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A Comparison of Various Practice Methods Used in Learning to Shoot Free Throws

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A COMPARISON OF VARIOUS PRACTICE METHODS USED IN LEARNING TO SHOOT FREE THROWS

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BY

STANLEY JOSEPH TOMLINSON

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CHAPTER I

INTRODUCTION

Many high school basketball games are won and lost at the free throw line. Since there is a possibility that performance variations could exist due to the learning methods utilized, studies should be completed to determine the effects of various types of practice procedures in learning specific skills. Coaches should concern themselves with improving methods of instruction regarding free throw accuracy. Consequently, there seems to be a need for studying the effects of various types of learning methods on improving free throw accuracy. This study was directed at analyzing the effect of four different learning methods on free throw shooting accuracy.

STATEMENT OF THE PROBLEM

The purpose of this study was to compare four practice methods used in learning to shoot free throws in basketball. The first method, mental learning, was used to instruct subjects by using mental practice procedures. The second method, physical learning, was used to instruct subjects by using physical practice procedures. The third method, physical-mental learning, was used to instruct subjects by using a combination of physical and mental practice procedures. The fourth method, the control group, received no instruction concerning the practice procedure, but received equal time to practice free throw shooting.

Hypothesis

There would be no significant differences among the mental, physical, physical-mental, and control groups following the first, fourth, seventh, and tenth weeks of practice and no significant differences would exist between the first and tenth-week performance among the same groups.

IMPORTANCE OF THE STUDY

Brown[1] completed a study in South Dakota High Schools to determine the effect of the free throw on the outcome of basketball games. The study showed that winning teams committed fewer fouls, attempted more free throws, and converted more free throws.

Gephart[2] did a study on the importance of free throw practice on the outcome of basketball games. The study showed that schools who had higher winning percentages in Iowa, spent more time daily in free throw practice.

Wilkinson[3] did a similar study in Indiana and found that in 50 schools of approximately the same size, the schools

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[1]James A. Brown, "A Study of Winning Basketball Teams in South Dakota." (unpublished Master's thesis, South Dakota State University, 1961).

[2]Richard Gene Gephart, "The Importance of the Free Throw in Basketball Games." (unpublished Master's thesis, Iowa State University, 1963).

[3]William Dale Wilkinson, "A Study of Successful High School Basketball Teams in Indiana." (unpublished Master's thesis University of Indiana, 1960).

over a ten-year period who had higher winning percentages committed fewer fouls and converted a higher percentage of free throws.

Assuming that the research was valid, techniques need to be developed to improve free throw shooting accuracy for intramurals, physical education classes, interscholastic teams, and individual practices.

From a standpoint of observation, many basketball players as well as physical education students are taught the overt skills involving free throw shooting, without regard to the various types of mental and physical practice. Little research has been conducted which concerns instructing students in overt and fine skills of free throw shooting. Therefore, there appeared to be a need for a study relating free throws to physical and mental instruction and practice.

LIMITATIONS

The groups were selected randomly before practice trials were started. Therefore, it could be assumed that they were equal on the first day of shooting performance. The possibility exists that the groups may not have been equal after the pre-test, even though there were no significant differences among the group means when the first day practice scores were compared. Since performance varies from day to day, performance scores over a period of one week may have proven more reliable in the pre-tests for determining the

quality of the groups.

Four separate learning and teaching sessions were held in the first week to relate the subject matter to the subjects.

Definitions of mental practice and physical practice have not been uniform since researchers have not consistently identified the terms. Consequently, the terms of mental practice and physical practice have been uniquely defined for this study.

Many uncontrollable situations existed during this study. There was no way to determine how motivational factors affected performance. The control group did not receive the same amount of attention from the instructor, and this may have influenced their level of motivation.

DEFINITION OF TERMS

Mental Practice

Mental practice was the learning and instruction experienced by subjects through listening to lectures on free throw shooting techniques, watching demonstrations by the instructor and on film, and reading material for free throw skill development. Subjects mentally rehearsed the free throw shooting techniques during a pre-practice period of 10 minutes following instruction.

Physical Practice

Physical practice was the learning and instruction

experienced by subjects through physically participating with the instructor in demonstrations, and physical practice. Trial and correction of errors constituted physical practice. Following instruction subjects physically rehearsed the free throw skills during a pre-practice period of 10 minutes.

Physical-Mental Practice

Physical-mental practice was the combining of mental practice procedures with the physical practice procedures as defined above. Pre-practice periods of 10 minutes followed instruction for mental and physical rehearsal.

Control Group

The control group received no instruction, but participated in shooting practice and received equal time at practice sessions.

Free Throw

The free throw was a free attempt at a basket as scored in a basketball game.

CHAPTER II

REVIEW OF LITERATURE

The literature was reviewed to summarize some of the previous research which concerned established form techniques in free throw shooting, comparisons of free throw methods in producing accuracy, and mental and physical practice in learning motor skills.

TECHNIQUES OF FREE THROW SHOOTING

At Valparaiso High School, Valparaiso, Indiana, a basketball coach[1] used a regimen technique in free throw shooting. He taught the technique of placing the second finger of the shooting hand on the air valve of a basketball. The free hand was used as a guide, and the thumb was near the center of the ball. No scientific studies have been completed on the effectiveness of this technique. However, in the past ten years with this method, the Valparaiso High School teams have never shot below 79 percent for an entire season. They hold the National High School record for team percentage during one season, which is 89.4 percent.

In the same ten year period, Valparaiso teams have won 66 games in which they were outscored from the field. The longest consecutive record of free throws made in practice by a Valparaiso player was 409 free throws. The longest

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[1]Virgil Sweet, Free Throw Shooting Techniques (Englewood Cliffs, New Jersey: Coaches Book Club Press, 1966), pp. 1-175.

consecutive record of free throws made in competition was set by the same player at 54. Several Valparaiso players made more than 40 free thros in a row during competition, and eleven players made 100 consecutive free throws in practice.

COMPARISONS OF PRACTICE METHODS

Dehnert[2] conducted a study on the effects of two methods of instruction upon free throw shooting ability. He investigated the effects of a kinesiological and a conventional method of instruction upon the development of the two-handed chest shot for free throws. The elements of a successful free throw were defined for all subjects as accuracy, angle of projection, and velocity. There were two control groups and two experimental groups with two teachers. Each teacher had one control group and one experimental group. Dehnert's study concluded that the control groups showed a greater variation from the mean for velocity and accuracy and approximately the same variation for angle of projection when compared with the experimental groups.

Takacs[3] completed a study on the effects of two methods of practice on basketball free throw shooting. Sixty male

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[2]Annete E. Dehnert, "A Comparison of the Effects of Two Methods of Instruction Upon Free Throw Shooting Ability," (unpublished Master's thesis, University of Iowa, 1962).

[3]Robert Takacs, "A Comparison of the Effects of Two Methods of Practice on Basketball Free Throw Shooting," (unpublished Master's thesis, Indiana State University, 1965).

grade school students were divided into matched groups by the Johnson Test of Motor Educability and an initial free throw shooting test.

Group "A" shot 20 free throws at a small 14 inch diameter basket five days per week. Group "B" followed the same procedure using an official basket, 18 inches in diameter. Group "C" took part in a regular physical education class for the four weeks of the experiment. The subjects then repeated the free throw shooting test. The small basket group showed a 37 percent gain in accuracy while the official basket group improved 29 percent. The control group showed a nine percent loss. Free throw shooting at a small or a regulation basket produced a significant improvement over the four-week period. Free throw shooting at a small basket produced significantly greater accuracy than no practice, but the other differences were not significant.

Jable[4] studied the relative effects of training with basketballs of varying weights upon free throw accuracy. Male college students were assigned to one of three groups on the basis of a pre-test with 21 ounce regulation basketballs.

During the five-week experimental period, one group practiced with regulation basketballs, the second group used 16 ounce basketballs, and the third group practiced with 40 ounce basketballs. All subjects were retested with regulation

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[4]John T. Jable, "The Relative Effects of Training with Basketballs of Varying Weights Upon Free Throw Shooting Accuracy." (unpublished Master's thesis, Kent State University, 1965).

basketballs following the training period. The only significant difference favored the group using the 40 ounce basketballs. Practice with the regulation basketball and the 16 ounce basketball did not affect free throw shooting performance.

Kite[5] completed a study concerning the effects of variations in target size and two methods of practice on the development of accuracy in a motor skill. Eighty high school freshmen and sophomore boys were divided into four equated groups on the basis of the one-hand push shot in basketball.

The subjects practiced four days per week for a period of four weeks with either the official 18 inch basket, 15 inch basket, 18 inch basket with target installed, or 21 inch basket. Half of the subjects in each group attempted 20 shots and the other half attempted 40 shots per practice period.

Analysis of variance indicated that practice with all four target sizes resulted in significant gains, but not in significant differences between the target sizes. Kite concluded that practicing 40 shots per period was significantly superior to practicing 20 shots per period in developing accuracy.

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[5]Joseph C. Kite, "The Effects of Variations in Target Size and Two Methods of Practice on the Development of Accuracy in a Motor Skill," (unpublished Master's thesis, Illinois State University, 1964).

