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Effectiveness of the Problem Solving Method in Coaching Junior High School Basketball

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EFFECTIVENESS OF THE PROBLEM SOLVING METHOD
IN COACHING JUNIOR HIGH SCHOOL BASKETBALL

A Thesis
Presented to
the Graduate Faculty
Central Washington State College

In Partial Fulfillment
of the Requirements for the Degree
Master of Education

by
Robert Duane Pedersen
July 1970
APPROVED FOR THE GRADUATE FACULTY

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James G. Nylander, COMMITTEE CHAIRMAN

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Betty Jean Putnam

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James Monasmith
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# TABLE OF CONTENTS

**LIST OF TABLES** ................................................................. vi

**Chapter**

1. **INTRODUCTION** ............................................................. 1
   - THE PROBLEM ............................................................ 2
     - Statement of the Problem ........................................... 2
     - Hypotheses .......................................................... 2
     - Importance of the Study ............................................ 2
     - Limitations .......................................................... 4
   - DEFINITIONS OF TERMS ................................................ 5

2. **REVIEW OF THE LITERATURE** ........................................... 7
   - MOVEMENT EDUCATION AND PHYSICAL EDUCATION .................. 7
   - PROBLEM SOLVING IN MOVEMENT EDUCATION ....................... 10
   - PROBLEM SOLVING APPLIED TO TEACHING SPORTS SKILLS .......... 13
   - PROBLEM SOLVING APPLIED TO ATHLETICS .......................... 15
   - SUMMARY ...................................................................... 16

3. **PROCEDURE USED IN THE STUDY** ..................................... 18

4. **RESULTS** ....................................................................... 26

5. **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS** ............... 34
   - SUMMARY ...................................................................... 34
   - CONCLUSIONS ........................................................... 35
   - RECOMMENDATIONS ..................................................... 39
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Inter-group Comparison of $T_1$ Scores</td>
<td>27</td>
</tr>
<tr>
<td>2. Inter-group Comparison of $T_2$ Scores</td>
<td>29</td>
</tr>
<tr>
<td>3. Intra-group Comparisons Between $T_1$ and $T_2$ Scores</td>
<td>31</td>
</tr>
<tr>
<td>4. Inter-group Comparison of the Knox</td>
<td>33</td>
</tr>
<tr>
<td>Basketball Test Items</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 1

INTRODUCTION

The competitive spirit of men has become one of the trademarks of our culture, and in athletic situations many times it has been stressed to excess. Out of this necessity to win has evolved the specialist—the perfection of a specific skill in a certain way.

The traditional approach to instruction has, in turn, evolved from the specialist. Skills are taught to perfect the "correct form" and practiced by students in one specific way. Any variation is usually considered unacceptable. Locke's summation of this concept was:

When traditional programs do provide students with some skill in a sport, the skill is often isolated, surrounded by a wasteland of personal awkwardness, inhibition and insensitivity to the experience of movement. The result has been generations of adults who move poorly and dislike movement activities. These adults are the product of attempting to thrust one skill after another upon students who have yet to achieve any real command over, or insight into their movement capacity. Hunt has called the result of this additive process, the "summated failure" (15:213).

If the "summated failure" is prevalent in physical education, then we need to take a good look at our profession. Is the traditional approach lacking in some way to teach a total understanding of a skill and the use of the body in performing this skill? This need for
understanding was expressed in Deach's statement:

A real challenge to all teachers of physical education exists today—that of helping the student to gain a thorough understanding of his body and habitual application of the efficient movement not only in the gymnasium, on the playing field, in the pool, but in the multitudinous activities of daily life (6:93).

This study explores one of the possible ways that we can deal with the problem of students' moving through a specific series of skills without understanding why or how they have accomplished it.

THE PROBLEM

Statement of the Problem

The purpose of this study was to compare two methods of instruction in coaching selected eighth grade boys in selected basketball skills.

Hypotheses

1. Boys taught by the problem solving method acquire significantly better basketball skills than boys taught by traditional methods as measured by the Knox Basketball Test.

2. Boys taught by the problem solving method acquire a significantly better understanding of basic basketball skills than boys taught by traditional methods as measured by a basketball knowledge test.

Importance of the Study

Most athletic team sports of today are becoming
more and more specialized, and coaches are requiring players to perform skills in a specific way. They teach the skill and then have their players practice it over and over until it can be accomplished with little error. The student is not given an opportunity to experiment on his own in search of a way to perform the same skill in a different manner.

Some teachers in the field of physical education are utilizing a more creative approach to instruction, namely movement exploration and problem solving. For many years physical educators in England have used these methods at the elementary and secondary levels, particularly in gymnastics and apparatus. Elementary specialists in the United States have utilized the English method of problem solving very effectively in teaching a wide variety of basic motor skills (11:30).

The challenge which led the researcher to conduct this study was the lack of concern in athletics for allowing each individual to develop his own effective movement patterns and to the understanding of them. The major concern of the athlete has always been centered around such objectives as scoring and winning, regardless of how the associated movements were made or simply that they were even made.

Many times the students of today resent being told how to do everything. If given the chance to perform
specific skills in their own way, and if guided properly as through the problem solving method, they should not only learn but excel, because they are learning through their own efforts.

The literature does not reveal previous application of problem solving to an athletic situation largely because few have ever dared to question, in terms of its teaching methods and its practices, any aspect of our present authoritarian coaching system. It might be enlightening for coaches to read this study even though its effects may be quite limited because of their resistance to change. Questions hopefully would arise which would cause coaches to evaluate our present day methods of coaching.

Limitations

1. The time spent by each group in learning a specific skill was not identical. Some skills taught by the problem solving method required more time than the same skill taught by traditional methods. There were also some students in problem solving who spent more time than other students in the same group to learn the same skill.

2. The knowledge test used in the study was constructed by the researcher and it was not subjected to any test measuring its validity.

3. There were no practice sessions during the two week Christmas vacation for the experimental group.
4. This study was conducted using 30 eighth grade students from Bremerton, Washington. All boys ranged from thirteen to fourteen years of age.

DEFINITIONS OF TERMS

Problem Solving Method

This is a teaching method in which a series of progressional verbal questions are asked concerning basketball skills and the student is expected to seek out and develop the answers on his own with continued assistance from the instructor.

Traditional Method

For the purposes of this study, this term is used to identify an authoritarian teaching method by which the coach selects specific skills to be learned, teaches these skills and sets up drills which enable the students to practice these skills until they become proficient enough to apply them to a game situation.

Correct Form

Correct form is defined as a specific way of doing a skill which is used in the traditional method and meets the criteria established by the authors of the basketball books read prior to the study.

Selected Eighth Grade Boys

This phrase identifies the eighth grade boys in
Bremerton, Washington, selected to participate in this study by Mr. Jerry Willson and the researcher. Selection was based on basketball ability as demonstrated during an open tryout held the first week of the basketball season.

**Selected Basketball Skills**

These include the basketball skills taught in this study, which were: the lay-in, jump shot, hook shot, foul shot, dribbling, chest pass, pivoting, and rebounding.
Chapter 2

REVIEW OF THE LITERATURE

The review of the literature pertinent to this study covers the following four areas: (1) a definition of movement education and how it relates to physical education; (2) problem solving as a process in movement education; (3) problem solving as a process for teaching specific sports skills; and (4) problem solving as applied to athletics.

Movement Education and Physical Education

Movement education is just one aspect of physical education. Deach wrote:

Some would have us change the title of physical education to movement education. We should realize the importance of relating principle of motion to all human movement and furthermore to teach these principles and appropriate activities in all classes, thus making movement education one of the aims of physical education (6:92).

