote the development of skills and fitness.

The Effects of Concepts Programs

Two investigations into the effects of concepts programs were found in the literature. Both had positive results concerned with providing information about physical activities.

In 1968-69, Drake University conducted a study on an elementary physical education curriculum based on concepts (Shadduck, 1970). It was entitled "The Development, Implementation, and Evaluation of Teaching-Learning Materials Based on a Conceptual Approach to Physical Education." The purpose of the project was to identify cognitive and psychomotor concepts which form the basis for developing further learning experiences. Two conceptual units were taught to Johnston Elementary School kindergarten

students, who were assigned to experimental and control groups. Five different types of tests were administered. Shadduck (1970) reported positive results from the conceptual approach. The experimental group showed significant improvement in knowledge and skill development.

Slava, Laurie and Corbin (1984) studied the effects of a college level physical education concepts course designed to provide information about exercise and physical fitness. College graduates were evaluated with a questionnaire on attitudes, knowledge and activity behaviors. The three groups who were compared were those who had completed a physical education lecture-laboratory course, those who had had a traditional physical education course and those who "quizzed out" of the concepts course. Results showed that knowledge contributed the most to differences between the concepts-course group and traditional-course group. In general, the conclusion was that "a college level conceptual physical education class can have positive long term effects" (Slava, Laurie and Corbin, 1984, p. 181).

The Effects of Learning Mechanical Principles

The assumption that a knowledge of kinesiological or mechanical principles would facilitate motor skill learning has been investigated. These studies have provided

conflicting results. Some of the findings support the assumption and some do not.

Hendrickson and Shroeder (1941) found that knowledge of the theory of refraction enhanced learning to use an air gun to shoot at underwater targets. In their experimental study, eighth grade boys were presented with two problems. First, subjects had to practice shooting at targets which were submerged to a depth of six inches. Then the depth of the target was changed to two inches. The experimental group received instruction in the theory of refraction prior to performing the tasks. The researchers found that knowledge of the refraction theory facilitated initial learning and transfer to the second problem. They reported that, in many subjects, the explanation of the theory enhanced the individual's discovery of the solution. However, it should be noted that the focus of this study was on the subject's knowledge and use of the principle of refraction rather than on skill learning. Although shooting at a target is a motor skill, the actual task was to discover where to aim.

Daughtrey (1945) found considerably more improvement in skill performances in classes that followed a kinesiologically planned program compared to classes that followed an elective program. Junior high school boys participated in one of two physical education programs for a three-month period. In the organized group, principles of kinesiology

were applied to instruction and activities. Subjects in the elective group selected activities and practiced them on their own. The researcher concluded that kinesiological teaching of skills improved the performance of learners.

Colville (1957) found no evidence that understanding and applying principles facilitated learning of motor skills. College women participated in experiments designed to investigate performance of three selected motor skills. Subjects in the control group participated in learning and practicing the skill. The subjects in the experimental group learned about the principle pertinent to the skill in addition to learning and practicing it. The total amount of time spent by both groups was the same. General findings were that similar learning took place in both groups. There was no evidence that instruction in mechanical principles facilitated the initial learning of the skill more than an equal amount of time spent in practicing the skill. Moreover, there was no evidence that knowledge of the principle facilitated the learning of a similar or more complicated skill in which the same principle was applicable.

Werner (1972) compared the effects of physical education lessons that were integrated with the concept of levers to the effects of lessons that did not integrate the concept on the performance of softball throw and soccer ball kick. Fourth, fifth and sixth grade students were

participants in a two-week learning program. All were instructed in the lever concepts by the science teacher and all took part in physical education. The physical education instruction for the experimental group integrated the science concepts of levers. Results showed that the experimental group showed a greater increase in performance for both skills with the difference between groups on the softball throw being statistically significant. Conclusions were that integrating physical education instruction with the concept of levers facilitated learning to throw a softball and was equally as effective as the non-integrated instruction in learning to kick a soccer ball.

Summary

The abundance of conceptually-based physical education programs in the literature overshadows the lack of research on the educational effects of such programs. Results of several investigations of concepts programs have shown positive effects on the development of skill and knowledge. However, research has shown that a motor skill can be learned without knowledge of kinesiological principles. The function of cognitive processes in skill development is not fully understood. There is a need to investigate the effects of concepts programs on the development of knowledge, understanding and skills.

CHAPTER III

METHODS AND PROCEDURES

The primary purpose of this study was to compare the effects of selected physical education teaching styles on the learning of a kinesiological concept by second grade children. A second purpose was to determine the possible effects of the pretest on learning the concept. This chapter describes the subjects, procedures, tests, lessons and design that were utilized during the study.

The Subjects

The subjects were second grade students who attended selected elementary schools in Shawnee, Oklahoma, and Stillwater, Oklahoma. Second grade classes from Jefferson and Sequoyah Elementary Schools in Shawnee and Skyline and Westwood Elementary Schools in Stillwater participated in the study during February and March, 1986. Fourteen second grade classes with fifteen to twenty-five students each were included. Permission slips were sent to the parents of each subject prior to the study (see Appendix B). Only one parent chose to exclude his child from the study.

Procedures

In this study, each class was randomly assigned to one of two treatment groups: practice style experimental group and guided discovery style experimental group. It was necessary to keep each class intact since the treatments were lessons taught to entire classes. The classes were numbered from one to fourteen, and seven numbers were drawn, one at a time from the set of fourteen, to determine the classes in the practice style group. The remaining seven classes were placed in the guided discovery style group. Half of the practice style group and half of the guided discovery style group were randomly selected to take pretests. The same assignment procedure was followed by drawing four numbers from the set of numbers one to seven. Since there were seven classes to be divided, a random half of the fourth class drawn was assigned to be pretested. This procedure resulted in the following four groups: practice style group-pretest, practice style group-no pretest, guided discovery style group-pretest and guided discovery style group-no pretest (see Table I).

The investigator administered the tests and taught the lessons during regularly scheduled physical education class periods (see Appendixes C, D and E). For each class, two consecutive class periods were used. The pretest and first catching lesson were given during the first class period. The second catching lesson and post tests were given

during the second class period. The length of time between class periods for each class varied from two to five days. The schedule for each class appears in Table II.

TABLE I

ASSIGNMENT OF CLASSES TO GROUPS

	PRETESTED	NOT PRETESTED
PRACTICE STYLE	Jefferson #3 Jefferson #4 Sequoyah #2 Westwood #1 (1/2)	Jefferson #2 Skyline #3 Skyline #4 Westwood #1 (1/2)
GUIDED DISCOVERY STYLE	Westwood #3 Westwood #4 Skyline #2 Westwood #2 (1/2)	Jefferson #1 Sequoyah #1 Skyline #1 Westwood #2 (1/2)

TABLE II

SCHEDULE FOR CLASSES

CLASS	TIME	TEACHING STYLE	FIRST CLASS PERIOD	SECOND CLASS PERIOD
Jefferson #1	- 10:10-10:40	Guided Discovery	2/24	2/28
Jefferson #2	- 12:15-12:45	Practice	2/24	2/28
Sequoyah #1	- 1:00-1:30	Guided Discovery	2/24	2/28
Jefferson #3	- 10:10-10:40	Practice	3/3	3/7
Jefferson #4	- 12:15-12:45	Practice	3/3	3/7
Sequoyah #2	- 1:00-1:30	Practice	3/3	3/7
Skyline #1	- 1:40-2:05	Guided Discovery	3/17	3/19
Skyline #2	- 2:05-2:30	Guided Discovery	3/17	3/19
Skyline #3	- 1:40-2:05	Practice	3/18	3/20
Skyline #4	- 2:05-2:30	Practice	3/18	3/20
Westwood #1	- 1:05-1:35	Practice	3/21	3/26
Westwood #2	- 1:35-2:05	Guided Discovery	3/21	3/26
Westwood #3	- 2:25-2:55	Guided Discovery	3/21	3/26
Westwood #4	- 2:55-3:35	Guided Discovery	3/21	3/26

The Pretest and Post Test Examinations

The tests were designed by the investigator to evaluate learning of the concept of absorbing force while catching a ball. The tests were six-question, multiple-choice examinations. For each question there were three possible responses. Each response was a picture of a boy demonstrating a specific technique for catching a ball. The questions focused on selecting the correct positions of arms, elbows, hands, fingers, body, legs and feet for absorbing the force of a ball (see Appendix E).