Minahan[6] experimented with a restrictive goal device, designated to improve basketball free throw shooting accuracy of ninth grade boys. Two parallel groups were randomly extablished from 50 ninth grade boys paired on the basis of a pre-test of four 25 free throw trials.

The odd-even pre-test reliability coefficient was .82. A 20 day controlled practice program was conducted with subjects shooting 50 free throws per day. One group shot at regulation goals and the other group shot at goals with a restrictive device inserted. The final test was in two parts and correlated .54. Minahan found that the group shooting at the restricted goal scored higher on the final test with mean differences of 2.74 and 2.24 (significant at the 10 and 13 percent levels.) Therefore, the null hypothesis was not rejected at the five percent level.

Maaske[7] studied the effect of working with small baskets on the accuracy of free throw shooting in basketball. Twenty-six members of a college freshman basketball team were divided into two groups. Over a period of two basketball seasons, one group practiced shooting at 15 inch baskets and the other group practiced shooting at official baskets.

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[6]Fred B. Minahan, "An Experiment With a Restrictive Goal Device Designated to Improve Basketball Free Throw Shooting Accuracy of Ninth Grade Boys," (unpublished Master's thesis, University of Wisconsin,1964).

[7]Paul W. Maaske, "The Effect of the Practice of Free Throw Shooting at Small Baskets on the Accuracy of Free Throw Shooting," (unpublished Master's thesis, Indiana State University, 1961).

A shooting test of 450 shots was made at the beginning and end of each practice.

Throughout the two seasons a record of the shots attempted and the shots made in practice games and in inter-scholastic games was kept for each player. The results appeared to warrant the conclusion that practice in shooting at non-official baskets were significantly greater than practice in shooting at official baskets.

Lenguardo[8] found that the amount of time taken to execute a free throw had a direct effect on the success in free throw shooting in basketball. Lenguardo's study pointed out that players who concentrate longer and take more time, are more successful free throw shooters than those taking less time and concentration.

MENTAL AND PHYSICAL PRACTICE

Stebbins[9] sought to determine the relative effectiveness of mental and physical practice upon the learning of a selected motor skill, and the possible differential effects of mental practice during different stages of the learning period.

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[8]James Lenguardo, "The Relationship Between the Time Taken to Execute Free Throws and Success in Free Throw Shooting in Basketball," (unpublished Master's thesis, Western Michigan University, 1961).

[9]Richard J. Stebbins, "A Comparison of the Effects of Physical and Mental Practice in Learning a Motor Skill," Research Quarterly, 39:714-720, October, 1968.

Ninety-three male volunteers were used as subjects. They were randomly assigned to the following treatment conditions. The control group received no practice. The mental practice group was instructed to stand beside the subjects who were physically practicing the skill. They were asked to try to visualize all the sensations the physical group experienced on the initial test and to mentally rehearse throwing 25 balls at the target. The physical practice group practiced throwing 25 balls at the target. The mental-physical practice group was assigned to mentally practice the skill from the first through the tenth practice sessions, and beginning with the eleventh practice session physically practiced the skill through the eighteenth practice session. The physical-mental practice group physically practiced from the first through the tenth practice sessions, and mentally practiced the skill from the eleventh through the eighteenth practice session. Practice consisted of throwing rubber balls at a target from a distance of fifteen feet. The practice period lasted for eighteen days.

Initial and final tests were administered to determine the increase in skill. The analysis of variance was used and the results showed that the only significant improvement occurred in the combination-type treatment conditions. Trend analysis was used to evaluate the changes in the daily practice scores. The results indicated that either mental or physical practice was effective during the first half of the skill development period.

Oxendine[10] studied the effect of mental and physical practice on the learning of three motor skills. The study used three separate experiments involving the pursuit rotor, a soccer kick for accuracy, and a modified jump shot. Research was conducted in three Philadelphia high schools.

Two hundred and twelve seventh-grade boys served as subjects in the study. In each experiment, four groups practiced for seven successive school days. Three of the groups followed schedules which included different proportions of mental and physical practice only. Results showed that up to 50 percent of the practice time or trials in mental practice were as effective as 100 percent of the time in physical practice. This was limited to subjects within the normal intelligence range. IQ scores were indicative of one's ability to benefit from mental practice. Seventh-grade boys responded favorably and conscientiously to the suggestion of mental rehearsal. However, when used to excess, indications were that up to three-fourths of the practice time tended to bore students and they were impatient with the technique.

Richardson[11] concluded that mental practice procedures were associated with improved performance of the task.

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[10]Joseph B. Oxendine, "Effects of Mental and Physical Practice on the Learning of Three Motor Skills," Research Quarterly, 40: 755-763, December, 1969.

[11]Alan Richardson, "Mental Practice: A Review and Discussion," Research Quarterly, 38: 95-107, March, 1967.

Although most studies have found that physical practice was superior to mental practice, several studies concluded that a combination of physical and mental practice was always as effective, and in some cases more effective, than physical practice alone.

Cratty[12] stated that significant differences in performance existed between groups who were told to "think about" or rehearse a task mentally without actually moving, and those not instructed to do so. Difficulty existed in determining what the subjects really thought. Investigations have demonstrated that some muscular movement is taking place while a person thinks about the task.

Some corollaries concerning mental practice were developed. Cratty stated,

> "Mental rehearsal of the task will positively influence learning, particularly when combined with actual physical practice. Mental rehearsal alone will not aid performance and learning more than physical practice. The positive effects of mental rehearsal were not influenced by slight differences in the intelligence of the learners. Mental practice was not influential of performance change in tasks requiring endurance."

The study concluded that mental practice has been particularly helpful in gymnastic skills. In skills that required hand-eye coordination, mental practice combined with physical practice improved performance significantly. Mental

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[12] Bryant J. Cratty, Psychology and Physical Activity, (Englewood Cliffs, New Jersey: Prentice-Hall, Inc.), P. 143.

practice has had little effect upon group performance in which complex team patterms are to be acquired.

Singer[13] has stated that time spent in overt physical activity may be replaced with verbal instruction, directions, films, viewing another's performance, reading material, and mental imagery or practice.

Mental practice, under many conditions, has been shown to be beneficial as a method of learning and improving motor performance. In Singer's words, "the ratio of mental and physical practice will provide many physical educators new outlets for teaching."

Oxendine[14] pointed out that many things can effect mental and physical practice. He cited a study by Clark on the effect of mental practice on the development of a certain motor skill. Clark studied the basketball free throw with mental rehearsal or practice. High school boys practiced the one-hand foul shot. The subjects were divided into mental and physical groups on the basis of intelligence, arm strength, and basketball playing experience.

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[13]Robert N. Singer, Motor Learning and Human Performance (New York: The Macmillan Company), PP. 216-218.

[14]Joseph B. Oxendine, Psychology of Motor Learning (New York: Appleton-Century-Crofts), P. 230-231, citing L. V. Clark, "The Effect of Mental Practice on the Development of a Certain Motor Skill, "Research Quarterly, 31: 560-569, December, 1960.

On the first day, both the mental group and the physical group were given their instructions. These were followed by 25 practice shots and then 25 shots for score. For each of the next fourteen school days, the physical group practiced 5 warm-up shots and 25 shots for score. For that same period, the mental practice group was instructed to imagine shooting 5 warm-up shots and 25 shots for score. The daily mental practice of this group was preceded by reading through a work sheet which described the correct execution of the shot.

After 14 days of practice, Clark administered a re-test to both groups. He found that both the physical and the mental practice groups showed highly significant gains in shooting ability. The physical practice group showed only a slight advantage over the mental practice group. All mental practice subjects reported a gain in the ability to visualize or imagine shooting techniques. Clark also reported that arm strength seemed to make a difference in shooting performance. However, general intelligence did not appear to be a factor in shooting skill or the ability to benefit from mental practice.

SUMMARY

From the literature surveyed, it was apparent that other investigators found it important to have established techniques in teaching the free throw skill. The various instructional and practice methods studied, revealed that free

throw accuracy was improved by many different means. The most significant literature studied was the effects of mental and physical practice on various skill performances. It was evident that mental and physical practice together produced the most significant improvement in skill performances. This study was initiated to compare the effects of mental practice, physical practice, physical-mental practice, or no practice on free throw shooting skill.

CHAPTER III

METHODOLOGY

The primary purpose of this study was to investigate the differences in performing free throw shooting among four groups which utilized different learning and practice procedures. The first method, mental practice, consisted of learning and instruction through lectures, discussion, films, demonstrations, and reading material. The second method, physical practice, consisted of learning and instruction by physically performing the free throw shooting task. The third method, physical-mental practice, was a combination of mental practice and physical practice learning and instruction procedures. A fourth group, the control group, received no formal learning or instruction, but were allowed the same amount of free throw practice time. Subjects in the mental, physical, and physical-mental practice groups were instructed in the skill techniques of free throw shooting during the first four days in the first week of practice.

The groups practiced five days each week for the remaining nine weeks. The subjects attempted 100 free throws per day and the number of successful attempts for each group was recorded. Mean weekly scores were utilized to determine the differences among the groups for the first, fourth, seventh, and tenth weeks of free throw shooting. Data concerning free throw accuracy was collected within the groups between the first and tenth weeks of free throw shooting.