In defining movement education's approach to physical education, Deach referred to Marion Broer's statement of the concept of movement that is generally accepted today:

The need of every individual is to understand human movement so that any task—light or heavy, fine or gross, fast or slow, of long or short duration, whether it involves every day living skills,
work skills or recreation skill—can be approached effectively. The problem is to determine how in a relatively short period of time, each individual can gain not only ability in a few isolated motor activities (most of them recreational) but also efficiency in movement (6:92).

In movement education Schurr saw all basic movement studied in terms of four factors: qualities of movement, space, body action, and relationships. Schurr explained these factors as follows:

In the performance of all movement skills, the body must make adjustments to the factors of time, force, pattern, and flow—all of these being dependent upon the purpose of the movement.

All movement takes place in space, while in itself may be quite varied. The amount of space available demands many adjustments in the performance of specific skills. Body action factor actually involves learning what movements or skill the body is capable of doing.

In early skill learnings children must have experiences where they adapt skills to performance with or in opposition to a partner, then in a small group, and with a variety of obstacles and objects (27:224).

Ludwig also agreed with Schurr's concern that movement education teach the child to be aware of his own potential for moving effectively. Ludwig stated the following about movement education:

A child learns to use his body with power and economy of movement: he experiences in a wide variety of ways the degree of effort required for easy, fluent, and efficient performance of the particular movement task he has undertaken. He solves problems dealing with gravity, direction, and controlling objects such as balls as conscious experiences. Efficient and effective movement results within the innate capacity of each child (16:28).
Locke, in his critique of movement education, stated, "One problem is that there are no guiding principles because methods have previously been designed to a particular situation, and no general guidelines are in existence" (15:214).

This may be true of movement education in the United States, but Shirley Howard's report on the observations of participants in the Second Anglo-American Workshop on Movement Education stated, "Since its inception some twenty-five years ago, movement education has become a dynamic aspect of the total education program in England" (11:31). She went on in her report to outline the elementary and secondary physical education program utilized in England and the use of movement education.

In her writing, Schurr also seemed to disagree with Locke's statement that there are no guiding principles in movement education. Schurr's summation of the advancement of movement education in the United States was:

As a result of several years of study, conferences, exchange teachers, and publications dealing with movement education, or movement exploration as it is called by some, there has been a definite pattern of acceptance of the English method and content in American elementary school physical education programs (27:224).

Locke continued his critique of movement education by questioning the claim that movement education results in a better understanding of the instruction than through
traditional education. He stated that no reliable empirical data dealing with movement education has been published to make this evaluation possible (15:217).

The elementary teachers in the Milwaukee Public School system who participated in the movement education pilot program (Educational Personnel Development Project) directed by Elizabeth Ludwig might disagree with Locke's questioning the claim of movement education. They listed the following traits as being directly developed by the movement education approach to physical education: self-confidence, self-control, self-discipline, coordination, and strengthening of listening skills. One teacher summarized her feelings as to the value of the movement education approach to physical education:

I found the basic movement education approach to physical education an excellent way to help children acquire physical skills, but also skills that were helping the children to become better "learners." The problem approach gave the children the opportunity to develop skills of self-direction, motivation, and evaluation which I believe is the basis of all learning (17:59-61).

Problem Solving in Movement Education

The basis of the problem solving method as a process for teaching movement education is movement exploration. Hackett and Jenson discussed the concept:

The term "exploration" is just what it says: the search for a solution to a problem. "Movement" indicates that some action is used in seeking the solution. Through individual analysis of the problem, each participant is encouraged to interpret and respond within
the limitation of his own physical and mental abilities (9:28).

In their writings, Locke (15), Hackett and Jenson (9), and Mosston (22) set up a series of requirements which limit and actually define that which can be called a problem solving method. All agreed with the idea that the child must be given the appropriate climate in which to stimulate his creative ability. Brown and Cassidy gave an excellent summation of this point:

The creation of a climate which encourages innovation and discovery and places upon the student the responsibility of examining his experiences is essential. The experience cannot be given, but the opportunity for this experience can (3:137).

Most authors agree that other requirements which are essential for the problem solving method are individual freedom and time for the student to develop at his own pace so that he can work out the problem on his own. Smaller classes, sufficient equipment, and an activity which is interesting and self-motivating are beneficial for the problem solving environment.

Locke stated that the key to any learning is that the student has a chance to enjoy success. Being successful strengthens one's feeling about his abilities to meet new situations (15:214). One way to insure this is to create problems which have more than one correct answer. Howard agreed with this by writing, "The problem solving situation enables each student to gain satisfaction from
moving within his own capabilities. Creativity is encouraged, because there is no single response to the problems" (11:28).

The problem solving method not only promotes success, but also is motivating for the participant. It is this type of motivation from within the student which Mosston saw as the catalyst of the problem solving method.

The element of choice, the availability of a variety of solutions, the possibility of finding still another way, and the climate of encouragement to seek a new response creates a particular kind of motivation and a special excitement in learning. The knowledge that there is still another way keeps the cognitive process kindled. This cognitive process of discovery is self-perpetuating. The act of discovery becomes the motivating force (22:194).

Mosston continued by saying that problem solving requires the teacher to provide a more extensive effort to analyze his subject material and dissect it into those parts which will be meaningful to the student. These parts must be carefully organized and problem solving questions originated which will bring about a solution of them in the student's mind (22:189).

Mosston also suggested that the problem solving method will not seem natural to the classroom teacher and will require an emotional adjustment. This emotional adjustment is necessary as Mosston implied in his statement, "Perhaps the teacher needs to cross an emotional barrier in order to help the student cross the cognitive barrier. This is the invisible block where the student
begins to involve himself with the question and seek his own answer" (22:148).

In their analysis of the English movement exploration approach, Hackett and Jenson also found a definite need concerning the problem method. "Our self-analysis revealed a definite need—that of educating the classroom teacher. He too was initially uncomfortable in this new teaching situation" (9:28).

**Problem Solving Applied to Teaching Sports Skills**

In theory, according to Hunt, all skills are made up of basic patterns of movement; and these patterns should be mastered before we teach the skill itself. In practice we try to develop a person's skill before he can control his basic efforts; and, before he grasps a skill, we throw him into a complex game situation (12:87).

One benefit of the problem solving approach is that the student is stimulated to question his body movements. Hunt continued by saying we are forced toward traditional methods of instruction because teachers have not been given a background in movement education.

Currently we develop skills by correcting the errors and trying to teach the right. We do so because people cannot seem to feel their movements and its consequences. The ultimate goal of an experience approach would be to develop a broad movement repertoire together with skills of feeling and the ability to analyze one's own movements. It would put the person in the center of the process; and eventually, make him his own teacher (12:87).
The research done on the application of the problem solving method of teaching specific sports skills is quite limited. Duncan saw this as a whole new area for study. "Body movements in sports situations constitute a laboratory for inductive reasoning" (8:67).

One of the few related studies was that of Iris Garland, in which she taught swimming by the problem solving approach. She asked students to experiment with ways of moving their arms and legs against the water to detect resistance. She also had them assume different positions in the water as well as raise and lower their head and limbs. In each new experience she requested that they feel and discover what happened to their bodies. Evaluation at the end of the semester showed that the problem solving group was significantly better in speed and stroke form, and they appeared to be more comfortable in the water, more motivated and self-directed than the group taught by traditional methods (12:89).

Another instance where sports skills were taught by use of the problem solving method was found in Howard's writing of the secondary physical education program in England.

Initially, students are given free choice of how they use the apparatus, both Olympic type and a variety of other interesting pieces. They are encouraged to move continuously, still with free choice of movements. Gradually the students are directed towards supporting and suspending their bodies on different parts of the apparatus and toward developing a variety of ways of mounting, dismounting,
and moving on the apparatus. The teacher then further structures problems by specifying the path of the movement, the types of movement or the quality of the movement. This progression is designed to improve body management, confidence, and initiative in movement.

The application of movement education to ball handling and game skills are not as wide spread as are the applications to dance and gymnastics. However, some game skills were seen such as soccer skills being developed from such problem solving tasks as stopping the ball with different parts of their body or keeping the ball in the air as many different ways as possible (11:33).