The pretest was given to half the practice style group and to half the guided discovery style group. It was given by the investigator at the beginning of the first physical education class period for each class. The students were instructed by the investigator to select the picture of the boy who is using the correct technique for absorbing the force of the ball he is catching. Prior to the students selecting a response at each question, the investigator rephrased the question in terms of the body part focused on in the question. For example, for question number one the instruction was, "Select the picture of the boy who is using the correct arm and elbow position for absorbing the force of the ball he is catching." The test was not returned or discussed with the students following the pretest.

The post test was given by the investigator to all classes at the end of the second physical education class period for each class. The post test consisted of the pretest questions arranged in a different order. The order of the responses for each question was also changed. The pretest procedures and instructions were followed for the post test.

Validity and Reliability of Testing Instrument Used for Evaluation of Study

Validity is the degree to which the test measures what it purports to measure (Borg and Gall, 1983). Validity of the testing instrument was demonstrated in the following ways.

Content validity is the degree to which the test items represent the content that the test is designed to measure. The test appears to be valid in that it covers the basic subject matter presented to both experimental groups. Subjective validity was demonstrated in the construction of the test. Multiple choice questions were constructed based on the material covered in the physical education lessons for both groups.

The purpose of the test was to measure the extent to which second graders understood the concept that to absorb the force of a ball being caught one needs to increase the

distance through which the ball moves after contacting the hands. Use of carefully designed pictorial responses demonstrated test validity in that students could select from three pictures the one that showed the correct catching method for absorbing the force of the ball. It was assumed that the selection made was based on the understanding that the ball would be received over the greatest distance possible. It was also assumed that pictorial responses were the most valid measures of the second graders' learning. Written responses would be affected by the student's reading level; oral responses would be affected by vocabulary and ability to express one's self; and demonstrations would be affected by motor skill level.

Content validity is demonstrated when the sample of test questions represents the parts of the content in appropriate proportion. A comparison of the six test questions with the content of the lessons showed that the questions covered every objective of the lessons.

Content validity is important in tests used in experiments involving two different treatments. The test was equally valid for both treatment groups in that the objectives for both were the same. The subject matter (i.e., correct techniques for catching a ball in such a way as to absorb its force) was the same for both groups. The treatment difference was the method of presenting the information, including the type of activities used to facilitate the learning.

The pretest was submitted to a committee of judges. They were the following: Mrs. Leesa Adams, Mr. Byron Monroe and Dr. Linda McElroy, elementary physical education teachers; and Mrs. Francis Blakemore and Mrs. Kathy Jolie, second grade teachers. They examined the test questions for structure, content, clarity and appropriate level. Upon recommendations and approval of the committee, the pretest and post test were completed for use in the study.

Reliability of the tests was determined by the alternate form method. In February, 1986, the tests were administered to second grade students at Sangre Ridge Elementary School in Stillwater, Oklahoma. Twenty-nine students took the pretest form and sixteen students took the post test form. Exactly two weeks later, the students were tested again under the same conditions, taking the alternate form of the test they had taken previously. The scores on the two forms were correlated to determine the degree to which the students consistently responded to the test questions. A Pearson product moment correlation was used to determine the reliability coefficient. The results showed a high correlation coefficient of .76, which represents a measure of stability over time and ranks in the "high" category for reliability estimates for this type of test.

The Lessons

Each group participated in two physical education lessons designed and taught by the investigator. The first lesson for both groups focused on catching balls with the hands. The second lesson for both groups focused on catching balls with a scoop.

The objectives of the lessons were the following:

Upon completion of the catching lessons the student should be able to identify the correct positions of the following parts of the body for absorbing the force of a ball that (1) one is preparing to catch and (2) one is catching:

(a) arms and elbows

(b) hands and fingers

(c) feet and legs

(d) body lean

The two lessons taught in the practice style had the following characteristics:

(1) The terms "force" and "absorbing the force of a ball" were discussed.

(2) The investigator explained and demonstrated the correct techniques for catching a ball.

(3) The phrase "look, reach and give" was used to identify the phases of catching.

(4) Students were given a variety of tasks in which they practiced catching balls (see Appendix C).

The two lessons taught in the guided discovery style had the following characteristics:

(1) The terms "force" and "absorbing the force of a ball" were discussed.

(2) The investigator did not explain and demonstrate the correct techniques for catching. Instead, a series of experiments were presented in which students were asked to catch using different techniques.

(3) Students were asked to compare two techniques and select the one that was correct or worked best. Students were encouraged to think about why they chose a particular technique and what the difference was between the two.

(4) The investigator did not tell the answers but provided questions and tasks that caused the students to experiment until they found the correct technique (see Appendix D).

Design and Statistical Analysis

The purpose of this investigation was to determine if there was any statistically significant difference on post test scores between four groups of students, in which half of each of the two treatment groups were pretested. The design used was a modification of the Solomon four-group design (Campbell and Stanley, 1970). This factorial design requires random assignment of subjects to experimental and control groups. A random half of each group is pretested,

and all subjects are post tested. The result is four groups. The four post test scores were analyzed with a two-way analysis of variance. The results assessed the main effect of the treatments, the main effect of pretesting and the interaction between pretesting and treatment conditions. The .05 level of significance was established as the level of acceptance or rejection of the hypotheses. The statistical computations were carried out using the IBM 3081D computer and the SPSSX statistical computing programs at Oklahoma State University.

CHAPTER IV

RESULTS AND DISCUSSION

This chapter presents the statistical data relative to the hypotheses of the study. It contains the following sections: (a) design of the study, (b) reliability of the instrument, (c) statistical analysis of data according to teaching style, pretesting, and interaction between teaching style and pretesting and (d) discussion of results.

Design of the Study

The primary purpose of the study was to compare the effects of the practice and guided discovery physical education teaching styles on the learning of the concept of absorption of force by second grade children. A second purpose was to determine the possible effects of the pretest on learning the concept. A Solomon four-group design was used to analyze the data. It permits the determination of the effect of the treatments and the effects of the pretest on the post test results. If the experimental and control groups are pretested, the results might be different than if a pretest was not administered (Borg and Gall, 1983). The pretest might affect post test scores by providing an

opportunity for the subjects to think about the content. It might also affect the experimental group by sensitizing the subjects to the treatment content. Since the control group does not receive the experimental treatment, it is not sensitized by the pretest.

According to Campbell and Stanley (1970), the Solomon four-group design is as follows:

		Pre-test		Post Test
Group 1.	R	O_1	X	O_2
Group 2.	R	O_3		O_4
Group 3.	R		X	O_5
Group 4.	R			O_6

R = random assignment
X = experimental treatment
O = observation

Subjects are randomly assigned to four groups in which two factors, treatment and pretest, are systematically varied. Groups one and three are experimental groups but only group one is pretested. Groups two and four are control groups but only group two is pretested. If the post test scores of the pretested groups (one and two) are higher than the post test scores of the nonpretested groups (three and four), then the pretest invokes a practice effect. If there is a greater difference on post test scores between the experimental groups (one and three) than between the control groups (two and four), then there is a sensitization effect.

That is, the pretest interacted with the treatment of the experimental group but not the control group, resulting in facilitating the learning of the experimental group.

In this investigation four groups of students were identified and arranged in a Solomon four-group design. Classes of students were randomly assigned to either the practice style or guided discovery style group. Half of the practice style classes and half of the guided discovery style classes were randomly selected to be pretested. The result was the following four groups: practice style-pretest, practice style-no pretest, guided discovery style-pretest and guided discovery style-no pretest.

Reliability of the Instrument

The reliability of the testing instrument reflects the extent to which it is free from error variance (Borg and Gall, 1983). The test must be a reliable measure of the true differences rather than chance differences among the students in assessing their knowledge of the concept of absorbing force while catching a ball. To determine the reliability coefficient, two parallel forms of the test were administered to second grade physical education classes at Sangre Ridge Elementary School, Stillwater, Oklahoma. The test forms were developed by the investigator for evaluating achievement of second grade children. Since the

test forms were nearly identical, the second form was administered exactly two weeks after the first form. The purpose of the two-week interval was to reduce the practice effect. Forty-five students completed both tests. The testing was arranged so that twenty-nine students took the pretest form first and the post test form last. For sixteen students the order was reversed so that the post test form was taken first and the pretest form was taken last. The testing procedures, conditions and instructions were the same for both administrations.