SUBJECTS

The subjects used in this study were 40 sophomore boys from Champaign Centennial High School in Champaign, Illinois. Sixty-three boys originally applied to participate in the study. The 40 subjects were selected by randomly drawing their names from a box.

Grouping of the Subjects

The subjects were randomly assigned to one of four groups. The first name drawn was assigned to the mental practice group, the second name to the physical practice group, the third name to the physical-mental practice group, and the fourth name to the control group. This process was continued until all groups contained 10 subjects.

DESIGN OF THE STUDY

After the subjects were grouped, the purpose and aim of the study was explained. Each group was then sub-divided into two free throw shooting groups so the practice time following the instructional period would be less. The subjects were taken to the gymnasium and shown the shooting stations for their individual groups. Each group remained at the same basket throughout the ten-week practice sessions.

Instructional Sessions

The instructional sessions started on Monday, March 29, 1971 and they were held each day Monday through Friday. Mental

instruction for the mental and physical-mental groups involved the following methods: 1) demonstration, 2) lecture, 3) reading material, 4) films, and 5) questions and answers. Physical instruction for the physical and physical-mental groups was demonstration by the instructor and physically participating in the instruction by the subjects. The control group received no instruction.

Instructional period one. The first instructional period involved teaching the control of the body at the time of the shot. The body was to be in a state of controlled tenseness rather than totally relaxed. All subjects were encouraged to do the same movements every time they prepared to shoot a free throw. A right-handed shooter placed the right foot at a 75 degree angle to the foul line and near the center of the line. The left foot was extended back and no more than four to six inches to the left of the right heel, and only the ball of the left foot touched the floor. The majority of the body weight was placed on the front foot. If the back foot was raised from the floor, the shot was not influenced by this movement. The right knee was flexed for proper control of the upper body. The amount of flexion depended upon the strength, height, and weight of the subject. The hips were hyper-extended forward so that all movement was propelled forward during the shot. The hips, legs, and feet were extended in an upward motion. A film was shown to further familiarize the subjects with the instruction.

Reading material was passed to subjects for review. Questions and answers ended the instruction period.

Instructional period two. Hand placement was the topic of the second instructional period. The free or guide hand was placed on the side of the ball. The thumb of the free hand was placed on the intersection of all the seams, and the fingers were spread evenly in a comfortable position. The free hand acted as a guide, and was not a source of power for shooting the ball. The shooting hand fingers were equally spread and placed firmly on the ball. The thumb and fingers of the shooting hand formed a 45 degree angle between the index finger and the thumb. The second finger on the shooting hand pointed toward the air valve but did not cover the valve. The basketball was placed at the waist or slightly below before the action of shooting the ball was started. A film, reading material, and questions and answers ended the second instructional session.

Instructional period three. Instructional period three involved teaching the use of the wrist, elbow, and forearm in shooting a free throw. The wrist on the shooting arm was hyperextended at the instant the ball was in the shooting position for the free throw. Movement of the wrist was limited to flexion or snapping the wrist so the ball moved upward and outward towards the basket at approximately a 45 degree angle to the floor. Propelling the basketball toward

the basket was performed with the three fingers on the shooting hand.

The elbow of the shooting arm was up and not drooped. Before the basketball was released, the elbow was aimed directly at the basket. During the release of the shot, the elbow did not drop more than one inch.

Prior to releasing the basketball, the forearm was perpendicular to the floor. When the basketball was released, the forearm guided the hand and wrist directly at the basket. The forearm followed the arch of the ball, and the wrist was extended during the release of the shot. In its trajectory to the basket, the basketball rotated approximately two and one half times. The instructional session ended with the same teaching aids used in the previous two periods.

Instructional period four. Eye placement was emphasized during the last instructional period. While the ball was held at eye level, the basketball rim was sighted on the front edge over the index finger of the shooting hand. The basketball was shot over the front edge of the rim. After sighting the basket, there was a two-second pause just prior to shooting the ball, which insured complete concentration.

Practice Sessions

Practice consisted of pre-practice and practice

sessions. Pre-practice was either mental pre-practice or physical pre-practice. Following instructional periods one, two, three, and four the mental, physical, and physical-mental groups received 10 minutes of pre-practice time to rehearse the instruction. The control group did not receive instruction, however, they were allowed the same amount of pre-practice time. Practice sessions consisted of shooting 100 free throws daily following the instruction, pre-practice periods, and during the remaining weeks in the study for all groups. The practice periods varied from 20 to 40 minutes in length.

Mental pre-practice. Mental pre-practice for the mental and physical-mental groups involved mentally rehearsing the instruction for a period of 10 minutes. No physical action occurred during the mental pre-practice period.

Physical pre-practice. Physical pre-practice was physically rehearsing the instruction for a period of 10 minutes in the physical and physical-mental groups. The subjects imitated the demonstration during physical pre-practice and actually shot the basketball for a trial and error procedure.

Motivational techniques. Subjects who had the highest individual practice free throw score were awarded a carbonated beverage and a bar of candy within each group daily. A dinner was awarded to the group that scored the

highest number of daily practice free throws above the pre-test score. The motivational factors were used to encourage subjects over the ten-week period.

Pre-test. The scores for the first day of the study consisted of each subject shooting 100 free throws. The mean scores of each group were compared to determine whether the groups were equated on free throw shooting ability.

Collection of the Data

The subjects reported their scores to a recorder at a table located in a corner of the gymnasium. Scores were reported following each practice session on the basis of how many free throws were made out of 100 attempted. Each group reported to the instructor when all scores for that group had been recorded.

Recording of the data. Free throw scores reported by subjects in practice sessions were recorded on a free throw record chart. The chart had the name of the group and 10 subdivisions for the names of the subjects. Five columns were designed to contain the daily practice scores of individual subjects. The five week-days headed the five columns. A sixth column was used to sum the weekly total practice scores. Below the tenth name on each recording sheet, a daily total line was used for adding the group's daily free throw practice total. Scores were entered

according to the subject's name on the line and the day of the week on the column following practice sessions.

STATISTICAL PROCEDURES

The computational work was completed manually. Weekly mean scores for each subject were computed from the first through the tenth weeks.

The t-ratio was the statistic used to test the significance of the differences among the means of the mental, physical, physical-mental, and control groups during the first, fourth, seventh, and tenth weeks of the study. The t-ratio was also used to test the significance of the difference between the first and tenth week means for each of the four groups studied.

CHAPTER IV

ANALYSIS OF THE DATA

The purpose of this study was to compare four different learning and practice methods of free throw shooting among four groups. The instructional periods were organized to use lectures, demonstrations, discussions, films, and reading materials. The mental practice group mentally rehearsed the free throw shooting techniques following the instruction during a pre-practice period of 10 minutes. The physical practice group physically practiced the instruction during the pre-practice period of 10 minutes. The physical-mental practice group mentally rehearsed instruction for 10 minutes of the pre-practice period and physically practiced the skill during another 10 minutes of pre-practice. The control group received no instruction, but were given 10 minutes of pre-practice time of their own.

Following the pre-practice sessions each of the four groups practiced shooting 100 free throws five days a week for a period of 10 weeks.

The subjects were 40 sophomore boys from Champaign Centennial High School in Champaign, Illinois. Ten subjects were assigned to each group by a random selection technique.

The information collected concerned the improvement of free throw accuracy among the mental, physical, physical-mental, and control groups from the first, fourth, seventh, and tenth weeks of free throw shooting practice. Data was

collected to determine the improvement in free throw accuracy within each group between the first and tenth weeks of free throw shooting practice.

PRESENTATION OF THE DATA

The scores for each subject in each group for the 10 week period of the study have been placed in the Appendix. In addition, the weekly scores for each group, and the comparisons of the groups on the first day of the study were placed in the Appendix. The weekly mean scores for each group were used to compare the groups.

Comparisons Among the Groups

The mean scores, standard deviation, mean differences, and t-ratios for the first, fourth, seventh, and tenth weeks of practice for the mental, physical, physical-mental, and control groups have been compared. A t-ratio of 2.101 was needed at the .05 level of confidence with 18 degrees of freedom for a mean difference to be significant.

First week. The mean scores for the mental, physical, physical-mental, and control groups for the first week were 32.74, 30.62, 33.16, and 29.00. There were no significant differences among the four means during the first week of practice. The statistical data for the first week have been placed in Table 1.

TABLE 1

Comparison of Mean Free Throw Scores Among the Mental Practice Group, Physical Practice Group, Physical-Mental Practice Group, and Control Group during First Week of Practice

Subject	Mental Group (A)	Physical Group (B)	Physical-Mental Group (C)	Control Group (D)
1	51.2	44.4	22.6	21.2
2	23.8	32.0	28.8	30.6
3	22.0	19.4	34.4	23.4
4	34.4	39.2	27.8	32.8
5	34.8	20.0	20.4	38.2
6	41.8	46.6	44.0	22.0
7	32.8	30.4	35.8	18.2
8	26.0	16.8	25.0	48.4
9	41.2	30.4	46.8	22.4
10	19.4	27.0	46.0	32.8
Mean	32.74	30.62	33.16	29.00
S.D.	10.10	10.30	9.80	9.40

Mean Difference

	A	B	C	D
A		2.12	.42	3.74
B			2.54	1.62
C				4.16

t-ratio

	A	B	C	D
A		.47	.10	.85
B			.56	.37
C				1.00

t-ratio of 2.101 was needed for a significant difference at the .05 level of confidence.