The application of sports skills to a game situation is based on Diem's statement of the benefits of problem solving:

The more surely a child masters a movement, the more skillful he becomes and the more fun it is for him to "play" with this movement. Spontaneously the child invents his own variations. In this way out of a growing confidence in movement there comes a joy in group action and movement with a partner, and the striving for excellence in competition and organized games (7:5).

Problem Solving Applied to Athletics

There was no evidence of literature dealing specifically with the use of the problem solving method as the instructional method in a competitive athletic situation. There has been some literature concerning different approaches to coaching such as the two articles by Darrell Mudra on coaching football. He felt the players rather than the coach should make the decisions concerning team strategy and game planning (23; 24). Robert Moawad applied this idea of "democratic coaching"
to a high school basketball situation. All team decisions were based upon a team vote and the coach directed that decision (20). No literature was found, however, dealing specifically with the teaching of athletic skills through the problem solving method.

Summary

Deach saw movement education as one of the aims of physical education. It requires the students' involvement not only physically, but mentally as well. Schurr and Ludwig stated that this mental involvement allows the student to learn how he moves in relationship to space, physical forces, objects, and other students around him.

Howard reported that movement education in America has evolved out of the English movement education system, where it has been applied to the physical education program very successfully. Although Locke stated that there are no specific guidelines available for the classroom teacher, movement education was utilized with great success by the elementary teachers of Milwaukee, Wisconsin, in a pilot program under the directorship of Elizabeth Ludwig.

Problem solving is one of the more successful forms of movement education. Howard stated that this method stimulates the creative ability of the student by giving him problems with multiple solutions. The student is given enough time and equipment to answer in his own
mind the problem and is encouraged to seek alternate solutions. This process is self-motivating and is what Mosston calls the catalyst of the problem solving method, which requires the teacher to organize the subject material into progressional questions so that the student can be led through the material using his own intellect.

Problem solving has been utilized at the secondary level in the United States and England in teaching certain sports skills. Swimming, gymnastics, dance, and soccer are a few of the activities which have been taught through the problem solving method. No evidence was found, however, dealing with the use of the problem solving method in teaching competitive athletic skills.

The fact that the teacher has to wait for the student's response may seem unnatural, but it is necessary for what Mosston called the "cognitive process" to occur. The teacher needs unfathomed patience and tranquility in order to create the aura of accepting what the student says or does. Munrow gave an excellent description of this type of instruction: "The intelligence of a genius, the insight of a poet, and the patience of a saint" (15: 262).
PROCEDURE USED IN THE STUDY

The purpose of this study was to determine whether or not junior high school boys taught by individual and group problem solving situations in athletics could develop basketball skills and a knowledge of basic basketball fundamentals more effectively than boys taught by a more traditional method.

Subjects

The thirty boys used in this study were all thirteen and fourteen years of age and lived in Bremerton, Washington, a city of 36,000. Fifteen of these boys attended Coontz Junior High and were coached by this researcher. The other fifteen boys, who served as a control group, attended Dewey Junior High and were coached by Mr. Jerry Willson. Open tryouts were held at each school for a period of four days, for two hours a day, and each coach selected the fifteen boys he felt had the most basketball ability and potential. None of these boys had experienced any organized coaching situation, so their basic skills were limited.

Skill Test Used

To measure the skill level of both the control and
experimental groups, the Knox Basketball Test was used. It is a test battery composed of speed dribble, wall bounce, dribble-shoot and "penny-cup" tests. Scoring of the test is accomplished by adding together directly the scores made on the four tests. The score in each instance is the number of seconds required to complete the test. Directions for the test are found in Appendix B.

Knowledge Test Used

This researcher could not locate a measurement of basketball skill knowledge that would test an understanding of the body movements involved with basketball skills. Because of this, it was necessary to design one to measure an understanding of the body parts while performing specific basketball skills and the effect of the different forces exerted upon the body and the ball while performing these skills.

Each skill has several ways in which it can be performed depending upon the coach who is teaching it. In order to decide which was considered to be the most acceptable, the following procedure was followed:

1. This researcher consulted books written by: John Wooden, Robert Buck, John Cooper, Daryl Siedentop, Frank McGuire, Bill Sharman, and the Coaching Clinic and listed what they considered to be acceptable ways of performing the specific skills of: passing, dribbling, shooting, rebounding, and pivoting.
2. Four high school coaches were contacted in the Bremerton area and asked to summarize these same skills. This was done to see if any major differences of opinion occurred.

3. Next, fifty multiple choice questions were constructed pertaining to the skills and the body movements which comprise them.

4. With the aid of two of the coaches in this researcher's school, the questions were read over and clarified where changes in wording seemed necessary. Ten additional questions concerning rules were added so the test appeared to cover all aspects of basketball.

The knowledge test consisted of sixty questions, of which fifty were related to the study. Questions were worded for right handed players only. All questions were multiple choice questions with three or four possible answers. The test is found in Appendix C.

Pretest

The students in both the control and experimental groups were pretested in both basketball skill and knowledge directly after the last player cut was made. The written test was administered to the experimental group by this researcher and to the control group by their coach, Mr. Willson. The students were given the test and no time limit was set in order that all would have time to complete the entire test. Students were told to remain
in their seats and no talking or discussing was allowed. Body motion was limited so that students could not work out answers to questions involving hand and arm movements. The students were not allowed to see the corrected test or the results until after the study was completed.

The skill test was given directly after the written test was completed. After a brief warm up, the test was explained and students were asked to do their best. The control group was tested by Mr. Willson with the assistance of the researcher so that the test would be given under similar conditions. Due to this researcher being an opposing coach, a negative outlook might have been shown by the Dewey Junior High students toward the researcher giving the test. At no time were these skill tests used in any practice session, nor were the students encouraged to practice them.

Posttest

The posttests consisting of the Knox Basketball Test and the knowledge test were administered during the week following the last scheduled game of the regular season under as near the same pretest conditions as possible.

The Experimental Group

The members of the experimental group, fifteen eighth grade boys, were coached by the researcher and
were taught by the use of the problem solving method. This method creates a mental problem regarding specific basketball skills and the movement of the body parts which make up these skills. Using the information gathered from the basketball books read during the construction of the knowledge test, each skill was broken down by the writer to its simplest form, and then questions were designed which led the student to discover on his own the basic body movements which made up the specific skill.

The study was conducted between November 15, 1969, and February 14, 1970. The practice sessions were held directly after school for two hours, four to five days a week, depending upon whether there was a scheduled basketball game the fifth day of the week.

The material taught included: lay-ins, both right and left handed; the foul shot; the jump shot; the hook shot; dribbling, both right and left handed; the chest pass; the bounce pass; rebounding; pivots and faking.

The researcher to student ratio varied with the skill taught and the level of achievement to which the student had reached. Most advanced basketball skills were taught on a one to one basis. Some skills, such as shooting and rebounding, were taught on a one to one basis, while others, such as passing and dribbling, were taught one to two. Also some team problems were introduced, such
as proper body positioning when dribbling the ball close to a defensive player.

Instructions were given verbally. At no time were there any demonstrations given or were any undesirable answers corrected. Every answer was considered correct until a better one could be found. This was achieved by asking additional questions which led the student back toward the desired response. Also, no comments were made if the desired answer was given.

The general method used was to tell the student to do a specific skill in his own way. Once he had done it several times and the researcher thought it to be effective, the student was then asked simple questions, which, when answered, would lead the student to understand why he did it in that particular way. If the skill was done in an undesirable way, the questions were designed to cause him to examine what he was doing and to search for a better way. In most skills he had to rely on what felt best and what he was successful in doing. The student seemed motivated by his new success and also because he was doing it in his own way.