The coefficient of equivalence was determined by correlating the scores obtained on the two forms in order to yield a reliability coefficient. A Pearson product-moment correlation was used. The results produced a .76 reliability coefficient.

Statistical Analysis

The pretest was regarded as an experimental variable and arranged with the teaching style variable in a two by two analysis of variance factorial design (Campbell and Stanley, 1970). The first variable, teaching style, consisted of (1) practice style and (2) guided discovery style. The second variable, pretest, consisted of (1) pretest administered and (2) pretest not administered. The post test was used as the dependent variable. Raw scores were expressed as the percentage of correct responses on the post test instrument.

Table III shows the mean scores and standard deviations for each treatment group. It also presents overall row means and column means. Each row mean represents the average score for the combined groups of the corresponding teaching style, disregarding whether or not a pretest was administered. Each column mean represents the average score for the combined groups of the same pretest condition, disregarding which teaching style was used.

TABLE III

SUMMARY OF POST TEST KNOWLEDGE SCORE
MEANS AND STANDARD DEVIATIONS

	PRETEST		
TEACHING STYLE	PRETEST	NO PRETEST	ROW MEAN
Practice	81.1 18.46 (N = 53)	79.3 20.36 (N = 71)	80.1 19.52 (N = 124)
Guided Discovery	88.0 14.60 (N = 67)	86.0 14.74 (N = 62)	87.1 14.71 (N = 129)
Column Mean	85.0 16.75 (N = 120)	82.4 18.22 (N = 133)	

The results of the two by two analysis of variance are presented in Table IV. The main effect of teaching style was statistically significant. The calculated F of 9.732 is greater than the tabled F of 6.76 that was needed to be statistically significant at the .01 level of confidence. Therefore, the guided discovery style mean of 87.1 was significantly greater than the practice style mean of 80.1. Neither the main effect of the pretest nor the interaction effect was statistically significant. The calculated F of 0.765 for the main effect of the pretest is less than the tabled F of 3.89 that was needed to be statistically significant at the .05 level of confidence. The calculated F of 0.002 for the interaction effect between the treatment and the pretest is less than the tabled F of 3.89 that was needed to be statistically significant at the .05 level of confidence.

TABLE IV

2 X 2 ANALYSIS OF VARIANCE OF POST TEST KNOWLEDGE SCORES

Source	SS	df	MS	F
Teaching Style	2904.179	1	2904.179	9.732*
Pretest	228.171	1	8.171	0.765
Teaching Style by Pretest	0.731	1	0.731	0.002
Residual	74304.302	249	298.411	
Total	77615.328	252	307.997	

*p < .01

Discussion

The data from the study revealed a significant difference between the practice teaching style and the guided discovery teaching style in their effect on learning concepts. On the post test assessment of knowledge of the concept of absorption of force, students who were taught catching skills with the guided discovery style scored significantly higher than students who were taught the same catching skills with the practice style. This finding supports the assertion by Mosston (1981) that the learner

must be cognitively involved in a discovery process in order to internalize concepts. This indicates that physical education teachers should incorporate guided discovery teaching techniques into lessons that are designed to teach the basic concepts of the discipline.

The analysis of data with regard to the effects of pretesting did not prove to be significant. This indicates that the effects of the pretest on the post test scores was not significantly different for the practice style and guided discovery style groups. Also, since the pretest and teaching style variables did not interact significantly, the pretest did not sensitize the students to the treatment. The effectiveness of the treatment did not vary with regard to whether or not the students had been pretested.

The finding of no significant interaction between teaching style and pretesting strengthens the significance of the difference between teaching style effects. Since pretesting and teaching style did not operate together, the main effect of each variable is distinguishable, with the teaching style effects being significantly different. These results suggest that pretest practice and sensitization effects are not serious concerns in this study.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Summary

The primary purpose of this study was to determine if there was a statistically significant difference on post test knowledge scores between two groups of second grade students who were taught catching skills with either the practice teaching style or guided discovery teaching style. Knowledge of the concept of absorption of force was determined from scores obtained from a specially designed pictorial test. A second purpose of the study was to determine the possible effects of the pretest on learning the concept.

Fourteen second grade physical education classes with a total of 253 students attending selected elementary schools in Shawnee and Stillwater, Oklahoma, were randomly assigned to either the practice teaching style group or guided discovery teaching style group. Each group participated in two lessons on catching skills taught according to the specific style and was administered a post test, developed by the investigator. Half of the classes in each group were

randomly selected to take a pretest, which was an alternate form of the post test. There were 124 students in the practice style group and 129 students in the guided discovery style group. The pretest was administered to 120 students and was not administered to 133 students.

Findings

The data collected in this study were analyzed and yielded the following findings:

Hypothesis I: There will be no statistically significant difference between the guided discovery style group and practice style group for all physical education classes combined when their post test scores are compared. Hypothesis one was rejected as a significant difference in post test scores was found between the guided discovery style group and the practice style group, guided discovery style group having higher scores in knowledge of the concept of absorbing force while catching.

Hypothesis II: There will be no statistically significant difference between the pretested group and the nonpretested group for all physical education classes combined when their post test scores are compared. Hypothesis two was accepted as there was no significant difference between the post test scores of the pretested and nonpretested groups.

Conclusions

Results of the analysis indicated that the guided discovery teaching style produced greater learning of the concept of absorbing force. Students who were taught with the guided discovery style scored higher on a test of knowledge of the concept than students who were taught with the practice style. Taking a pretest did not change the effect of the lessons on post test results.

Recommendations

The effects of two teaching styles on the learning of a concept were examined and the guided discovery teaching style was superior in regard to post test knowledge scores by students exposed to either style. With reference to the purpose, methods, procedures and results of this study the following recommendations for possible use of the findings are offered:

The sample group should be expanded to include other grade levels. This would allow a more complete investigation of the learning of physical education concepts by students who are at various phases of cognitive development.

The experimental treatment should include other teaching styles. In reviewing teaching styles identified by elementary physical education curriculum authors, this

author recommends that the following teaching styles be investigated: reciprocal, peer teaching, self-check, inclusion, problem solving and self-instruction (Mosston, 1981; Dauer, 1983; and Rink, 1985).

The learning experience could be expanded in several ways. One suggestion is that a single concept should be included in a series of lessons. Another possibility is to incorporate two or more related concepts into the content of the lessons. A third suggestion is to include one or more of a variety of concepts, some basic and some complex, from physical education subdisciplines other than kinesiology. The Basic Stuff Series I (1981) identified concepts from six subdisciplines that could be included. These subdisciplines include exercise physiology, motor learning, psycho-social aspects of physical education, humanities in physical education and motor development. Finally, the application of basic concepts to new learnings could be investigated.

The method of evaluating knowledge of concepts could be expanded. The dilemma is how to evaluate cognitive learning in activity-centered classes. Written tests seem to be the most efficient means of evaluation. There should be investigations of different types of written tests, oral tests and demonstrations for their effectiveness at specific grade levels.

Long-term retention of concepts should be investigated. this would provide determination of the extent to which previously covered concepts should be reviewed.

The study should be replicated with the regular physical education teachers instructing the lessons and administering the tests. These teachers would need to receive training in each teaching style. This would control for the reaction effects of the students to being in an experimental situation.

Future research would be desirable to negate or substantiate the findings of this investigation. The use of the guided discovery teaching style to facilitate the learning of physical education concepts has a researched basis for justification as a result of this study. This study should encourage physical education instructors to explore the use of this style of teaching when their purpose is to convey physical education concepts. It is not suggested that the guided discovery style should be used for all teaching situations. However, it should be considered as a more effective style than the practice style for teaching concepts.

A final recommendation is to develop a list of sequential and progressive physical education concepts for the entire curriculum from kindergarten to grade twelve. The concepts should be arranged in a spiral hierarchy so

that basic concepts are taught in the lower grades and sequentially increase in complexity and abstraction as students mature.

SELECTED BIBLIOGRAPHY

American Alliance for Health, Physical Education, Recreation and Dance. Knowledge and Understanding in Physical Education. Washington D.C.: AAHPERD, 1969.

Bain, Linda L. and Hally B. W. Poindexter. "Applying Disciplinary Knowledge in Professional Preparation." Journal of Physical Education and Recreation, February, 1981, p. 40-41.