Fourth week. The statistical information concerning the fourth week of practice have been placed in Table 2. The mean scores for the mental, physical, physical-mental, and control groups were 40.62, 38.68, 44.70, and 30.02. The mental group and the physical-mental group mean scores were significantly better than the control group during the fourth week of the study but were not significantly different from the physical group.

Seventh week. During the seventh week the mean scores for the mental, physical, physical-mental, and control groups were 44.90, 44.60, 50.02, and 33.36 respectively. There was a mean difference of 16.66 between the physical-mental group and the control group, 11.54 mean difference between the mental and control groups, and, a mean difference of 11.24 between the physical and control groups. Each of the group scores were significantly higher than the control group. The statistical information for the seventh week of the study have been placed in Table 3.

Tenth week. The mean score for the mental group was 45.34; the physical group 53.02; the physical-mental group 54.40; and the control group 38.22. The mean difference of 14.80 between the physical group and the control group showed the physical group scores to be significantly higher. There was a mean difference of 16.18 between the physical-mental group scores and the control group scores. The

TABLE 2

Comparison of Mean Free Throw Scores Among the Mental Practice Group, Physical Practice Group, Physical-Mental Practice Group, and Control Group during Fourth Week of Practice

Subject	Mental Group (A)	Physical Group (B)	Physical-Mental Group (C)	Control Group (D)
1	50.6	54.0	34.4	24.4
2	25.4	44.8	37.4	28.8
3	37.0	23.2	55.6	26.2
4	61.2	43.0	54.4	27.8
5	36.6	23.2	27.6	38.6
6	53.2	52.6	48.4	25.8
7	38.2	49.0	47.0	26.6
8	30.0	24.2	28.0	48.2
9	50.8	44.4	50.2	28.0
10	23.2	23.4	64.0	25.8
Mean	40.62	38.68	44.70	30.02
S.D.	12.67	12.70	12.30	7.40

Mean Difference

	A	B	C	D
A		1.94	4.08	10.60
B			6.02	8.66
C				14.68

t-ratio

	A	B	C	D
A		.33	..73	2.30*
B			1.10	1.90
C				3.30*

*t-ratio of 2.101 was needed for a significant difference at the .05 level of confidence.

TABLE 3

Comparison of Mean Free Throw Scores Among the Mental Practice Group, Physical Practice Group, Physical-Mental Practice Group, and Control Group during Seventh Week of Practice

Subject	Mental Group (A)	Physical Group (B)	Physical-Mental Group (C)	Control Group (D)
1	51.4	58.2	42.8	27.8
2	33.0	57.6	43.8	32.8
3	52.6	36.0	57.6	31.0
4	69.4	53.2	59.8	32.6
5	39.8	26.6	31.2	47.8
6	51.2	62.2	53.6	29.2
7	36.2	43.2	58.0	37.4
8	32.4	29.8	29.0	44.6
9	54.6	56.8	61.0	24.6
10	28.4	22.6	63.4	25.6
Mean	44.9	44.6	50.02	33.36
S.D.	14.6	14.8	12.20	7.70

Mean Difference

	A	B	C	D
A		.30	5.12	11.54
B			5.42	11.24
C				16.66

t-ratio

	A	B	C	D
A		.005	.85	2.21*
B			.89	2.12*
C				3.69*

*t-ratio of 2.101 was needed for a significant difference at the .05 level of confidence.

physical-mental group scores were significantly higher. The statistical data for the tenth week have been placed in Table 4.

Comparison of Each Group's First and Tenth Week Scores

The mean scores, standard deviations, mean differences, and t-ratios for the first and tenth weeks of practice have been compared within the mental, physical, physical-mental, and control groups. A t-ratio of 2.262 was needed at the .05 level of confidence with nine degrees of freedom for a significant difference.

Mental group. The mean scores for the mental group during the first and tenth weeks were 32.74 and 45.34 respectively with a mean difference of 12.60, the tenth week mean free throw score of the mental group was significantly higher than the first week mean socre. The statistical data for the mental group have been placed in Table 5.

Physical group. The statistical information concerning the physical group's first and tenth weeks mean free throw scores have been placed in Table 6. The first and tenth weeks mean free throw scores were 30.62 and 53.02 respectively. There was a mean difference of 22.40 between the first and tenth weeks mean free throw socres, and the tenth week mean score for the physical group was significantly higher than the first week socre.

TABLE 4

Comparison of Mean Free Throw Scores Among the Mental Practice Group, Physical Practice Group, Physical-Mental Practice Group, and Control Group during Tenth Week of Practice

Subject	Mental Group (A)	Physical Group (B)	Physical-Mental Group (C)	Control Group (D)
1	46.0	71.8	52.4	31.2
2	37.8	57.8	42.6	35.4
3	55.4	49.6	61.2	26.8
4	62.8	55.0	67.0	34.0
5	42.6	27.0	38.4	52.4
6	38.2	71.8	56.2	34.2
7	41.8	54.8	65.2	51.0
8	38.0	47.2	34.0	56.2
9	55.8	63.4	59.0	30.0
10	35.0	31.8	68.0	31.0
Mean	45.34	53.02	54.40	38.22
S.D.	9.4	14.90	12.20	10.67

Mean Difference

	A	B	C	D
A		7.68	9.06	7.12
B			.38	14.80
C				16.18

t-ratio

	A	B	C	D
A		1.4	1.89	1.61
B			.203	2.55*
C				3.17*

*t-ratio of 2.101 was needed for a significant difference at the .05 level of confidence.

TABLE 5

Comparison of Mental Practice Group Mean Free Throw Scores Between the First and Tenth Weeks of Practice

Subject	Mental Group (First Week)	Mental Group (Tenth Week)
1	51.2	46.0
2	23.8	37.8
3	22.0	55.4
4	34.4	62.8
5	34.8	42.6
6	41.8	38.2
7	32.8	41.8
8	26.0	38.0
9	41.2	55.8
10	19.4	35.0
Mean	32.74	45.34
Standard Deviation	10.10	9.40

Mean Difference: 12.60 t-ratio: 2.92*

*t-ratio of 2.101 was needed for a significant difference at the .05 level of confidence.

TABLE 6

Comparison of Physical Practice Group Mean Free Throw Scores Between the First and Tenth Weeks of Practice

Subject	Physical Group (First Week)	Physical Group (Tenth Week)
1	44.4	71.8
2	32.0	57.8
3	19.4	49.6
4	39.2	55.0
5	20.0	27.0
6	46.6	71.8
7	30.4	54.8
8	16.8	47.2
9	30.4	63.4
10	27.0	31.8
Mean	30.62	53.02
Standard Deviation	10.30	14.90

Mean Difference: 22.40 t-ratio: 3.93*

*t-ratio of 2.101 was needed for a significant difference at the .05 level of confidence.

Physical-mental group. Mean free throw scores for the physical-mental group were 33.16 and 54.40 respectively for the first and tenth weeks comparison. There was a mean difference of 21.24 between the first and tenth weeks scores, and the tenth week mean free throw score of the physical-mental group was significantly higher than the first week score. The statistical information for the physical-mental group's first and tenth weeks mean free throw scores have been placed in Table 7.

Control group. A comparison of the first and tenth weeks mean free throw scores of the control group revealed a mean difference of 9.22. The first week mean free throw score was 29.00 for the control group followed by the tenth week mean score of 38.22. The tenth week mean free throw score was not significantly higher than the first week mean free throw score. The data for the control group have been placed in Table 8.

SUMMARY AND DISCUSSION OF THE DATA

From the statistical information presented, the physical-mental group had a significantly higher mean difference than the control group during the fourth, seventh, and tenth weeks of free throw shooting. The mean differences for the physical-mental and control groups were 14.68, 16.66, and 16.18 respectively. The physical group's seventh and

TABLE 7

Comparison of Physical-Mental Practice Group Mean Free Throw Scores Between the First and Tenth Weeks of Practice

Subject	Physical-Mental Group (First Week)	Physical-Mental Group (Tenth Week)
1	22.6	52.4
2	28.8	42.6
3	34.4	61.2
4	27.8	67.0
5	20.4	38.4
6	44.0	56.2
7	35.8	65.2
8	25.0	34.0
9	46.8	59.0
10	46.0	68.0
Mean	33.16	54.40
Standard Deviation	9.80	12.20

Mean Difference: 21.24 t-ratio: 4.34*

*t-ratio of 2.101 was needed for a significant difference at the .05 level of confidence.

TABLE 8

Comparison of Control Group Mean Free Throw Scores Between the First and Tenth Weeks of Practice

Subject	Control Group (First Week)	Control Group (Tenth Week)
1	21.2	31.2
2	30.6	35.4
3	23.4	26.8
4	32.8	34.0
5	38.2	52.0
6	22.0	34.2
7	18.2	51.0
8	48.4	56.2
9	22.4	30.0
10	32.8	31.0
Mean	29.00	38.22
Standard Deviation	9.40	10.67

Mean Difference: 9.22 t-ratio: 2.09

*t-ratio of 2.101 was needed for a significant difference at the .05 level of confidence.

tenth weeks mean free scores were significantly higher as was the mental group's fourth and seventh weeks mean scores when compared to the control group. No other significant differences existed during the first, fourth, seventh, and tenth weeks mean free throw scores.