Students were asked to do it the way they felt most comfortable and still do it quickly and accurately. Simply, the students were told, "Do it the best way you can and fast enough to get the job done." Not only were students encouraged to do it their own way, but once they were grasping the
desired skill, they were told to increase the speed of what they were doing.

The Control Group

The members of the control group, fifteen eighth grade boys, were coached by Mr. Jerry Willson. Practice session times were identical to those of the experimental group except the control group held regular turnouts during the two week Christmas vacation. The material taught to the control group was the same as that taught to the experimental group and was agreed upon by the researcher and Mr. Willson at the beginning of the study.

In coaching the control group, Mr. Willson used a standard method of simply introducing the skills by talking and demonstrating and then having the students run drills in which they learned and practiced the new skill.

The lay-in was explained and demonstrated and practiced by running lay-ins from each side of the basket. Stress was placed on jumping up to the basket and laying the ball against the backboard. The use of the correct foot take-off and the palm-up release were also stressed.

Free shooting periods were given and boys were told to work on those shots they would get in a game. Those having problems were given instructions in correct form. A special period ranging from ten to fifteen minutes was also given each day to practice shooting foul shots. Concentration on the top of the front rim was stressed.
Pivots, screens and cut-aways were also taught and drilled by using two against two drills. Two offensive players worked together against two defensive players.

The rebound drill used was the three on three check off drill. Stress was placed on good body positioning and getting your hand up on top of the ball and pulling it down.

The chest pass was introduced by having two lines of players pass the ball back and forth to each other. Instructions were given to have the thumbs roll under, causing a reverse spin. Also stepping to pass the ball as well as stepping to receive the ball were stressed. The bounce pass was also taught in the same manner. A popular drill which utilized all types of passes and fakes was "Bull in the Ring." Seven men form a circle with one defensive man in the middle whose job it is to prevent the passes.

At no time did this researcher have any contact with the control group other than to help administer the skill test. All discussions with Mr. Willson as to what should be taught were carried on in this researcher's home.
Chapter 4

RESULTS

The purpose of this study was to compare two methods of instruction in coaching selected eighth grade boys in selected basketball skills. The control group was taught by the traditional method and the experimental group was taught by the problem solving method. Both groups started and concluded with fifteen participants.

Inter-group Comparisons of $T_1$ Scores

To insure that the skill and knowledge development of this study was due to the teaching method, the equality of both the control and experimental groups was established by the use of a pretest. See Table 1. The scores from the total Knox Basketball Test battery from the control group were compared with those from the experimental group using a two-tailed $t$ ratio test for the significance of difference between means of uncorrelated groups. The $T_1$ test mean score for the control group was 41.7 and the mean score for the experimental group was 42.3. The difference between the mean scores was .6 seconds. This resulted in a $t$ ratio of .47, which was not statistically significant. This means that there was almost no difference in the skill
levels between the control and experimental groups at the beginning of the study.

The scores from the knowledge test from the control group were compared with those from the experimental group using a two-tailed ratio test for the significance of difference between means of uncorrelated groups. The $T_1$ test mean score for the control group was 24.9, and the mean score for the experimental group was 27.5. This resulted in a $t$ ratio of 1.42, which was not statistically significant. See Table 1. Although the difference in the knowledge test mean score between groups was not statistically significant, it was large enough to show some advancement of the control group at the beginning of the study.

Table 1

<table>
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<td>2.6</td>
<td>1.83</td>
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<td>1.42</td>
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</table>

Inter-group Comparison of $T_2$ Scores

The inter-group comparison of $T_2$ mean scores was made to measure significance of difference between
groups in skill and knowledge. The scores for the total Knox Basketball Test battery from the control group were compared with those from the experimental group, using a two-tailed $t$ ratio test for the significance of difference between means of uncorrelated groups. The $T_2$ test mean score for the control group was 39.7, and the mean score for the experimental group was 37.9. The difference between mean scores was 1.8 seconds. This resulted in a $t$ ratio of 4.11, which was statistically significant at the .01 level of confidence. This shows that there was an improvement in basketball skill by the experimental group and that this improvement was caused by some factor other than chance. See Table 2.

The scores from knowledge test of $T_2$ from the control group were compared with those from the experimental group, using a two-tailed $t$ ratio test for the significance of difference between means of uncorrelated groups. The $T_2$ test mean score for the control group was 25.1, and the mean score for the experimental group was 18.2. The difference between mean scores was 6.9. This resulted in a $t$ ratio of 3.69, which was statistically significant at the .01 level of confidence. See Table 2. This shows a marked improvement of the experimental group as to the knowledge of basketball skills and that this improvement was caused by factors other than chance.
Intra-group Comparison Between $T_1$ and $T_2$ Scores

The intra-group comparison between $T_1$ and $T_2$ was made to detect any change made in both skill and knowledge during the course of the study.

The $T_1$ skill scores of the control group were compared with the $T_2$ skill scores, using a one-tailed $t$ ratio test for the significance of difference between means of correlated groups. The $T_1$ test mean score was 41.7 and the $T_2$ test mean score was 39.7, with a mean difference of 2.0 seconds. This resulted in a $t$ ratio of 2.71, which was statistically significant at the .02 level of confidence. See Table 3. This shows improvement by the control group in basketball skills and that this improvement was caused by factors other than chance.

The $T_1$ skill scores of the experimental group were compared with the $T_2$ skill scores, using a one-tailed $t$ ratio test for the significance of difference between means.
of correlated groups. The $T_1$ test mean score was 42.3, and the $T_2$ test mean score was 37.9, with a mean difference of 4.4 seconds. This resulted in a $t$ ratio of 6.17, which was statistically significant at the .01 level of confidence. See Table 3. This shows a great deal of improvement by the experimental group in basketball skills and that this improvement was caused by factors other than chance.

The $T_1$ knowledge test scores of the control group were compared with the $T_2$ knowledge test scores, using a one-tailed $t$ ratio test for the significance of difference between means of correlated groups. The $T_1$ test mean score was 24.9, and the $T_2$ test mean score was 25.1, with a mean difference of .2. This resulted in a $t$ ratio of .15, which was not statistically significant. See Table 3. This shows very little improvement of knowledge of skills by the control group.

The $T_1$ knowledge test scores of the experimental group were compared with the $T_2$ knowledge test scores, using a one-tailed $t$ ratio test for the significance of difference between means of correlated groups. The $T_1$ test mean score was 27.5, and the $T_2$ test mean score was 18.2, with a mean difference of 9.3. This resulted in a $t$ ratio of 4.57, which was statistically significant at the .01 level of confidence. See Table 3. This shows a great deal of improvement by the experimental group in
knowledge of basketball skills and that this improvement was caused by factors other than chance.

Table 3

Intra-group Comparisons Between $T_1$ and $T_2$ Scores

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean Diff.</th>
<th>SE Diff.</th>
<th>$r$</th>
<th>df</th>
<th>$t$</th>
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</thead>
<tbody>
<tr>
<td>Control Skill</td>
<td>2.0</td>
<td>.736</td>
<td>.547</td>
<td>28</td>
<td>2.71+</td>
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<tr>
<td>Experimental Skill</td>
<td>4.4</td>
<td>.713</td>
<td>.816</td>
<td>28</td>
<td>6.17*</td>
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<tr>
<td>Control Knowledge</td>
<td>.2</td>
<td>.113</td>
<td>.296</td>
<td>28</td>
<td>.15</td>
</tr>
<tr>
<td>Experimental Knowledge</td>
<td>9.3</td>
<td>2.035</td>
<td>.043</td>
<td>28</td>
<td>4.57*</td>
</tr>
</tbody>
</table>

+Statistically significant at the .02 level of confidence.
*Statistically significant at the .01 level of confidence.

Inter-group Comparison of the Knox Basketball Test Items

To ascertain which types of basketball skills were best learned by which teaching method, an analysis of the four individual tests which make up the Knox Basketball Test was conducted.