Borg, Walter R. and Meredith D. Gall. Educational Research: An Introduction. Fourth Edition. New York: Longman Inc., 1983.

Bruner, Jerome S. The Process of Education. Cambridge: Harvard University Press, 1966.

Bunn, John William. Scientific Principles of Coaching. Second Edition. Englewood Cliffs, New Jersey: Prentice-Hall, 1972.

Campbell, Donald T. and Julian C. Stanley. Experimental and Quasi-Experimental Designs for Research. Chicago: Rand McNally & Company, 1970.

Colville, F. M. "The Learning of Motor Skills as Influenced by Knowledge of Mechanical Principles." Journal of Educational Psychology, Vol. 48, October, 1957, p. 321-332.

Corbin, C. G.; L. Dowell; R. Lindsey; and H. Tolson. Concepts in Physical Education with Laboratories and Experiments. Dubuque, Iowa: William C. Brown Company, Publishers, 1978.

Dauer, Victor P. and Robert P. Pangrazi. Dynamic Physical Education for Elementary School Children. Seventh Edition. Minneapolis, Minnesota: Burgess Publishing Company, 1983.

Daughtrey, Greyson. "The Effects of Kinesiological Teaching on the Performance of Junior High School Boys." Research Quarterly, Vol. 16, March, 1945, p. 26-33.

Festinger, Leon. A Theory of Cognitive Dissonance. Stanford, California: Stanford University Press, 1962.

Fitts, Paul Morris. "Skill Learning." Categories of Human Learning. Ed. A. Melton. New York: Academic Press, 1964, p. 244.

Gagne, Robert M. and Leslie J. Briggs. Principles of Instructional Design. Second Edition. New York: Holt, Rhinehart and Winston, 1979.

Gallahue, David L.; Peter H. Werner; and George C. Luedke. A Conceptual Approach to Moving and Learning. New York: John Wiley and Sons, Inc., 1975.

Greenlee, Geraldine; Helen Heitmann; Barbara Cothren; and Delores Hellweg. Basic Stuff Series I: Kinesiology. Reston, Virginia: American Alliance for Health, Physical Education, Recreation and Dance, 1981.

Hartman, Betty and Annie Clement. "Adventure in Key Concepts." Journal of Health, Physical Education and Recreation, March, 1973, p. 20-22.

Hendrickson, Gordon and William H. Shroeder. "Transfer of Training in Learning to hit a Submerged Target." The Journal of Educational Psychology, Vol. 32, No. 3, 1941, p. 205-213.

Hilgard, Ernest R. and Donald G. Marquis. "Generalization." Conditioning and Learning. Revised by Gregory A. Kimble. New York: Appleton-Century-Crofts, Inc., 1961, p. 2-3.

Hinds, John Jr. "Body Orientation: A Workable Technique for Self-Discovery." Journal of Health, Physical Education and Recreation, Vol. 42, No. 1, 1971, p. 44, 57.

Jokl, Ernst. "The Acquisition of Skill." Quest, Monograph VI, Spring Issue, 1966, p. 11-25.

Lawson, Hal and Barbara Lawson. "An Alternative Program Model for Secondary School Physical Education." Journal of Physical Education and Recreation, February, 1977, p. 38-39.

Lindquist, Edith L. "The GSPS Model: A Program for Skill Acquisition." Quest, Monograph XVIII, Winter Issue, January, 1972, p. 74-81.

Martorella, Peter H. Concept Learning: Designs for Instruction. Scranton, Pennsylvania: Intext Educational Publishers, 1972.

Mosston, Muska. Teaching Physical Education. Second Edition. Columbus, Ohio: Charles E. Merrill Publishing Company, 1981.

Piaget, Jean. "The Genetic Approach to the Psychology of Thought." Journal of Educational Psychology, Vol. 52, No. 6, 1961, p. 275-281.

Placek, Judith H. "A Conceptually-Based Physical Education Program." Journal of Physical Education, Recreation and Dance, Vol. 54, No. 7, 1983, p. 27-28.

Pollack, Marion B. "Speaking of Concepts." The Journal of School Health, Vol. 42, No. 6, 1971, p. 283-286.

Rekstad, Mary E.; James Miller; and Edwin Lanehart. "Promising Practices in Elementary School Physical Education." Journal of Health, Physical Education and Recreation, Vol. 40, No. 1, 1969.

Rink, Judith E. Teaching Physical Education for Learning. St. Louis, Missouri: Times Mirror/Mosby College Publishing, 1985.

Robb, Margaret D. "Man and Sports . . . the Acquisition of Skill." Quest, Monograph XIII, Winter Issue, January, 1970, p. 50-55.

----------. The Dynamics of Motor Skill Acquisition. New Jersey: Prentice-Hall, Inc., 1972.

Rog, James A. "Viewpoint: Teaching and Textbooks." Journal of Physical Education, Recreation and Dance, February, 1981, p. 45.

Sakola, Sally Parent. "A K-6 Progression Built on Organizing Concepts." Journal of Physical Education, Recreation and Dance, September, 1982, p. 38-39.

Seidel, Beverly L.; Fay R. Biles; Grace E. Figley; and Bonnie J. Newman. Sports Skills: A Conceptual Approach to Meaningful Movement. Second Edition. Dubuque, Iowa: William C. Brown, Company, 1980.

Shadduck, Ione G. "Johnston Research Project -- A Curriculum Based on Concepts." The Physical Educator, October, 1970, p. 107-108.

Slava, Scott; David R. Laurie; and Charles B. Corbin. "Long-Term Effects of a Conceptual Physical Education Program." Research Quarterly for Exercise and Sport, Vol. 55, No. 2, 1984, p. 161-168.

Stewart, Michael J. "Implementing the Concepts Approach." Journal of Physical Education, Recreation and Dance, September, 1983, p. 31, 34.

Torbert, Marianne. Secrets to Success in Sport and Play. Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1982.

Wadsworth, Barry J. Piaget's Theory of Cognitive and Affective Development. Third Edition. New York: Longmen Inc., 1984.

Werner, Peter H. "Concept Teaching in Movement and Music." Journal of Physical Education, Recreation and Dance, Vol. 53, No. 7, 1982, p. 49, 48.

----------. "Integration of Physical Education Skills with the Concept of Levers at Intermediate Grade Levels." The Research Quarterly for Exercise and Sport, Vol. 43, No. 4, 1972, p. 423-428.

APPENDIXES

APPENDIX A

CORRESPONDENCE

STILLWATER PUBLIC SCHOOLS
314 S. Lewis
Stillwater, Oklahoma 74074
405-372-4577

OFFICE OF SPECIAL SERVICES

March 1, 1986

Ms. Leta Hicks
815 N. Main #9
Stillwater, Oklahoma 74074

Dear Ms. Hicks,

I have reviewed your request for research and find it to be acceptable. It is your responsibility to duplicate the parent permission form and distribute prior to your actual study. Please be sure that ample time has passed to allow parents to decline involvement.

Good luck with the completion of your dissertation study! I would like to have a copy of your results.

Sincerely,

Deborah Hahn

Dr. Deborah Hahn, State/Federal Programs

cc: Terry Hopper, Westwood Principal
Angie Cyr, Westwood Physical Education
Karen White, Sangre Ridge Principal
Dennis Cyr, Sangre Ridge Physical Education
Dr. O.D. Wikoff, Skyline Principal
Dr. Linda McElroy, Skyline Physical Education

RESEARCH REQUEST/PROPOSAL

1. PURPOSE OF INTENDED STUDY

The purpose is to study the effects of teaching styles on elementary students' cognitive learning in physical education.

2. SPECIFIC OBJECTIVES

A. Pretest - The researcher will administer a short, pictorial, multiple choice test to evaluate the students' understanding of the concept of absorbing force in catching skills.

B. Treatment/Lessons - The researcher will teach two lessons on catching skills. The objective of the lessons is to help the students learn the most effective techniques to absorb the force of the ball being caught.

-- To half of the classes the researcher will use a guided discovery teaching style. This is a student-centered instructional approach in which the teacher poses questions and challenges progressively, causing students to experiment and discover effective responses. Through the use of inquiry, students individually discover effective performance techniques.

-- To the other half of the classes the researcher will use the practice style of teaching. This is a more traditional approach to skill instruction. The teacher explains and demonstrates the skill and then provides tasks in which to practice the skill.