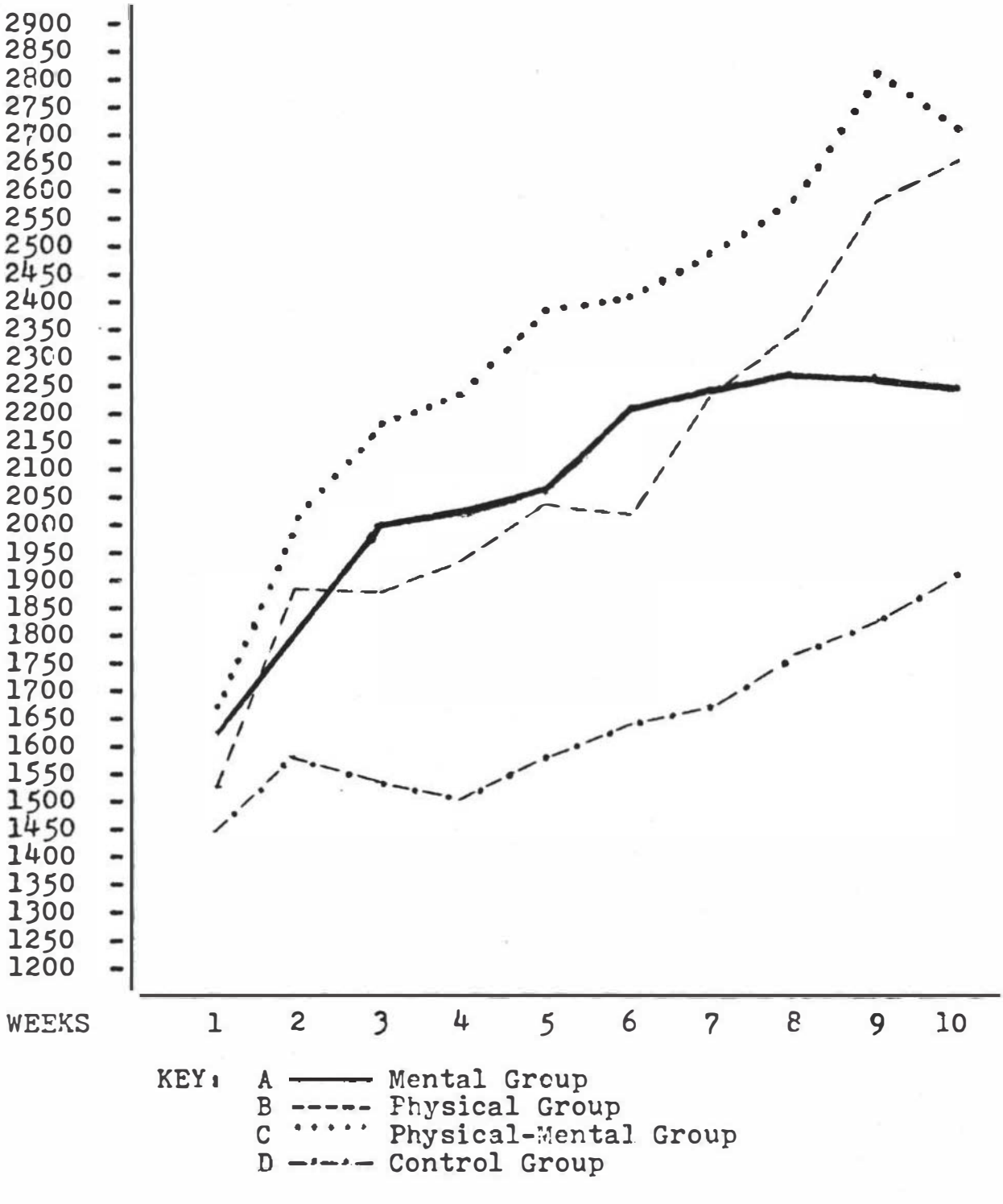
A comparison of the four groups' first and tenth weeks mean free throw scores showed that the physical-mental, physical, and mental groups each improved significantly while the control group showed no significant improvement. The physical-mental group had the highest mean gain and was followed by the physical group and the mental group respectively.

A performance curve has been presented in Figure 1 to depict the improvement in the performance free throw shooting from the first week through the tenth week for each of the four groups. The performance curves have indicated that the physical-mental group scores improved more than the other three groups, and was followed by the physical group, mental group, and control group respectively. Total weekly scores referred to in Figure 1 indicate the total of the ten subjects' weekly free throw scores for each week.

FIGURE 1

Total Weekly Free Throw Performance

Total weekly scores of mental practice group (A), physical practice group (B), physical-mental practice group (C), and control group (D) from the first through the tenth weeks.



CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

SUMMARY

The purpose of this investigation was to compare four different methods of performing free throw shooting which utilized different learning and practice procedures. The first method, mental learning, consisted of learning and instruction through lectures, films, discussions, demonstrations, and reading materials followed by 10 minutes of mental pre-practice rehearsal. The second method, physical learning, consisted of learning and instruction by physically performing the free throw shooting task. Physical learning was followed by 10 minutes of physical pre-practice. The third method was a combination of mental and physical learning. Following the instructional procedures, there was 10 minutes of mental pre-practice and 10 minutes of physical pre-practice given to the physical-mental learning group. A fourth group, the control group, received no instruction, but were given the same amount of time for pre-practice and practice.

The subjects in the three learning groups were instructed in a specific technique of free throw shooting during four days of the first week of learning. The duration of the study was 10 weeks. The groups practiced five days each week and attempted 100 free throws during

each practice session following the pre-practice period.

The subjects used in the study were 40 sophomore boys from Champaign Centennial High School in Champaign, Illinois. After the subjects were selected, they were randomly placed into four groups.

Scores were recorded, and mean weekly scores were utilized to determine the differences among the groups during the first, fourth, seventh, and tenth weeks of free throw shooting practice. Data concerning a comparison of free throw accuracy within each group was collected following the first and tenth weeks of free throw shooting practice.

Summary of Results

A t-ratio was applied to compare the four groups following the first week of free throw shooting practice. There were no statistically significant differences among the means of the mental practice group, physical practice group, physical-mental practice group, or the control group.

However, statistically significant differences did occur in the comparison of free throw shooting means following the fourth week of practice for two of the four groups. The physical-mental group and the mental group showed significant improvement over the mean free throw scores of the control group. During the seventh week, the physical-mental, mental, and physical groups all showed

statistical improvement over the control group. The tenth week mean comparisons among the groups indicated that the physical-mental group and the physical group mean free throw scores were significantly higher than the control group's scores. No other statistically significant differences occurred.

A comparison of mean free throw scores within each group during the first and tenth weeks of practice showed that the physical-mental, physical, and mental groups all made statistically significant improvement. The physical-mental group ranked first in statistical significance followed by the physical and mental groups respectively. The control group made no statistical improvement.

CONCLUSIONS

The following conclusions are presented based on the information presented in this study:

1. The physical-mental method of learning produces the best free throw performance during the fourth, seventh, and tenth weeks of free throw shooting.

2. The mental method of learning free throw shooting produces the second best performances during the fourth and seventh weeks of free throw shooting.

3. The physical method of learning produces the third best free throw performance during the seventh week and the second best performance at the end of the tenth week.

4. The physical-mental method of learning produces the greatest gains in shooting performance. The physical group ranked second, and the mental group proved to be third.

RECOMMENDATIONS

As the result of this study, it is recommended that a similar study be undertaken to investigate motivational factors and how they affect free throw shooting performance. Similarly, a study should be conducted to determine how mental and physical performance is affected when films and other visual aids are used as a part of the instruction.