The scores from the $T_2$ Wall Bounce test of the control group were compared with those scores from the $T_2$ Wall Bounce test of the experimental group, using a two-tailed $t$ ratio test for the significance of difference between means of uncorrelated groups. The $T_2$ test mean
score for the control group was 8.7, and the mean score for the experimental group was 8.1. The difference between the mean scores was .6 seconds, which resulted in a t ratio of 1.44, which was not statistically significant. See Table 4.

The scores from the T<sub>2</sub> Speed Dribble test of the control group were compared with those scores from the T<sub>2</sub> Speed Dribble test of the experimental group, using a two-tailed t ratio test for the significance of difference between means of uncorrelated groups. The T<sub>2</sub> test mean score for the control group was 10.4, and the mean score for the experimental group was 10.5. The difference between the mean scores was .1 seconds, which resulted in a t ratio of .32, which was not statistically significant. See Table 4.

The scores from the T<sub>2</sub> Dribble Shoot test of the control group were compared with those scores from the T<sub>2</sub> Dribble Shoot test of the experimental group, using a two-tailed t ratio test for the significance of difference between means of uncorrelated groups. The T<sub>2</sub> test mean score for the control group was 11.4, and the mean score for the experimental group was 10.5. The difference between the mean scores was .9 seconds. This resulted in a t ratio of 3.34, which was statistically significant at the .01 level of confidence. It shows that the improvement was caused by some factor other than chance. See Table 4.
The scores from the $T_2$ Penny Cup test of the control group were compared with those scores from the $T_2$ Penny Cup test of the experimental group, using a two-tailed $t$ ratio test for the significance of difference between means of uncorrelated groups. The $T_2$ test mean score for the control group was 9.2, and the mean score for the experimental group was 8.7. The difference between the mean scores was .5 seconds. This resulted in a $t$ ratio of 5.00, which was significant at the .01 level of confidence. It shows that this improvement was caused by some factor other than chance. See Table 4.

Table 4

Inter-group Comparison of the Knox Basketball Test Items

<table>
<thead>
<tr>
<th>Test</th>
<th>Control Mean</th>
<th>Experimental Mean</th>
<th>Mean Diff.</th>
<th>SEM Diff.</th>
<th>df</th>
<th>t</th>
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<tbody>
<tr>
<td>Wall Bounce</td>
<td>8.7</td>
<td>8.1</td>
<td>.6</td>
<td>.418</td>
<td>28</td>
<td>1.44</td>
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<td>Speed Dribble</td>
<td>10.4</td>
<td>10.5</td>
<td>.1</td>
<td>.314</td>
<td>28</td>
<td>.32</td>
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<tr>
<td>Dribble Shoot</td>
<td>11.4</td>
<td>10.5</td>
<td>.9</td>
<td>.269</td>
<td>28</td>
<td>3.34*</td>
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<tr>
<td>Penny Cup</td>
<td>9.2</td>
<td>8.7</td>
<td>.5</td>
<td>.100</td>
<td>28</td>
<td>5.00*</td>
</tr>
</tbody>
</table>

*Statistically significant at the .01 level of confidence.
Chapter 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to compare two methods of coaching selected eighth grade boys in selected basketball skills and to test the hypotheses: (1) boys taught by the problem solving method acquire significantly better basketball skills than boys taught by traditional methods, as measured by the Knox Basketball Test; and (2) boys taught by the problem solving method acquire a significantly better understanding of basic basketball skills than boys taught by traditional methods, as measured by a basketball knowledge test.

The study was conducted in Bremerton, Washington, with thirty junior high boys in the eighth grade. Fifteen of these boys attended Coontz Junior High, and fifteen attended Dewey Junior High.

The study ran from November 15, 1969, to February 14, 1970. Practice sessions were held for two hours on school days only. The fifteen boys from each school were chosen for their athletic ability by their respective coaches during a four day open tryout held at each school.

The students were tested at the beginning of the
study and again at the conclusion on both basketball skills, by the use of the Knox Basketball test, and in knowledge of basic basketball skills, by a written test which was created by this researcher.

The control group was taught by Mr. Jerry Willson, using a traditional approach of introducing the skill to be learned, teaching the skill, and then setting up drills which enabled the students to practice the skill. The experimental group was taught by this researcher, using the problem solving method of instruction. Each student was asked a series of questions which led him to discover the correct answer on his own, rather than being told how to do it.

Conclusions

To insure the equality of the two groups at the beginning of the study, a pretest was administered to both the control and experimental groups. The scores from the Knox Basketball Test T₁ resulted in a mean difference of .6 seconds and a \( t \) ratio of .47. This was not statistically significant and showed that the two groups were equal in skill at the beginning of the study. The comparison in knowledge of basketball skills resulted in a mean difference of 2.6 points and a \( t \) ratio of 1.42. This also was not statistically significant to detect any major difference in knowledge at the start of the study.

Comparing the two groups at the conclusion of the
study in both skill and knowledge revealed a significant improvement by the experimental group. The $T_2$ comparison of the Knox Basketball Test resulted in a mean difference of 1.8 seconds with a $t$ ratio of 4.11, which is well above the .01 level of confidence. The $T_2$ comparison of the knowledge test resulted in a mean difference of 6.9 points with a $t$ ratio of 3.69, which is significant at the .01 level of confidence.

The following conclusions can be made:

1. Comparison of the two groups' $T_2$ skill tests showed that boys taught by the problem solving method acquired significantly better basketball skills than the boys taught by the traditional method.

2. Comparison of the two groups' $T_2$ knowledge tests showed that boys taught by the problem solving method acquired a significantly better understanding of basic basketball skills than boys taught by the traditional method.

In the intra-group comparisons which test for the amount of improvement within each group, both groups improved in skill. The comparison was made between $T_1$ and $T_2$ of the Knox Basketball Test for each group. The control group's total mean improvement was 2.0 seconds and resulted in a $t$ ratio of 2.71, which was statistically significant at the .02 level of confidence. The experimental group's total mean improvement was 4.4 seconds, which resulted in
a $t$ ratio of 6.17. This was statistically significant at the .01 level of confidence. Both methods of instruction were successful in producing skill development, but greater gains were made by the group taught by the problem solving method.

In the intra-group comparison of knowledge of these skills, the control group's mean score dropped .2 of a point and resulted in a $t$ ratio of .15. Even though they increased their skill development, the control group's understanding of these same skills remained relatively the same. The problem solving group, on the other hand, improved their mean score by 9.3 points, which resulted in a $t$ ratio of 4.57. This was statistically significant at the .01 level of confidence and shows understanding of the skills learned. These results add some support to the thinking that skills learned by the students own efforts are understood more than if he is told how to move in performing a skill.

The inter-group comparison of the four individual tests which made up the Knox Basketball Test was made in an attempt to ascertain which types of basketball skills were best learned by which teaching method. The $T_2$ Wall Bounce test scores of the two groups were compared and resulted in a mean difference of .6 seconds and a $t$ ratio of 1.44. This was not statistically significant and shows no advantage in either teaching method.
This was also true of the comparison of the Speed Dribble $T_2$ test. The mean difference was .1 second and resulted in a $t$ ratio of .32. This was not statistically significant and shows no advantage in either teaching method.

The comparison between the two groups' $T_2$ Dribble Shoot scores revealed a greater gain on the part of the problem solving group. The mean score difference was .9 seconds and resulted in a $t$ ratio of 3.34, which was statistically significant at the .01 level of confidence.

The $T_2$ Penny Cup test comparison resulted in a mean difference of .5 seconds and a $t$ ratio of 5.00. This was also statistically significant at the .01 level of confidence. This showed greater gains on the part of the problem solving group.

Those skills which required changing of direction, pivoting, and shooting were performed better by the problem solving group than by the group taught by the traditional method. There was little difference in the skills of dribbling and passing.