C. Post Test - The researcher will administer a second form of the pictorial, multiple choice pretest.

(1) The first class period will include the pretest and a lesson on catching a playground ball. (Only half of the classes will take the pretest.)

(2) The second class period will include a lesson on catching using scoops and plastic balls and the post test.

3. TARGET POPULATION

Second grade students at Skyline, Westwood and Sangre Ridge Elementary Schools will be involved in the research project.

4. RESEARCH CONDITIONS

Time: Two physical education class periods for each second grade class.

Space Requirements: The regular physical education facility will be used. The researcher will provide all needed equipment, such as balls and scoops.

No physical modifications will need to be made.

5. INSTRUMENTATION

A copy of the test is enclosed.
Technical data, including the results of the tests and statistical computations are available upon request.

6. CONFIDENTIALITY PROCEDURES

Classes and students will be identified by numbers and not by names.

7. RESEARCH DESIGN

The Solomon four-group design will be used. Half of the guided discovery and practice style classes will be pretested and half of the classes will not be pretested. All classes will be post tested. This design will identify whether the effectiveness of the treatment (teaching style) varies according to whether the students have been pretested. (Taking the pretest might sensitize the students to the treatment.)

8. UTILIZATION OF RESULTS

The results will be included in a dissertation study.

Since catching skills are an important part of the elementary curriculum, these lessons will contribute to the students' skill development and to their understanding of performance. Second graders need specific instruction and practice in manipulative skills, including catching. In addition, the researcher will be demonstrating the little used guided discovery teaching style for the regular physical education teacher. This style promotes thinking about physical performance, enhancing understanding of underlying psychomotor concepts.

APPENDIX B

PERMISSION SLIPS FOR STUDENT PARTICIPATION

Dear Parent,

I am a doctoral student at Oklahoma State University. As a former elementary physical education teacher, I have a special interest in studying what children learn from physical activities.

This is to inform you about a study I will conduct in your child's physical education class. During the last two weeks of March, I will be administering two short tests on catching skills to your child's physical education class. Each test will take about five minutes. The regular physical education teacher will be present. The results will be used as part of my dissertation. Your child's name will not be used.

If you do not want your child to participate in the testing, please sign this form and return it to the physical education teacher. If this form is not returned, your child will be included in the testing.

Thank you,

Leta Hicks

SIGN AND RETURN THIS PART IF YOU DO NOT WANT YOUR CHILD TO PARTICIPATE

I do not want _____ to participate in the testing.
(Child's name)

_____
(Parent's name)

APPENDIX C

PRACTICE STYLE CATCHING LESSONS

PRACTICE STYLE LESSON 1

PURPOSE: Students will develop the basic skills of underhand catching that will absorb the force of the ball.

ORGANIZATION:

EQUIPMENT:
- Station 1 - 6 eight-inch playground balls
- Station 2 - 3 of each of the following: large nerf balls, small nerf balls, table tennis balls, tennis balls, racquetball balls, plastic balls
- Station 3 - 6 three-inch yarn balls
- Station 4 - 12 softball size nerf and plastic balls

FORMATION: Four stations are set up. Students are divided into four groups, with one group at each station. Groups rotate to new stations every three to five minutes.

DESCRIPTION: Discuss the concept of force and absorption of force according to the following statements:

Force is needed to cause an object to move. When you throw a ball it moves because you have applied force to it. What do you think "force" is?

When you catch a moving object such as a ball, you must stop its movement by using methods that will slow down the ball and absorb its force.

Explain and demonstrate the following methods to use to absorb the force of a ball being caught:

1. Stand with the feet in a stride position, one foot slightly ahead of the other.

2. Lean forward slightly, extending the arms toward the ball with the elbows and fingers slightly bent.

3. As the ball contacts the hands, the fingers wrap around it and the arms "give" in order to absorb its force. Continue to bend the elbows, bringing the ball toward the body.

4. The weight of the body shifts backward with the catch.

Select a student to throw the ball. Demonstrate the correct catching methods, reminding them to "reach and give." Instruct the students to use these catching methods as they perform the tasks at each station.

INSTRUCTIONS: Task cards at each station explain what is to be done.

Station 1: Throw the ball above your head and do each of these tasks five times:

1. Catch it after one bounce.

2. Catch it in the air before it bounces.

3. Reach up to catch it as high in the air as you can.

4. Catch it as low to the ground as you can.

5. Turn around and catch it after one bounce.

Station 2: Practice throwing and catching with a partner.

1. Choose four different balls. Throw one ball at a time.

2. Use an underhand throw and catch with both hands.

3. Throw and catch each ball ten times.

Station 3: Throw the ball above your head and do each of these tasks five times:

1. Count how many times you can clap your hands before you catch the ball.

2. While standing, throw the ball above your head. Then sit down and catch the ball before it hits the floor.

3. Catch the ball with one hand.

4. Catch the ball with your other hand.

5. Alternate throwing and catching from one hand to the other.

Station 4:

1. Get a partner and one ball for both of you.

2. Use an underhand throw to throw and catch the ball with your partner.

3. Everytime you catch the ball take one step backwards.

4. Every time you miss the ball take one step forward.

5. If you both reach the end lines, start over. Throw two balls at the same time.

SUMMARY: What methods should you use to absorb the force of a ball you are catching?

Review the reach-and-give techniques. Ask students to explain and demonstrate the correct methods.

PRACTICE STYLE LESSON 2

PURPOSE: Students will develop skills of catching with a scoop in order to absorb the force of the ball.

ORGANIZATION:

EQUIPMENT: 1 scoop, 1 tennis ball and 1 plastic ball for each student

FORMATION: First, individuals perform in personal spaces. Later, partners stand about five feet apart and throw a ball to each other.

DESCRIPTION: Review the concept of absorption of force while catching according to the following statements:

Who can explain the term "force?" When you catch a ball, what are the methods you should use to absorb the force of the ball?

Today we are going to practice catching with scoops. Remember to throw with your hand and catch with the scoop in your other hand. Keep doing the task until I give you the signal to freeze.

INSTRUCTIONS:

Individual tasks using scoops and tennis balls.

1. Throw the ball above your head. Let it bounce and then catch it in your scoop. Remember to "reach and give."

2. Throw the ball above your head. Catch it in the air, before it bounces.

3. Throw the ball above your head. Turn around and catch it after one bounce.

4. Throw the ball above your head. Sit down and catch it in the air, before it bounces.

5. Roll the ball to your partner. As you catch it, move your scoop forward and up in order to keep the ball in the scoop.

6. Throw the ball in the air to your partner. Use an underhand throw to help your partner make successful catches.

7. See how many catches you and your partner can make without missing. If you and your partner make six successful catches, both of you should back up one step.

SUMMARY: Ask the students to explain the methods for catching a ball with a scoop in order to absorb the force of the ball. As students describe the positions of the feet, body lean and arms, demonstrate each one.

APPENDIX D

GUIDED DISCOVERY STYLE CATCHING LESSONS

GUIDED DISCOVERY STYLE LESSON 1

PURPOSE: Students will develop the basic skills of underhand catching that will absorb the force of the ball.

ORGANIZATION:

EQUIPMENT: 1 eight-inch playground ball for each pair of students.

FORMATION: Partners stand about five feet apart and throw a playground ball to each other.

DESCRIPTION: Discuss the concept of force and absorption of force according to the following statements:

Force is needed to cause an object to move. When you throw a ball it moves because you have applied force to it. What do you think "force" is?

When you catch a moving object such as a ball, you must stop its movement by using methods that will slow down the ball and absorb its force.

Today we will be trying some experiments to see if we can determine the best ways to slow down and absorb the force of a ball we are trying to catch. I will give instructions for a catching experiment. You should throw and catch the ball with your partner, trying the experiment until I give you the signal to freeze. Use an underhand throw to help your partner make successful catches.

INSTRUCTIONS:

1. a. Catch the ball by keeping your arms straight in front of you. Be sure to lock your elbows so that your arms do not bend.

   b. Catch the ball while bending your elbows as you catch. Reach for the ball and bend your elbows as you catch it.

Question: Compare catching with arms straight and catching with arms bending. Which method is better for absorbing the force of the ball?

Anticipated Answer: Bending the elbows is better for absorbing the force of the ball. It makes catching easier.

Question: Why? What is different about the movement of the ball in the two methods.