APPENDIXES

APPENDIX A

Mental Practice Group Free Throw Scores

First Week Free Throw Scores

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
R. C.	52	48	50	55	51	51.2
D. C.	25	21	22	24	27	23.8
G. S.	20	22	20	22	26	22.0
T. A.	40	44	36	16	36	34.4
D. H.	36	32	31	37	38	34.8
R. P.	48	37	41	40	43	41.8
D. P.	38	29	31	30	36	32.8
D. T.	26	22	30	24	28	26.0
K. T.	50	50	46	20	40	41.2
D. W.	19	17	21	18	22	19.4
Total	354	322	328	286	347	327.4

APPENDIX A

Second Week Free Throw Scores
Mental Practice Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
R. C.	55	52	62	58	56	56.6
D. C.	31	33	28	32	34	31.6
G. S.	40	36	40	30	40	37.5
T. A.	54	50	68	48	50	54.0
D. H.	34	31	36	38	35	34.8
R. P.	45	49	44	52	54	48.8
D. P.	34	31	38	40	42	37.0
D. T.	25	28	24	31	29	27.4
K. T.	44	51	48	53	52	49.6
D. W.	18	23	20	24	22	21.6
Total	380	384	408	406	414	398.4

APPENDIX A

Third Week Free Throw Scores

Mental Practice Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
R. C.	56	52	62	60	59	57.8
D. C.	32	33	28	34	37	32.8
G. S.	32	22	46	40	38	35.6
T. A.	62	46	48	38	72	53.2
D. H.	34	31	37	40	38	36.0
R. P.	48	51	46	50	55	50.0
D. P.	35	31	37	42	45	38.0
D. T.	26	29	22	33	32	28.4
K. T.	42	53	45	55	55	50.0
D. W.	20	21	19	26	25	22.5
Total	387	369	390	418	456	404.0

APPENDIX A

Fourth Week Free Throw Scores

Mental Practice Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
R. C.	51	54	50	52	46	50.6
D. C.	28	23	25	22	29	25.4
G. S.	35	30	36	41	43	37.0
T. A.	60	57	66	63	61	61.2
D. H.	30	38	34	42	39	36.6
R. P.	53	46	57	51	59	53.2
D. P.	33	41	34	39	44	38.2
D. T.	29	31	24	34	32	30.0
K. T.	54	47	56	42	55	50.8
D. W.	23	18	22	27	26	23.2
Total	396	385	404	413	434	406.4

APPENDIX A

Fifth Week Free Throw Scores

Mental Practice Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
R. C.	52	57	49	55	63	55.2
D. C.	27	33	24	28	29	28.2
G. S.	42	35	40	44	48	41.8
T. A.	56	65	61	68	71	64.2
D. H.	39	27	33	41	32	34.4
R. P.	55	43	61	57	54	54.0
D. P.	31	24	26	35	29	29.0
D. T.	34	26	38	33	29	32.0
K. T.	39	54	51	43	58	49.0
D. W.	28	21	32	19	27	25.4
Total	403	385	415	423	440	413.2

APPENDIX A

Sixth Week Free Throw Scores

Mental Practice Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
R. C.	61	52	54	48	60	55.0
D. C.	29	35	41	33	35	34.6
G. S.	43	51	41	45	49	45.8
T. A.	63	72	57	64	61	63.5
D. H.	31	45	38	42	39	39.0
B. P.	46	56	52	68	59	56.5
D. P.	34	41	29	30	36	36.0
D. T.	37	43	31	38	30	35.8
K. T.	46	40	53	59	62	52.0
D. W.	29	22	24	33	31	27.8
Total	419	457	420	460	462	443.6

APPENDIX A

Seventh Week Free Throw Scores

Mental Practice Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
R. C.	53	46	57	51	50	51.4
D. C.	39	30	36	28	32	33.0
G. S.	46	53	49	61	54	52.6
T. A.	61	58	78	69	81	69.4
D. H.	40	48	34	36	41	39.8
R. P.	51	56	43	47	59	51.2
D. P.	32	36	31	44	38	36.2
D. T.	33	35	28	40	31	32.4
K. T.	55	71	46	49	52	54.6
D. W.	30	26	28	34	24	28.4
Total	440	459	430	459	462	450.0

APPENDIX A

Eighth Week Free Throw Scores

Mental Practice Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
R. C.	46	51	58	50	47	50.4
D. C.	31	28	42	39	35	35.0
G. S.	65	55	52	48	53	54.6
T. A.	71	60	63	69	62	65.0
D. H.	46	50	35	41	33	41.0
R. P.	43	51	58	49	60	52.5
D. P.	30	25	32	35	38	32.0
D. T.	41	33	45	29	36	36.8
K. T.	55	48	62	57	68	58.0
D. W.	29	33	24	26	32	28.8
Total	457	434	471	443	464	453.8

APPENDIX A

Ninth Week Free Throw Scores

Mental Practice Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
R. C.	48	51	42	53	50	48.8
D. C.	36	30	38	34	40	35.6
G. S.	48	54	58	50	60	54.0
T. A.	62	78	59	71	61	66.5
D. H.	48	36	40	41	35	40.0
R. P.	40	42	53	43	55	46.6
D. P.	42	38	30	43	41	38.8
D. T.	37	40	43	32	30	36.4
K. T.	60	46	54	49	56	53.0
D. W.	32	41	28	29	33	32.6
Total	453	456	445	445	461	452.0

APPENDIX A

Tenth Week Free Throw Scores

Mental Practice Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
R. C.	46	43	50	49	42	46.0
D. C.	41	37	34	39	38	37.8
G. S.	52	46	53	51	55	55.4
T. A.	58	63	65	60	68	62.8
D. H.	41	43	39	48	42	42.6
R. P.	36	41	37	33	44	38.2
D. P.	34	42	44	41	48	41.8
D. T.	38	34	36	43	39	38.0
K. T.	57	52	61	53	56	55.8
D. W.	35	34	35	38	33	35.0
Total	438	435	454	455	465	449.4

APPENDIX B

Physical Practice Group Free Throw Scores

First Week Free Throw Scores

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
K. S.	44	48	40	49	41	44.4
T. M.	26	28	38	32	36	32.0
D. P.	18	12	21	17	29	19.4
D. S.	37	51	33	39	36	39.2
J. A.	12	20	14	28	26	20.0
S. R.	45	42	56	42	48	46.6
J. L.	20	18	44	18	52	30.4
T. C.	13	19	14	21	17	16.8
J. R.	31	25	29	34	33	30.4
M. G.	27	29	23	26	30	27.0
Total	273	291	312	307	348	306.5

APPENDIX B

Second Week Free Throw Scores

Physical Practice Group

Subject	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
K. S.	58	53	49	51	62	54.6
T. M.	60	48	56	68	42	54.8
D. P.	22	14	18	27	22	20.6
D. S.	43	32	39	46	52	42.4
J. A.	28	26	26	38	32	30.0
S. R.	52	48	45	54	51	50.0
J. L.	60	36	56	46	22	26.6
T. C.	14	21	17	19	23	18.8
J. R.	28	34	31	39	42	34.8
M. G.	38	19	23	31	22	26.6
Total	403	331	360	419	370	376.6

APPENDIX B

Third Week Free Throw Scores

Physical Practice Group

Subject	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
K. S.	47	41	52	60	45	49.0
T. M.	24	52	70	48	62	51.5
D. P.	16	30	21	21	24	22.4
D. S.	41	38	55	42	36	42.4
J. A.	28	24	24	20	28	24.8
S. R.	46	61	53	42	44	49.5
J. L.	44	52	56	56	54	52.4
T. C.	18	23	13	25	21	20.0
J. R.	36	43	56	31	34	40.0
M. G.	30	26	31	18	15	24.0
Total	330	390	431	363	363	375.4

APPENDIX B

Fourth Week Free Throw Scores

Physical Practice Group

Subject	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
K. S.	56	48	61	52	53	54.0
T. M.	33	48	53	61	54	49.8
D. P.	21	19	29	23	24	23.2
D. S.	48	52	41	35	39	43.0
J. A.	19	23	31	21	22	23.2
S. R.	62	53	54	45	49	52.6
J. L.	41	62	44	51	47	49.0
T. C.	14	29	19	34	25	24.2
J. R.	48	37	52	44	41	44.4
M. G.	23	19	32	26	17	23.4
Total	365	390	416	392	371	386.8

APPENDIX B

Fifth Week Free Throw Scores

Physical Practice Group

Subject	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
K. S.	58	65	53	57	71	60.8
T. M.	48	39	56	62	51	51.2
D. P.	24	28	20	33	22	25.4
D. S.	40	32	53	47	59	46.5
J. A.	27	16	29	23	31	25.2
S. R.	53	68	59	72	61	62.6
J. L.	37	44	41	31	48	40.2
T. C.	27	33	18	25	26	25.8
J. R.	51	53	46	62	42	50.8
M. G.	14	22	23	19	17	19.0
Total	379	400	398	431	428	407.2

APPENDIX B

Sixth Week Free Throw Scores

Physical Practice Group

Subject	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
K. S.	49	51	62	42	55	51.8
T. M.	50	52	45	48	58	50.6
D. P.	19	33	27	41	30	30.0
D. S.	58	37	44	62	41	48.4
J. A.	26	33	20	21	23	24.6
S. R.	62	58	54	70	63	61.4
J. L.	23	31	47	40	41	36.4
T. C.	28	24	29	31	23	27.0
J. R.	46	43	55	49	50	48.6
M. G.	23	20	34	19	23	23.8
Total	384	382	417	423	407	402.6

APPENDIX B

Seventh Week Free Throw Scores

Physical Practice Group

Subject	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
K. S.	53	58	69	49	62	58.2
T. M.	55	50	63	61	59	57.6
D. P.	28	37	42	40	33	36.0
D. S.	43	38	58	59	68	53.2
J. A.	21	28	26	26	32	26.6
S. R.	61	54	58	63	75	62.2
J. L.	43	32	41	52	48	43.2
T. C.	33	20	34	29	33	29.8
J. R.	48	62	56	58	60	56.8
M. G.	20	21	25	19	28	22.6
Total	405	400	472	456	498	446.2

APPENDIX B

Eighth Week Free Throw Scores

Physical Practice Group

Subject	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
K. S.	57	61	59	66	57	60.0
T. M.	51	48	65	61	68	58.6
D. P.	24	27	43	48	51	38.6
D. S.	48	42	50	47	57	48.8
J. A.	23	22	31	28	28	26.4
S. R.	59	65	68	67	71	66.0
J. L.	41	43	49	55	51	47.8
T. C.	38	25	41	39	41	36.8
J. R.	57	62	59	65	68	62.2
M. G.	23	20	28	28	24	24.6
Total	421	415	493	504	516	469.8