**Observations of the writer.** Some observations made by the researcher during the course of the study as to the effectiveness of the problem solving method are:

1. Students were, in the writer's opinion, very much aware of how they were performing a skill and were
continuously experimenting with new ways which might increase their success.

2. This awareness was also expressed to other teammates in helping them perform better. This was especially seen in game situations.

3. Students seemed stimulated to practice these skills on their own time rather than just practicing shooting whenever they were in the gymnasium.

4. Students seemed to enjoy the idea of being able to perform the skill in their own way but still seemed motivated to find the best way that they could perform the skill.

5. At the beginning of the study, the students seemed quite uncertain about deciding which way was best. The students wanted the writer to tell them what was considered best instead of relying on their own abilities to find the answer.

6. The problem solving method works best with a one to one teacher-student ratio.

Recommendations
The following are recommendations for further study.

1. The problem solving method could be applied to another athletic sport, possibly one which has a well established skill and knowledge test already constructed.
2. The problem solving method could be applied to a situation where both the control and the experimental groups are taught by the same person.
BIBLIOGRAPHY


APPENDIXES
APPENDIX A

THE PROBLEMS USED IN THE PROBLEM SOLVING METHOD

Skill taught: Chest pass

Instructions: Two boys stand twelve feet apart. Throw the ball back and forth with the ball starting from your chest.

Question 1. Does the ball spin?
2. What way?

Instructions: Throw the ball to an exact spot while being twenty-five feet away.

Question 1. Did it spin?
2. What spin, if any, is most accurate?
3. Can you make that spin every time?

Instructions: Stand twelve feet apart.

Question 1. What spin is easiest to catch?
2. How can you make that spin?
3. Where do your thumbs go?
4. What do your wrists do?
5. Are your elbows out or in?*

* Problem: Elbows out. Have them try to shoot with their elbows out. What position do you shoot from? Is bringing your elbows in a wasted motion?
6. Can you pass as well with your elbows in as you can with them out?

Instructions: While twelve feet apart, throw to an exact spot on the receiver. (Let them pass the ball back and forth several times.) Now each take a large step back and repeat.

Question 1. Which distance is most accurate?

Instructions: Throw the ball as hard as you can.

Question 1. What did you do to make it go faster?
2. How long was the pass you just made?
Instructions: Place a third man behind the receiver. The other two boys keep the same distance apart. Third man can be a manager or anyone instructed to try to get the ball from behind, but don't foul. Pass the ball to the receiver hard. After both boys have been receiver and have stepped toward the ball.

Question 1. Why step toward the ball?
2. With both of you stepping, how far did the ball travel?
3. Does stepping increase accuracy?

Comments: Instruction is helped if there are actual lines (with tape) on the floor so distance can be visualized.

Instructions: Move the defensive man on either side of the receiver.

Question 1. How do you step now to receive the ball?
2. Can the passer create a fake which will cause the defense to move?

Skill taught: Bounce pass

Question 1. At what height is a chest pass normally thrown?
2. What other pass is possible from the basic chest pass motion?
3. In what area of the playing floor would you say it is most effective?
4. How should it be thrown?

Instructions: Two players twelve feet apart. Have them pass the ball back and forth.

Question 1. Should it also have a spin?
2. What spin is easiest to catch?
3. Find the way you think leads to greatest accuracy.
4. At what point does the ball hit the floor?
5. Can you throw a bounce pass too hard?
6. Does it help to stop?

Skill taught: Receiving a pass

Instructions: Two players twelve feet apart. Have them
pass the ball back and forth, but each time have the receiver close both eyes. Pass the ball at chest level.

Question 1. Why can't you catch it?

Instructions: Have them repeat, but this time look at the basket.

Question 1. Why do you bobble the ball each time?

Instructions: Normal passing resumed and watch if they watch it hit their hands.

Question 1. Is eye-hand vision important?

2. Make a rule which you can follow to help you catch the ball.

Instructions: Give them time to experiment with hand and finger combinations to decide which will give them the greatest control over the ball the quickest. Have them explain what their wrist and fingers are doing in their own words.

Skill taught: Passing by the defensive man

Instructions: Three boys, two passers, one defensive man between them. Passers fifteen to twenty feet apart. Without passing the ball, make the best fake you can. Now make the fastest fake you can and still make it look real.

Question 1. Which caused the defense to move the most?

2. Is it necessary to cause the defense to move a great deal or just enough to get your pass off accurately?

3. Practice your fakes and decide which ones are most effective.

4. Be able to explain why you think these fakes work best.

Instructions: Have a defensive player hold a specific defensive position. (Example: one hand up, one hand down by his knee.) Have this player stand between the two passers who are twelve feet apart. The defensive player stands four feet from the passer each time the ball is thrown.
Question 1. What is the fastest reacting part of the defensive player's body?
2. What is the least movable?
3. By which area should the ball be thrown to insure that it will not be touched?
4. Can you make a fake that will enlarge the slow movable area?

Instructions: Let him pass against several defensive positions.

Skill taught: Lay-in

Instructions: Stand five feet away and shoot ten shots. Keep track. Let them go off on his own. Repeat, only stand just in front of the basket. Repeat, only stand on a chair placed just in front of the basket.

Question 1. From which distance were you most accurate?
2. Why were you more accurate?

Instructions: Run and jump over the chair.

Question 1. Does accuracy increase the higher you jump?
2. At what point do you leave the floor?

Instructions: Shoot the ball as soft as possible: Give them several tries.

Question 1. What if there is a defensive man behind you?
2. What effect does the back board have on the ball?
3. What part of the rim or back board when hit gives you the greatest accuracy?
4. Should you jump up to the rim or the back board?
5. What foot should you jump off of from the right side? Left side?
6. Where is the ball held in relationship to your body?
7. Do you use two hands or one?
8. How long do you keep both hands on it?
9. What advantage is there to holding it in both hands as long as possible?
Advanced skill: Make one fake while you are in the air before you shoot.

Question 1. When could you use this move in a game situation?

Skill taught: Foul shot

Instructions: Stand comfortably. Shoot a few shots.

Question 1. What foot do you have forward?
2. What are you looking at when you shoot?

Instructions: Find some point near or on the basket which, when you look at it as you shoot, will result in a basket. Continue shooting until you find your spot of accuracy.

Question 1. Describe your concentration point and why.
2. Do you make the ball spin, and, if so, why?

Instructions: Place a rebound hoop over the basket. Try to make the ball stay up on the rim as long as possible. Continue using your point of concentration.

Question 1. What can you do to do this?
2. Does spin affect this?
3. What kind of spin causes the softest shot?
4. How do you create this spin?
5. Is your wrist tight or loose?
6. How high an arch?
7. What effect does height have on the bounce of the ball off the rim?

Skill taught: Jump shot

Instructions: Let the student shoot a few shots ten to fifteen feet away from the basket and directly in front of it.

Question 1. Where should you hold the ball when you shoot?
2. Why?

Problem: Most boys of this age who do not have enough wrist strength shoot the ball from their belt level.
Instructions: Let the student continue to shoot for accuracy.

Question 1. Where do you shoot from if you are closely guarded?
2. Can you get your shot off if he has his hand up?
3. How can you be sure to get it off?
4. Should there be a difference in the way you shoot when you are closely guarded and when you are not?
5. In what direction do you jump?

Instructions: Take a few shots jumping backward, straight up, and slightly forward.
Repeat, only five feet farther from the basket.

Question 1. Which way gives you the most power?
2. Which way are you the most relaxed?
3. What is your concentration point?
4. When do you look at your concentration point?
   a. Just as you shoot?
   b. Just before you shoot?
   c. As long as possible?

Instructions: Experiment with eye concentration and see which method helps your accuracy the most.