Anticipated Answer: Bending the elbows allows the ball to slow down and travel farther before it stops.

2. a. Try to catch the ball while keeping your palms and fingers straight. Stretch your fingers so that they are rigid when the ball contacts your hand.

   b. Try to catch the ball with your fingers slightly bent, "cupping" your hands. As the ball contacts your hands, wrap your fingers around it.

   Question: Compare catching with straight fingers and hands to catching with bending fingers and hands. Which method is better to absorb the force of the ball? Why?

   Anticipated Answer: Catching with bending fingers and hands is better because the hands and fingers can grasp the ball.

   Question: What happens to the ball when you try to catch it with straight arms and straight fingers?

   Anticipated Answer: The ball bounces (rebounds) off the hands.

3. a. Prepare to catch a ball by reaching for the oncoming ball with straight arms and straight fingers and hands.

   b. Prepare to catch a ball by reaching for the oncoming ball with slightly bent elbows and slightly bent fingers and hands.

   Question: Compare these two methods of preparing to catch a ball. Which one is better for absorbing the force of the ball?

Anticipated Answer: Slightly bent elbows, fingers and hands works better because that method allows the elbows and fingers to continue giving after the ball contacts the hands.

4. Let's explore the position of the feet while catching. How does foot placement affect absorption of force?

   a. Practice catching with the feet in a straddle position, slightly apart and side-by-side.

   b. Now practice catching with the feet in a stride position, one foot slightly ahead of the other.

      Question: Which position, straddle or stride, is better for catching? What happens to the body weight in each position?

      Anticipated Answer: Stride position, with one foot in front of the other, is a better position for catching. It allows you to shift your weight backwards, increasing the distance over which the force is absorbed after the ball contacts the hands.

5. a. Prepare to catch the oncoming ball with your body straight, not leaning. As the ball contacts your hands, keep your weight evenly distributed on both feet and keep your trunk straight.

   b. Prepare to catch the oncoming ball by leaning toward it. As the ball contacts your hands, shift your weight to your back foot.

      Question: Is it better to lean toward the oncoming ball and shift back during the catch or to keep your body straight during the catch? Which method allows you to absorb the force of the ball? Why?

      Anticipated Answer: Leaning forward and shifting back during the catch is better because it increases the distance over which the catch is made, absorbing the force of the ball.

SUMMARY:

Question: What do we need to know about absorbing the force of an object we are catching?

Anticapated Answer: We need to "give" with the force to receive it over the greatest distance possible. We can slow an object by increasing the distance through which it moves after contact.

Throw and catch with your partner, using the catching methods that allow you to absorb the force of the ball. Use the best positions of the arms, hands and fingers, feet, and body for catching.

GUIDED DISCOVERY STYLE LESSON 2

PURPOSE: Students will develop skills of catching with a scoop in order to absorb the force of the ball.

ORGANIZATION:

EQUIPMENT: 1 scoop, 1 tennis ball and 1 plastic ball for each student

FORMATION: First, individuals perform in personal spaces. Later, partners stand about five feet apart and throw a ball to each other.

DESCRIPTION: Review the concept of absorption of force while catching according to the following statements:

Who can explain the term "force?" Remember the methods you used to catch a ball, absorbing its force during the catch.

Today we are going to continue our experiments by using a scoop for catching. I will give instructions for a catching experiment. You should throw the ball with your hand and catch it with the scoop in your other hand. Keep trying the experiment until I give you the signal to freeze.

INSTRUCTIONS:

Individual tasks using scoops and tennis balls:

1. Throw the ball above your head. Let it bounce and then catch it according to the following instructions:

   a. Reach high to catch the ball, keeping your arm extended with your elbow locked as the ball contacts your scoop.

   b. Reach high to catch the ball, bending your elbow as the ball contacts your scoop.

      <u>Question</u>: Compare catching with a scoop with your arm straight and with your elbow bending. Which method is better for absorbing the force of the ball?

Anticipated Answer: Bending the elbow was easier for catching the ball and better for absorbing its force.

2. Throw the ball above your head. Catch it in the air, before it bounces according to the following instructions:

   a. Reach high to catch the ball, keeping your arm extended and your elbow locked.

   b. Reach high to catch the ball, bending your elbow as the ball contacts your scoop.

      Question: What happens to the ball after it contacts your scoop in each method?

      Anticipated Answer: With the elbow locked the ball bounced out of the scoop. With the elbow bending the ball stayed in the scoop.

Partner tasks with plastic balls:

3. Roll the ball to your partner.

   a. Catch the ball without moving the scoop after the ball contacts it.

   b. Catch the ball by moving the scoop forward and up as the ball contacts it.

      Question: Which method allowed you to absorb the force of the rolling ball? Why?

      Anticipated Answer: Moving the scoop forward and up worked better for catching because it allowed the ball to stay in the scoop longer.

      Question: In the last class you experimented with the best position of your hands and fingers for catching a ball. How does moving your scoop compare to the way you use your hands and fingers in catching?

      Anticipated Answer: Moving the scoop forward and up is like bending your hands and fingers around the ball.

4. Throw the ball to your partner using an underhand throw. Catch it according to the following instructions:

   a. Practice catching with the feet in a straddle position, side by side.

   b. Practice catching with the feet in a stride position, one foot slightly ahead of the other.

      Question: Which method is better for catching the ball? Why?

      Anticipated Answer: Stride position, with one foot slightly ahead of the other, is better for catching. It allows you to shift your weight back as you catch, increasing the distance over which the ball is caught.

5. a. Prepare to catch by leaning toward the oncoming ball and reaching for it with your scoop.

   b. Prepare to catch by standing straight and holding the scoop just in front of you.

      Question: Compare these two methods of preparing to catch a ball. Which one is better for absorbing the force on the ball? Why?

      Anticipated Answer: Leaning toward and reaching for the oncoming ball is better because it stays in the scoop longer, allowing the ball to slow down and travel farther before it stops.

SUMMARY:

Question: What do we need to do to absorb the force of a ball we are catching with a scoop? Everyone should practice the methods they chose as the best ones for catching the ball.

Anticipated Answer: Place the feet in a stride position. Lean toward the ball and extend the catching arm, reaching for the ball. When the ball contacts the scoop, move the scoop forward and up, bending the elbow and bringing the ball toward the body. The body weight shifts to the back foot.

APPENDIX E

PRETEST AND POST TEST

EXAMINATIONS

DIRECTIONS NAME: _____

Make an X under the picture that shows the boy who is using the best catching method to absorb the force of the ball.