APPENDIX B

Ninth Week Free Throw Scores

Physical Practice Group

Subject	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
K. S.	63	75	68	72	64	68.4
T. M.	54	63	58	62	62	59.8
D. P.	31	38	49	53	53	44.8
D. S.	57	52	61	48	54	54.4
J. A.	24	21	28	36	33	28.4
S. R.	71	63	68	74	73	69.8
J. L.	40	37	55	59	65	51.2
T. C.	48	43	42	51	53	47.4
J. R.	52	57	56	73	70	61.6
M. G.	28	22	23	38	32	28.6
Total	468	471	508	566	559	514.4

APPENDIX B

Tenth Week Free Throw Scores

Physical Practice Group

Subject	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
K. S.	59	72	69	78	81	71.8
T. M.	57	49	58	62	63	57.8
D. P.	51	39	49	58	51	49.6
D. S.	50	59	63	54	49	55.0
J. A.	21	29	31	26	28	27.0
S. R.	65	82	70	66	76	71.8
J. L.	44	59	48	63	60	54.8
T. C.	39	41	53	53	50	47.2
J. R.	49	64	59	70	75	63.4
M. G.	39	37	24	28	31	31.8
Total	474	531	524	558	564	530.2

APPENDIX C

Physical-Mental Practice Group Free Throw Scores

First Week Free Throw Scores

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
L. W.	21	19	30	23	20	22.6
B. C.	28	34	33	30	19	28.8
C. P.	30	42	42	48	10	34.4
B. D.	19	28	33	30	29	27.8
P. M.	12	24	12	36	18	20.4
B. M.	44	52	39	41	44	44.0
L. C.	31	36	33	38	41	35.8
J. F.	25	22	28	19	31	25.0
M. L.	37	46	55	51	45	46.8
B. B.	46	52	50	52	30	46.0
Total	293	355	355	368	287	331.6

APPENDIX C

Physical-Mental Practice Group

Second Week Free Throw Scores

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
L. W.	32	27	27	35	33	30.8
B. C.	26	31	38	32	34	32.2
C. P.	54	54	46	62	58	54.8
B. D.	41	39	52	51	54	47.4
P. M.	12	14	38	16	22	20.4
B. M.	40	32	48	42	54	43.2
L. C.	26	48	41	42	49	41.2
J. F.	22	19	41	33	34	29.8
M. L.	37	36	43	50	56	44.4
B. B.	40	42	68	68	70	57.6
Total	330	342	442	431	464	401.8

APPENDIX C

Physical-Mental Practice Group
Third Week Free Throw Scores

Subject	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
L. W.	29	30	30	37	34	32.0
B. C.	31	34	35	40	34	34.8
C. P.	56	54	50	58	62	56.4
B. D.	48	50	57	54	55	52.8
P. M.	24	36	24	24	28	27.2
B. M.	38	48	51	49	56	48.4
L. C.	37	41	48	44	49	43.8
J. F.	26	21	32	35	31	29.0
M. L.	42	40	50	56	52	48.0
B. B.	66	56	56	62	76	63.2
Total	399	410	433	459	477	435.6

APPENDIX C

Physical-Mental Practice Group

Fourth Week Free Throw Scores

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
L. W.	31	34	29	40	38	34.4
B. C.	30	35	35	45	42	37.4
C. P.	53	50	56	56	63	55.6
B. D.	45	55	55	59	58	54.4
P. M.	21	29	32	25	31	27.6
B. M.	41	45	48	54	54	48.4
L. C.	40	48	45	52	50	47.0
J. F.	23	20	31	34	32	28.0
M. L.	51	46	43	53	58	50.2
B. B.	60	63	59	68	70	64.0
Total	395	425	433	486	496	447.0

APPENDIX C

Physical-Mental Practice Group

Fifth Week Free Throw Scores

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
L. W.	35	38m	32	42	40	37.4
B. C.	40	38	46	42	50	43.2
C. P.	49	55	61	65	59	57.8
B. D.	50	58	63	59	62	58.4
P. M.	20	28	24	34	31	27.4
B. M.	50	44	55	49	53	50.2
L. C.	51	56	53	50	58	53.6
J. F.	25	23	28	32	36	28.8
M. L.	55	50	58	49	53	53.0
B. B.	61	59	74	67	68	65.8
Total	436	449	494	489	510	475.6

APPENDIX C

Physical-Mental Practice Group
Sixth Week Free Throw Scores

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
L. W.	37	34	48	41	40	40.0
B. C.	41	36	49	43	49	43.6
C. P.	50	53	58	59	60	56.0
B. D.	59	56	61	58	60	58.8
P. M.	24	28	25	30	21	25.6
B. M.	46	58	51	57	60	54.4
L. C.	47	58	61	59	57	56.4
J. F.	29	22	19	31	31	26.4
M. L.	58	56	54	49	60	55.4
B. B.	62	60	59	70	67	63.6
Total	453	461	485	497	505	480.2

APPENDIX C

Physical-Mental Practice Group
Seventh Week Free Throw Scores

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
L. W.	41	48	39	40	46	42.8
B. C.	39	39	48	45	48	43.8
C. P.	57	54	59	57	61	57.6
B. D.	57	57	63	57	65	59.8
P. M.	25	35	34	30	30	31.2
B. M.	49	48	57	54	60	53.6
L. C.	59	65	57	54	55	58.0
J. F.	26	30	27	34	28	29.0
M. L.	68	60	58	64	55	61.0
B. B.	64	61	68	59	65	63.4
Total	485	497	510	494	513	499.8

APPENDIX C

Physical-Mental Practice Group
Eighth Week Free Throw Scores

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
I. W.	45	40	43	52	48	45.6
B. C.	36	34	48	53	45	43.2
C. P.	54	55	60	62	64	59.0
B. D.	55	65	60	59	63	60.4
P. M.	30	35	34	43	41	36.6
B. M.	50	48	54	56	54	52.4
L. C.	61	54	75	51	58	59.8
J. F.	22	41	34	31	35	32.6
M. L.	55	61	63	70	62	62.2
B. B.	68	60	54	71	68	64.2
Total	476	493	525	548	538	516.0

APPENDIX C

Physical-Mental Practice Group
Ninth Week Free Throw Scores

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
L. W.	48	51	46	59	53	51.4
B. C.	39	49	44	37	52	44.2
C. P.	65	61	59	68	62	63.0
B. D.	59	68	62	74	69	66.4
P. M.	37	34	43	44	48	41.2
B. M.	61	57	60	49	56	56.6
L. C.	62	60	69	71	68	66.0
J. F.	39	37	28	40	36	36.0
M. L.	63	59	68	65	73	65.6
B. B.	65	81	70	69	72	71.4
Total	538	557	549	576	589	561.8

APPENDIX C

Physical-Mental Practice Group

Tenth Week Free Throw Scores

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
L. W.	52	49	55	51	50	52.4
B. C.	41	40	45	39	48	42.6
C. P.	60	55	59	64	69	61.2
B. D.	63	57	74	69	72	67.0
P. M.	32	36	39	45	40	38.4
B. M.	57	60	52	57	55	56.2
L. C.	59	65	61	72	69	65.2
J. F.	33	27	34	35	41	34.0
M. L.	60	52	58	62	63	59.0
B. B.	71	59	63	72	75	68.0
Total	528	500	540	566	582	543.2

APPENDIX D

Control Group Free Throw Scores

First Week Free Throw Scores

Subject	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
T. O.	16	26	14	36	14	21.2
J. Bu.	32	28	35	31	27	30.6
T. J.	22	18	25	23	29	23.4
D. G.	33	29	38	31	33	32.8
B. B.	42	34	37	40	38	38.2
D. S.	16	22	22	26	24	22.0
M. F.	17	20	15	23	16	18.2
S. B.	48	53	42	50	49	48.4
J. Br.	26	16	16	38	16	22.4
L. S.	33	38	34	29	30	32.8
Total	285	284	278	327	276	290.0

APPENDIX D

Second Week Free Throw Scores

Control Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
T. O.	24	40	34	42	32	34.4
J. Bu.	30	28	32	29	31	30.0
T. J.	21	26	23	30	24	24.8
D. G.	29	33	24	31	33	30.0
B. B.	43	38	45	37	33	39.2
D. S.	20	22	22	26	24	22.8
M. F.	19	23	20	21	24	21.4
S. B.	47	54	43	50	52	49.2
J. Br.	28	34	28	34	30	30.8
L. S.	29	37	33	35	30	32.8
Total	290	335	304	335	313	315.4

APPENDIX D

Third Week Free Throw Scores

Control Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
T. O.	24	40	38	42	38	36.4
J. Bu.	27	33	30	36	26	30.4
T. J.	19	27	22	21	24	22.6
D. G.	30	20	41	23	22	27.2
B. B.	45	35	36	34	40	38.0
D. S.	20	20	30	26	36	26.4
M. F.	21	20	18	28	25	22.4
S. B.	50	44	53	44	42	46.6
J. Br.	30	28	32	34	20	28.8
L. S.	25	31	28	33	30	29.4
Total	291	298	328	321	303	308.2