Question 1. Does it help your accuracy if you pick up your concentration point while you are still dribbling?
2. Does height of your jump insure that you will get your shot off?
3. What about quickness?
4. Which do you feel is most effective in getting your shot off?
5. What about accuracy?

Advanced questions:
1. As you move out away from the basket your shots may fall short. How can you adjust this and still stay relaxed?
2. What can you do after you shoot which will help the team?
3. Is there anything you can do before you shoot which will contribute to a team effort?
Skill taught: Hook shot

Instructions: While he is shooting ask these questions.

Question 1. How is a hook shot like any other shot?
2. What is your concentration point?
3. How do you locate this point if your back is toward the basket?
4. How can you use your body to form a shield for the ball?
5. What is your follow-through?
6. Can you create a fake which will precede your shot while you are facing the basket?
7. Can you create a fake with your back to the basket which precedes your hook shot?

Skill taught: Dribbling

Instructions: Each player is given a basketball. Tell each player to start bouncing his ball. Stop them and ask one player (X) to give you his ball. Next, tell the others to start bouncing their balls and tell (X) to try to get the ball away from anyone, without touching him. After he has made several attempts, stop them.

Question 1. What did you do with your body in relation to the ball when (X) came at you?
2. Did you change your posture in any way?

Instructions: Repeat, using another student as (X).

Question 1. Now explain everything you changed when (X) came at you.
2. What did your knees do?
3. Why did you only dribble with one hand?

Instructions: Have the student bounce his ball and look directly at it.

Question 1. What advantage is there to watch the ball hit your hands?
2. What part of your hand does the ball strike?

Instructions: Let the student begin dribbling. Tell him:
Close your hand.
Hand open but fingers together.
Fingers spread but rigid.
Fingers spread, loose and moving like playing a piano.

Question 1. Which of the two methods would you say gives you the most control?

Instructions: Using both methods, bounce the ball as low as you possibly can. Bounce it chest high. Repeat, only close your eyes.

Question 1. Which method do you feel you can control the ball the best?
2. Which method would you use?
3. Can you find any better method?

Instructions: Using your best method, run and bounce it. Repeat, only run as fast as you can.

Question 1. What did you have to do in order to run faster, but still have control of the ball?
2. What would you do if you suddenly had to stop?
3. What if a defensive player picked you up?
4. How high would your dribble be?
5. How would you lower your dribble?
6. Would your body position change?
7. How and why?
8. What does your other hand do?
9. Is it necessary to watch the ball?
10. What about when you dribble with your left hand?
11. Do you change the way you dribble any?
12. If you do not have to watch the ball, where should your eyes be focused?
13. Does this change the closer you get to the basket?

Skill taught: Rebounding

Instructions: Ask the student to stand under the net. Jump as high as you can.

Question 1. What was your body position just before you jumped?
2. Where was your weight in relation to your feet?

Instructions: Find the body position from which you can jump the highest.
Question 1. If you are being pushed from behind, what body position enables you to maintain your present position?
2. Can you jump from this position?
3. Can you jump as high as your best jumping position?
4. Can you jump as high with your hands at shoulder height as when they are at your waist?
5. Is there any advantage in having them at shoulder height?

Instructions: Hold your fist out. Have a student pull it down.
Hold a basketball out in your hands at shoulder height. Make sure your hands are on the sides.
Ask a student to pull it away from your hands.

Question 1. Why did you pull from the top and not the sides?
2. In grabbing a basketball in midair, what way gives you the most control?
3. Suppose someone else has hold of it?
4. Make a rule for rebounding.

Skill taught: Pivoting and stops

Instructions: Have student run twenty feet and stop as quickly as possible.

Question 1. Did you use both feet?
2. How did you absorb the shock of stopping?
3. What part of your shoe struck the ground first?

Instructions: Find the quickest way you can stop and still be under control.

Question 1. Explain what way you used.

Instructions: Run, stop while bouncing a basketball.

Question 1. Does anything change in the way you stopped?

Instructions: Run, stop and turn.

Question 1. What foot did you turn on?
2. On what foot did your weight shift when you stopped?
3. What effect does weight have upon the direction you turn?
4. Is this true of any pivot?

Instructions: Set a screen and pivot toward the basket.

Question 1. Which way do you pivot?
   2. Can you see the ball at all times?
   3. On what foot should your weight be if you are going to pivot so your eyes can follow the ball?
   4. Is there any other advantage to turning this way?
   5. Where is the man you screened located?

Instructions: Run, dribble, stop, turn.

Question 1. Where is the ball held as you turn?
   2. How do you hold the ball?
   3. Can you pass it after you turn?
   4. Is your pivot any different when you have the ball than it is without it?
   5. Why?
   6. How many possible ways can you move once you have stopped on one pivot foot and still not travel?
   7. Can you make a fake step and then go to the basket?
   8. Can you create any quick pivots which you can use before you start to dribble?
   9. Can you use these same pivots after you have stopped your dribble?
10. Create a quick pivot which will cause the defense to move in the opposite direction you want to go.
11. If you can do this, think of a way it might help your teammates.
APPENDIX B

KNOX BASKETBALL TEST

Each subject was given one trial at each event. This score was recorded even though mistakes occurred. Scoring of the test was accomplished by directly adding the scores made on the four tests. The score in each instance is the number of seconds required to complete the test.

Speed-dribble test. Four chairs are placed in a straight line so that the first one is 20 feet from the starting line and the others 15 feet apart. The subject dribbles around the chairs as in the Johnson dribble test.

Wall-bounce test. The subject stands with his toes behind a line five feet from a wall. The object of the test is to ascertain how long it will take him to chest-pass (no batting) the ball against the wall and catch it 15 times.

Dribble-shoot test. From a starting line on the right side-line of the court, 65 feet from the basket, arrange three chairs directly in line with the basket, so spaced as to divide the distance into four equal segments. The subject dribbles around the obstacles; shoots until
he makes a shot; and dribbles back around the obstacles to the starting line.

**Penny-cup test.** A 20-foot course is set up with a "signal line" eight feet from the start. Three tin cups, painted blue, white, and red, respectively, are placed five feet apart on the finish line (20-foot mark). The subject stands behind the starting line with his back to the cups and with a penny in his hand; at the signal (GO) he pivots and races toward the cups; as he crosses the "signal line," the tester calls out one of the cup colors; the subject must drop his penny into the cup so designated. The test is repeated four times, the total elapsed time representing the score.
APPENDIX C

BASKETBALL TEST

All questions refer to a right handed player.

1. When closely guarded a player should: (a) keep the ball in front of him (b) keep his body between the defensive man and the ball (c) dribble only with his right hand (d) keep his back to the defense and back toward the basket

2. Which of the following would you associate with good dribbling form? (a) crouched position (b) weight evenly distributed upon the feet (c) back bent over the ball (d) head down

3. While dribbling your eye contact should be: (a) on the ball (b) occasionally on the ball (c) to the direction you are going and the players ahead of you (d) to the floor ahead and the opposing player’s feet

4. Which of the following would be considered in dribbling? (a) fingers well spread (b) fingers relaxed (c) hand slightly cupped (d) all are correct

5. A dribbler closely guarded should have: (a) elbows free and loose (b) forearm parallel to the floor (c) the ball bounced at least waist high (d) all are correct

6. Dribbling while running requires: (a) a greater angle of the ball being pushed (b) a very low bounce (c) elbows held at the pockets (d) fingers stiff

7. An offensive player with the ball has how many seconds in the key? (a) 5 seconds (b) 4 seconds (c) 3 seconds (d) no limit

8. Before you dribble, what should you consider? (a) are the corners of the court open (b) will a pass do the same job (c) should I shoot (d) all are correct

9. A dribble should always end with: (a) a good pass (b) a quick pivot (c) a good shot (d) complete control
10. A chest pass should be thrown: (a) thumbs going under the ball (b) thumbs going over the top of the ball (c) no movement of the thumbs (d) elbows away from the body