PREPARING TO CATCH

1. BODY

_____

_____

_____

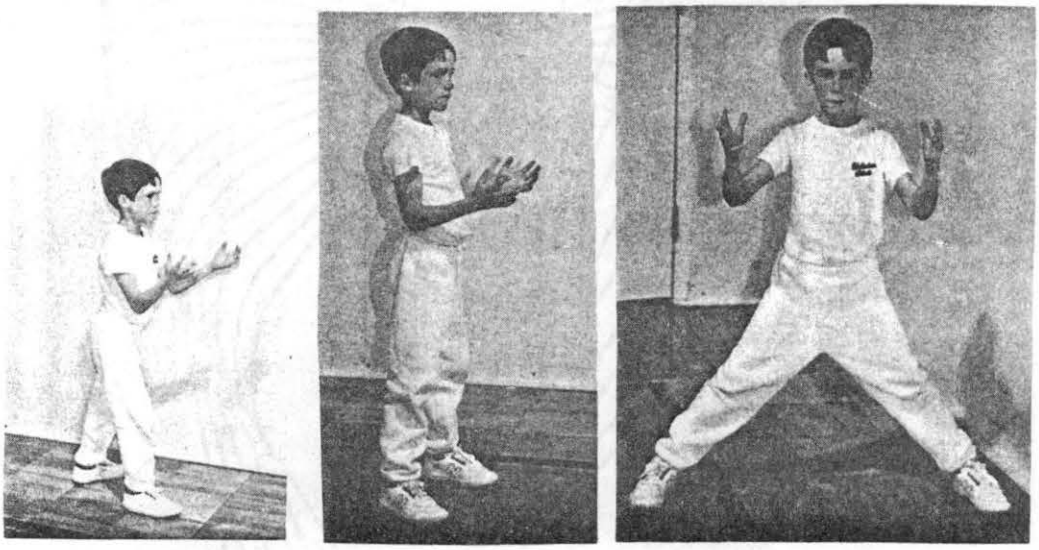
2. ARMS, HANDS AND FINGERS

_____

_____

_____

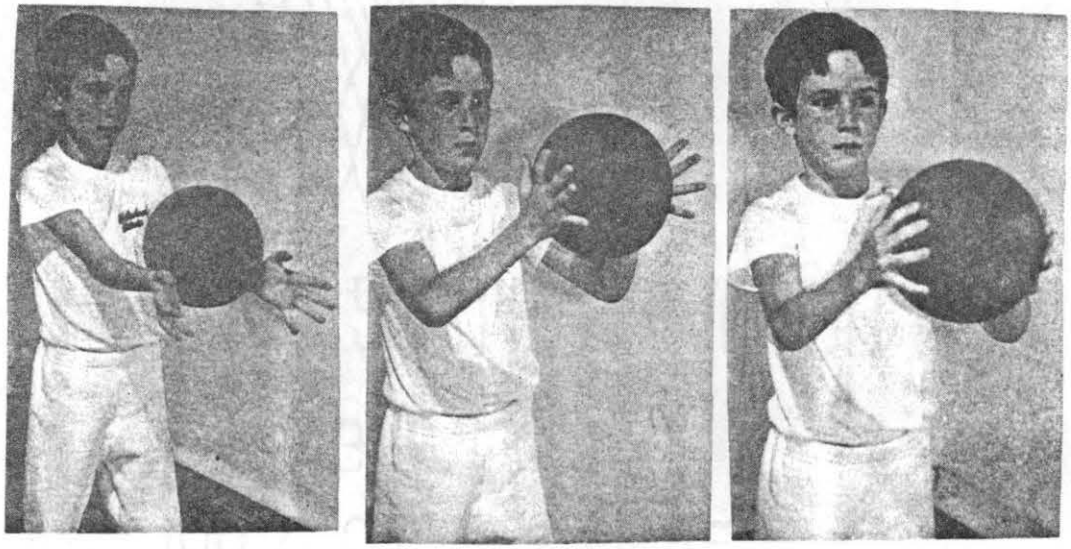
3. FEET AND LEGS



_____ _____ _____

CATCHING THE BALL

4. HANDS AND FINGERS



_____ _____ _____

5. FEET, LEGS AND BODY

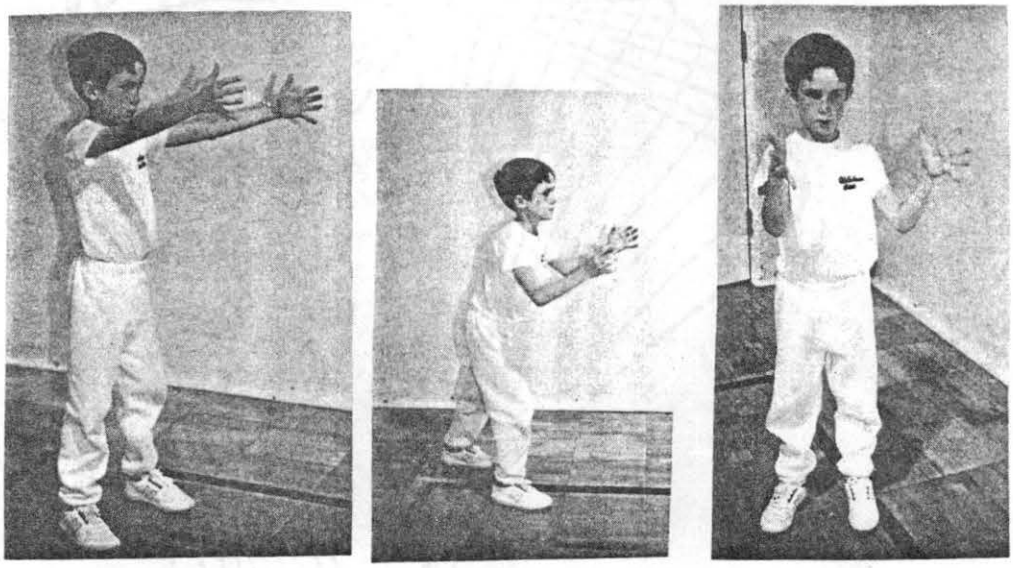
6. ARMS

POST TEST NAME: _____

Make an X under the picture that shows the boy who is using the best catching method to absorb the force of the ball.