APPENDIX D

Fourth Week Free Throw Scores

Control Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
T. O.	21	25	30	22	24	24.4
J. Bu.	30	22	34	28	30	28.8
T. J.	21	29	23	27	31	26.2
D. G.	23	28	32	27	29	27.8
B. B.	48	43	32	33	37	38.6
D. S.	19	29	24	33	24	25.8
M. F.	25	35	21	27	25	26.6
S. B.	48	53	42	47	51	48.2
J. Br.	28	25	30	32	25	28.0
L. S.	22	28	30	23	26	25.8
Total	285	317	298	299	302	300.2

APPENDIX D

Fifth Week Free Throw Scores

Control Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
T. O.	25	32	23	24	26	26.0
J. Bu.	32	28	22	35	24	28.2
T. J.	28	22	30	35	20	27.0
D. G.	30	27	36	31	28	30.4
B. B.	41	53	45	38	43	44.0
D. S.	23	20	28	32	27	28.0
M. F.	24	31	23	36	31	29.0
S. B.	39	46	44	55	49	44.6
J. Br.	25	33	26	36	31	30.2
L. S.	25	23	32	28	29	27.4
Total	292	315	309	350	308	314.8

APPENDIX D

Sixth Week Free Throw Scores

Control Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
T. O.	23	30	27	32	28	28.0
J. Bu.	30	26	39	31	27	30.6
T. J.	25	32	27	36	29	29.8
D. G.	33	26	20	30	37	29.2
B. B.	44	52	40	38	48	44.4
D. S.	27	22	33	30	30	28.4
M. F.	29	42	33	30	33	33.4
S. B.	45	40	42	50	53	46.0
J. Br.	29	30	28	33	35	31.0
L. S.	20	30	27	31	32	28.0
Total	305	330	316	341	352	328.8

APPENDIX D

Seventh Week Free Throw Scores

Control Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
T. O.	25	22	31	28	33	27.8
J. Bu.	29	33	30	34	38	32.8
T. J.	28	32	29	33	34	31.2
D. G.	30	32	30	33	38	32.6
B. B.	51	48	47	43	50	47.8
D. S.	28	25	30	29	34	29.2
M. F.	32	43	41	33	38	37.4
S. B.	41	48	43	39	52	44.6
J. Br.	21	30	22	24	26	24.6
L. S.	21	23	28	23	33	25.6
Total	306	336	331	319	376	333.6

APPENDIX D

Eighth Week Free Throw Scores

Control Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
T. O.	27	25	33	31	28	28.8
J. Bu.	35	28	38	32	37	34.0
T. J.	25	29	24	39	36	30.6
D. G.	35	31	28	39	38	34.2
B. B.	45	43	53	51	50	48.4
D. S.	29	27	34	35	32	31.4
M. F.	41	40	33	43	37	38.8
S. B.	50	48	57	39	49	48.6
J. Br.	17	28	23	39	43	30.0
L. S.	29	18	32	29	30	27.6
Total	333	317	355	377	380	352.4

APPENDIX D

Ninth Week Free Throw Scores

Control Group

Subjects	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
T. O.	29	35	28	31	27	30.0
J. Bu.	40	28	33	35	37	34.6
T. J.	20	19	38	30	32	27.8
D. G.	30	39	33	42	40	36.8
B. B.	53	47	50	53	53	51.2
D. S.	26	35	30	39	32	32.4
M. F.	39	48	42	42	51	44.4
S. B.	50	51	43	58	49	50.2
J. Br.	20	29	26	28	37	28.0
L. S.	33	30	20	38	33	30.8
Total	340	361	343	396	391	366.2

APPENDIX D

Tenth Week Free Throw Scores

Control Group

Subject	Monday Scores	Tuesday Scores	Wednesday Scores	Thursday Scores	Friday Scores	Week's Mean Scores
T. O.	25	27	38	31	33	31.2
J. Bu.	38	29	28	43	39	35.4
T. J.	30	27	27	22	28	26.8
D. G.	28	33	34	38	37	34.0
B. B.	50	48	52	54	58	52.0
D. S.	30	38	32	33	38	34.2
M. F.	48	43	58	52	54	51.0
S. B.	52	65	53	53	58	56.2
J. Br.	19	35	33	26	37	30.0
L. S.	21	30	29	38	37	31.0
Total	341	375	384	390	419	381.8

APPENDIX E

PRE-TEST FREE THROW SCORES ON FIRST DAY OF PRACTICE FOR THE MENTAL PRACTICE GROUP, PHYSICAL PRACTICE GROUP, PHYSICAL-MENTAL PRACTICE GROUP, AND CONTROL GROUP

Subject	Mental Group (A)	Physical Group (B)	Physical-Mental Group (C)	Control Group (D)
1	52	44	21	16
2	25	26	28	32
3	20	18	30	22
4	40	37	19	33
5	36	12	12	42
6	48	45	44	16
7	38	20	31	17
8	26	13	25	48
9	50	31	37	26
10	19	27	46	33
Mean	35.4	27.3	29.3	28.5
S. D.	12.3	11.9	10.8	11.1

MEAN DIFFERENCE

	A	B	C	D
A		8.1	6.1	6.9
B			2.0	1.2
C				.8

T-RATIO

	A	B	C	D
A		1.46	1.19	1.33
B			.39	.23
C				.16

*Significant difference at the .05 level of confidence with nine degrees of freedom was 2.262.

BIBLIOGRAPHY

BIBLIOGRAPHY

A. BOOKS

Cratty, Bryant J. Psychology and Physical Activity. New Jersey: Prentice-Hall Inc., 1967.

Oxendine, Joseph B. Psychology of Motor Learning. New York: Appleton-Century-Crofts, 1966.

Singer, Robert N. Motor Learning and Human Performance. New York: The Macmillan Company, 1967.

Sweet, Virgil. Free Throw Shooting Techniques. Englewood Cliffs, New Jersey: Coaches Book Club Press, 1966.

B. PERIODICALS

Clark, L.V. "The Effect of Mental Practice on the Development of a Certain Motor Skill," Research Quarterly, 31: 560-569, December, 1960.

Oxendine, Joseph B. "Effects of Mental and Physical Practice on the Learning of Three Motor Skills," Research Quarterly, 40: 755-793, December, 1969.

Richardson, Alan. "Mental Practice: A Review and Discussion," Research Quarterly, 38: 95-107, March, 1967.

Stebbins, Richard J. "A Comparison of the Effects of Physical and Mental Practice in Learning a Motor Skill," Research Quarterly, 39: 714-720, October, 1968.

C. UNPUBLISHED WORKS

Brown, James A. "A Study of Winning Basketball Teams in South Dakota." Unpublished Master's thesis, South Dakota State University, 1961.

Dehnert, Annete E. "A Comparison of the Effects of Two Methods of Instruction Upon Free Throw Shooting Ability," Unpublished Master's thesis, University of Iowa, 1962.

Gephart, Richard Gene. "The Importance of the Free Throw in Basketball Games," Unpublished Master's thesis, Iowa State University, 1963.

Jable, John T. "The Relative Effects of Training with Basketballs of Varying Weights Upon Free Throw Shooting Accuracy." Unpublished Master's thesis, Kent State University, 1965.

Kite, Joseph C. "The Effects of Variations in Target Size and Two Methods of Practice on the Development of Accuracy in a Motor Skill." Unpublished Master's thesis, Illinois State University, 1964.

Lenguardo, James. "The Relationship Between the Time Taken to Execute Free Throws and Success in Free Throw Shooting in Basketball." Unpublished Master's thesis, Western Michigan University, 1961.

Maaske, Paul W. "The Effect of the Practice of Free Throw Shooting at Small Baskets on the Accuracy of Free Throw Shooting in Basketball." Unpublished Master's thesis, Indiana State University, 1961.

Minahan, Fred B. "An Experiment With a Restrictive Goal Device Designated to Improve Basketball Free Throw Shooting Accuracy of Ninth Grade Boys." Unpublished Master's thesis, University of Wisconsin, 1964.

Takacs, Robert. "A Comparison of the Effects of Two Methods of Practice on Basketball Free Throw Shooting." Unpublished Master's thesis, Indiana State University, 1965.

Wilkinson, William Dale. "A Study of Successful High School Basketball Teams in Indiana." Unpublished Master's thesis, University of Indiana, 1960.

VITA

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The writer was born in Decatur, Illinois on August 31, 1943. He attended Macon High School where he earned varsity letters in three sports. He graduated in 1961 and entered Arkansas State University in 1962. While majoring in Physical Education, he competed in basketball and baseball earning three varsity letters in each sport. He competed on the ASU basketball team that placed third in the NCAA College Division basketball tourney in 1965. He was named to the Southland Conference All-Star baseball team in 1965 and 1966.

At Arkansas State University, he was a member of the Varsity Club, Sigma Pi national fraternity, and the American Association of Health, Physical Education and Recreation.

He graduated in 1966 from Arkansas State and accepted a teaching and basketball coaching position at Niantic-Harristown High School. His three-year varsity basketball coaching record at Niantic was 4-15, 11-10, and 17-8.

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