11. Double dribble occurs when: (a) both hands strike the ball at once (b) a player dribbles, stops, and then dribbles again (c) a player dribbles, stops to shoot, drops the ball, bounces it twice and then shoots (d) all are considered double dribble

12. A chest pass should have what kind of spin on the ball? (a) top spin (b) reverse spin (c) side spin (d) no spin at all

13. In ball handling one should always: (a) step to receive the pass (b) step to make your pass (c) watch the ball hit your hands (d) all are good practices

14. Passes should always be made: (a) with a quick snap (b) thrown at waist high of your receiver (c) with the wrist and fingers only (d) all are good practices

15. A player must pass the ball inbounds in: (a) 3 seconds (b) 5 seconds (c) 10 seconds (d) immediately

16. The trouble with a bounce pass is that: (a) it is often thrown too hard (b) it does not work well in crowded areas (c) it is often thrown too slow (d) all are correct

17. In catching any pass a player should: (a) block the force of the ball with the hand away from the defense (b) always step forward with the left foot (c) keep your arms stiff so the ball won't get by you (d) all are correct

18. In passing to a fellow player: (a) look to see if he is open (b) after passing, stand and wait for the return pass (c) always lob the ball across court over the defense's head (d) stare first to see him, then quickly look away, then pass

19. A reason why a pass is fumbled is: (a) eyes looking at the basket and not at the ball (b) physically tired (c) hands not up (d) all could be reasons

20. All ball handling requires: (a) elbows away from the body (b) good faking by extending the arms out quickly (c) holding the ball with the finger tips (d) all are correct
21. A team must get the ball out of back court in: (a) 5 seconds (b) 20 seconds (c) 10 seconds (d) 3 seconds

22. A good offensive position for a player would involve: (a) hands and arms hanging down relaxed (b) standing straight to provide a bigger target for a pass (c) head up and alert (d) all are correct

23. An offensive player without the ball should always: (a) keep his eyes on the ball no matter who has it (b) consider every shot taken to be missed (c) work to get open to receive a pass (d) all are correct

24. A defensive player may stay in the key: (a) 5 seconds (b) 10 seconds (c) 15 seconds (d) no limit

25. The best body position for getting a rebound is: (a) arms extended straight up (b) stand almost directly under the basket (c) knees bent with your weight on the balls of the feet (d) all are correct

26. If A passes to C and then moves to set a screen on C's defensive man, most of his weight should be on: (a) his right foot (b) his left foot (c) on the balls of both feet (d) evenly distributed on both feet

27. After screening for C, A breaks toward the basket by: (a) stepping toward the basket with his right foot (b) stepping across with his left foot (c) pivoting on his right foot, he swings his left foot back (d) pivoting on his left foot, he swings his right foot back

28. If A passes to B and screens, B's first move should be to: (a) dribble to his right (b) step with his left foot (c) fake right (d) dribble left

29. As A screens, he must: (a) be three feet away from B's man (b) allow enough room for B's defensive man to take one step (c) stand between B and his defensive man (d) just barely touch B's defensive man
30. In order to stop quickly on two feet a player should: (a) land on the balls of his feet (b) land with his arms and the ball away from his body for better balance (c) land with his knees bent (d) all of the above are correct

31. When closely guarded a player must in 5 seconds: (a) move toward the basket (b) pivot (c) do nothing (d) shoot

32. On a stride stop: (a) the right foot should be forward (b) the left foot should be forward (c) the feet should land parallel

33. As a person stops and pivots, the ball should be held: (a) close to the body (b) arms extended (c) just above the knees (d) over the head

34. Which of the following are essential for a good pivot? (a) head-up (b) head over the mid-point of the body (c) keep low with the feet spread (d) all of the above

35. If you receive a pass within 10 feet of the basket, you should pivot so that you: (a) have your back to the basket (b) are turned sideways to the basket with your strong hand facing the basket (c) turn so that you face the basket squarely (d) burn so that your head is down over the ball protecting it

36. A player securing a defensive rebound should: (a) pivot toward his strong hand (b) pivot toward the near side line (c) make a complete turn and look to both sides before passing

37. To prevent a charging foul, a dribbler must: (a) have his head and shoulders around the defensive man (b) have just his head around him (c) be moving in a certain direction (d) have control of the ball

38. A player landing on both feet with the ball may: (a) use his left foot only as his pivot foot (b) use his right only (c) use either (d) has no right to either being his pivot foot

39. Faking is a basic part of basketball. Which of the following would you consider to be the best method: (a) make all fakes on angles rather than arcs (b) use arm extended fakes because they cause the defense to make a more definite mistake (c) fake using movements of your hips and chest (d) all of the above are correct
40. In cutting toward the basket to receive a pass: (a) use short choppy steps (b) keep your hand open and above the waist (c) throw your head sharply toward the direction you intend to go (d) all are correct

41. The key to any shot you take is: (a) how close are you to the basket (b) position of the defense (c) concentration (d) what the consequences if you miss will be

42. Any player should: (a) practice those shots he'll get in a game (b) evaluate the areas of the court he is most accurate from (c) always try to be consistent with the way he shoots (d) all of them

43. In a game situation, before you shoot: (a) check to see if anyone is in position to rebound (b) be aware if anyone has a closer shot (c) be confident that you can score (d) all are good considerations

44. A ball should always be shot from: (a) the palm (b) the last joint of the fingers (c) both the palm and the finger tips

45. In shooting an outside shot, one should concentrate on the: (a) front rim (b) back rim (c) top of the front rim (d) the square on the backboard

46. Which finger is the last to touch the ball? (a) middle (b) forefinger (c) forefinger and thumb together (d) forefinger and middle together

47. The most accurate shot would have a: (a) low arch (b) medium arch (c) high arch

48. In shooting a jump shot, the ball should leave: (a) as you start to jump (b) as you reach the top of your jump (c) while you are at the very top (d) just as you start down

49. In shooting a jump shot, you should land: (a) in the same place as you shot from (b) slightly ahead of where you shot from (c) slightly behind where you shot from

50. In shooting a basketball: (a) the off hand is on the top of the ball (b) the shooting hand is toward the back and slightly under the ball (c) the forefinger and middle finger are held together (d) all of the above are correct
51. Correct shooting form involves: (a) the forefinger in direct line with your nose (b) the hand, forearm and elbow are in a straight line up the body (c) the head is up and in direct line with the body (d) all of the above __

52. The ball is released: (a) by a quick extension of the elbow and a flick of the wrist (b) by a tensed snap of the fingers (c) out toward the basket in a level trajectory (d) all of the above __

53. In shooting a jump shot: (a) you must get up as high as you can (b) quickness is more effective than height (c) push off from your right foot (d) the way you land is of no importance once you have the shot off __

54. The follow through of a one handed jump shot is: (a) the wrist and fingers stay stiff (b) the thumb and forefinger relax and drop forward toward the little finger (c) the forefinger drops straight down as if it were going into the basket (d) your left wrist also drops straight down with the palm up __

55. When shooting a hook shot, what should come around first? (a) your body (b) your head (c) your arm (d) your left shoulder __

56. On a fast break, it is best to have the ball: (a) in the right lane (b) in the middle lane (c) in the left lane (d) doesn't really matter where it is __

57. In shooting a lay-in from the front you should: (a) lay the ball over the front rim (b) go to the right side and use the backboard (c) go to the left side and use the backboard (d) lay the ball up over the front so it hits the back rim __

58. Lay-ins should be shot: (a) by using a long extended jump (b) by having the shooting hand extended out with the palm up (c) by having the palm facing the backboard __

59. When checking a right handed shooter, it is best to keep which hand up? (a) left (b) neither (c) left and right (d) right __

60. Any shot within 5 feet of the basket requires: (a) concentration on the rim (b) a falling away from the defensive player (c) concentration on the backboard (d) complete relaxation __