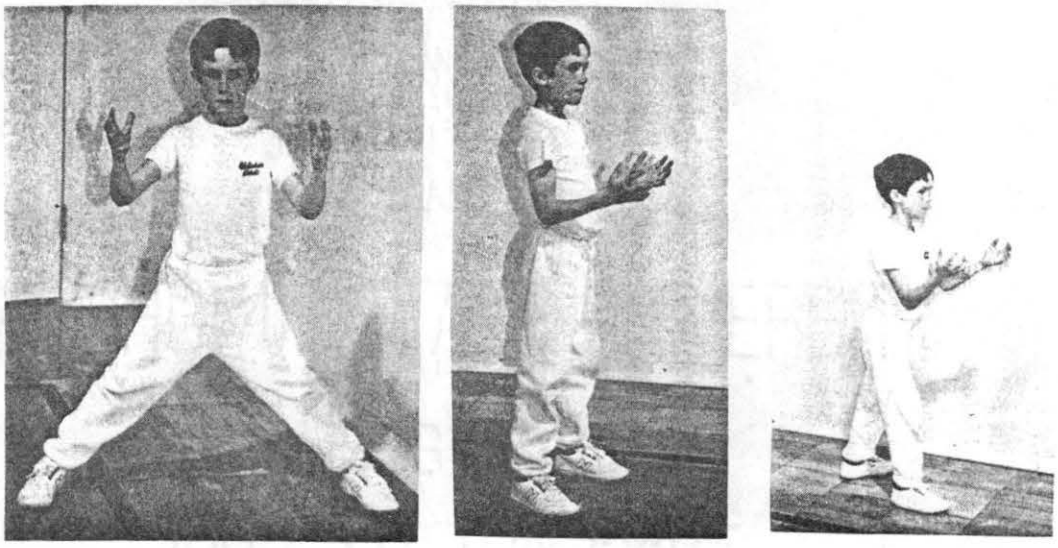
PREPARING TO CATCH

1. ARMS, HANDS AND FINGERS



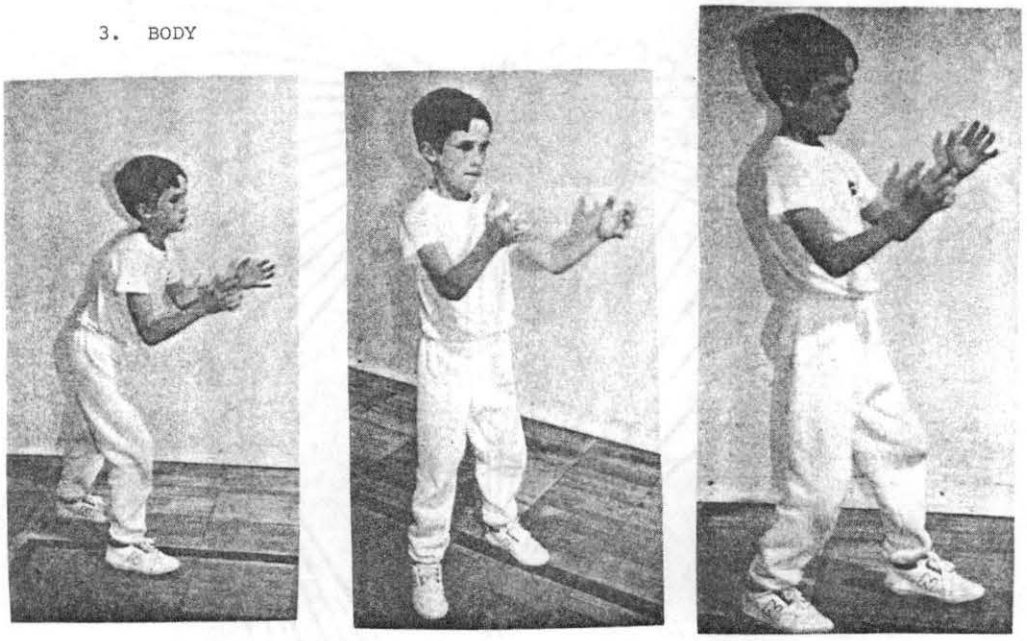
_____ _____ _____

2. FEET AND LEGS



_____ _____ _____

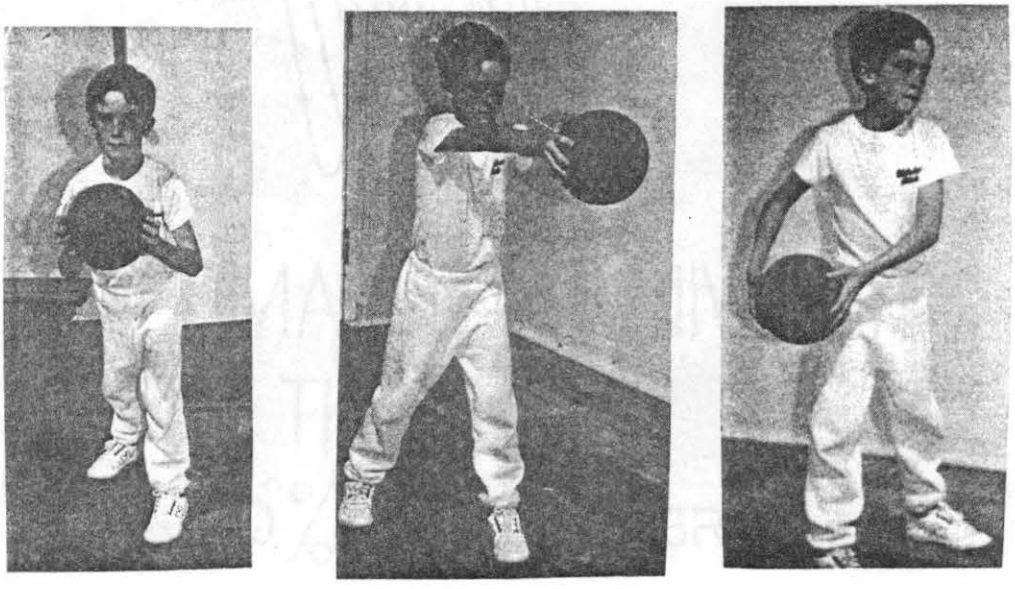
3. BODY



_____ _____ _____

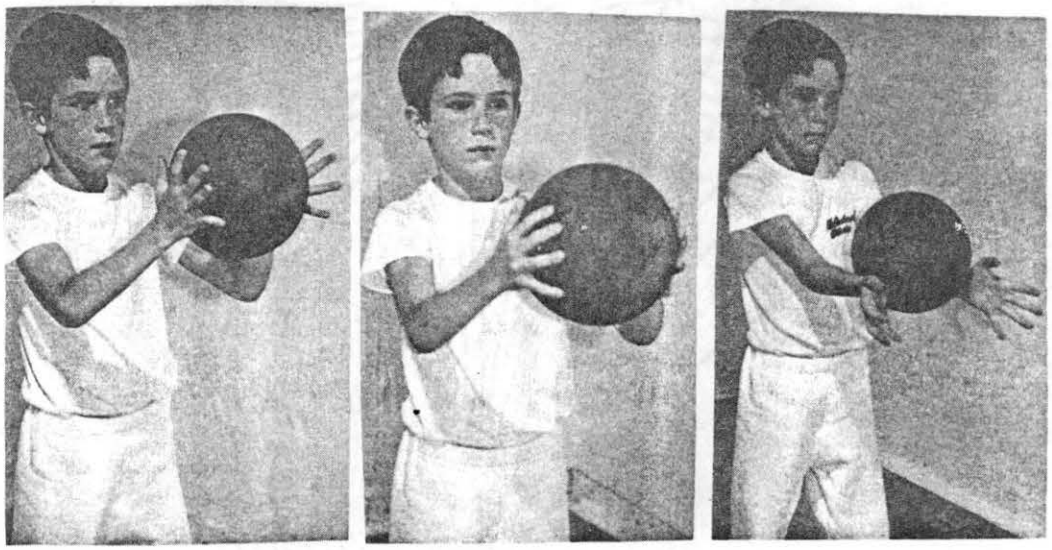
CATCHING THE BALL

4. ARMS AND ELBOWS



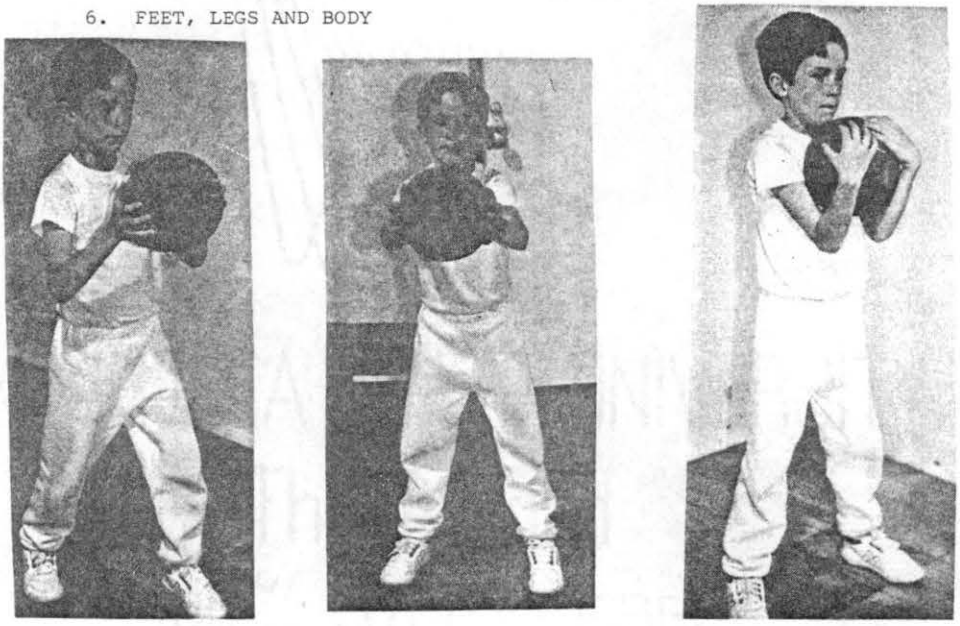
_____ _____ _____

5. HANDS AND FINGERS



_____ _____ _____

6. FEET, LEGS AND BODY



_____ _____ _____

VITA

Leta Elizabeth Hicks

Candidate for the Degree of

Doctor of Education

Thesis: THE EFFECTS OF SELECTED PHYSICAL EDUCATION TEACHING STYLES ON THE LEARNING OF A KINESIOLOGICAL CONCEPT BY SECOND GRADE CHILDREN

Major Field: Higher Education

Minor Field: Health, Physical Education and Recreation

Biographical:

Personal Data: Born in Oklahoma City, Oklahoma, May 27, 1953, the daughter of William Doran and Virginia Lee Roberts Hicks.

Education: Graduated from Shawnee High School, Shawnee, Oklahoma, in 1971; received the Bachelor of Science in Education degree in Elementary Education, from the University of Tulsa, Tulsa, Oklahoma, December, 1976; received the Master of Science degree in Health, Physical Education and Leisure Sciences from Oklahoma State University, Stillwater, Oklahoma, July, 1982; completed requirements for the Doctor of Education degree at Oklahoma State University in July, 1986.

Professional Experience: Physical education teaching aide for grades 1-8, School of Saint Mary, Tulsa, Oklahoma, 1974-1976; elementary physical education teacher, Will Rogers Elementary School, Shawnee, Oklahoma, 1977-1981; girls' tennis coach, Shawnee Junior High, 1977-1978, and Shawnee High School, 1978-1981, Shawnee, Oklahoma; counselor/coach for the National Youth Sports Program, Oklahoma State University, Stillwater, Oklahoma, summer 1983 and summer 1985; instructor for the Adult Recreation

Program, Oklahoma State University, Stillwater, Oklahoma, summer and fall 1985; graduate teaching associate in the School of Health, Physical Education and Leisure Sciences, Oklahoma State University, Stillwater, Oklahoma, 1981 to present.

Professional Organizations: American Alliance for Health, Physical Education, Recreation and Dance; Southern District of the American Alliance for Health, Physical Education, Recreation, and Dance; Oklahoma Association for Health, Physical Education and Recreation; Phi Epsilon Kappa; Phi Kappa Phi.