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THE EFFECT OF HEIGHT IN COMPARING THE
UNDERHAND AND OVERHAND SERVE IN VOLLEYBALL
FOR ACCURACY AND PLACEMENT

by

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ABSTRACT

The purpose of this study was to determine whether height was an advantage in executing the underhand and overhand serve in volleyball for accuracy and placement.

Both types of serves were taught to 124 ninth grade girls at Pius XI High School, Milwaukee, Wisconsin. They were classified into groups of short, average, and tall.

The Russell-Lange Serving Test was administered.

No significant difference between groups was obtained. Height for the junior high school girls in this study, therefore, was not a significant factor in the performance of the underhand and overhand serve in volleyball.

THE EFFECT OF HEIGHT IN PERFORMING THE
UNDERHAND AND OVERHAND SERVE IN VOLLEYBALL
FOR ACCURACY AND PLACEMENT

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CHAPTER I

INTRODUCTION TO THE PROBLEM

The mastery of basic fundamental skills is important in the game of volleyball. The serve is one of these skills. An effective serve is essential in developing a winning team because it is only while serving that points may be scored. The object of the serve is to send the ball into the opponent's court with such accuracy and placement that it can not be easily returned.

The researcher, in teaching volleyball to girls over a period of years, has often wondered whether height was necessarily one of the main factors in executing an effective serve.

Statement of the Problem

It was the intent of this study to find out the effect of height in the performance of the underhand and overhand serve in volleyball for accuracy and placement.

Purpose

This study was made to determine whether or not height is an advantage in executing the underhand and overhand serve in volleyball for accuracy and placement.

Need for the Study

Teachers in physical education are constantly seeking accurate means to evaluate the performance skills of their students. This study could be used as an aid in helping to determine whether or not height gives an advantage in the results of an objective skill test of serving in volleyball and, therefore, help to provide a more effective grading system.

Definition of Terms

Short Height. Student ranging in height from 58 inches to 63.499 inches.

Average Height. Student ranging in height from 63.5 inches to 65.599 inches.

Tall Height. Student ranging in height from 66 inches to 69.999 inches.

Delimitations

This study was conducted at Pius XI High School in Milwaukee, Wisconsin. Six of the regularly scheduled ten class sections were used for the project, and all subjects were ninth grade girls with no previous formal class instruction in volleyball skills.

Limitations

Certain factors that may have made a difference in the results of the study were not controlled. These factors included failure to give a motor ability test at the start of the unit, testing objectives foreign to a game situation, shortness of skill development period, and validity of scoring. The rapid growth spurt of girls at this age level may also have affected the results.

CHAPTER II

REVIEW OF RELATED LITERATURE

Not a great number of studies have been done in regard to this area, although two proved to be of importance in helping the writer select and administer an adequate test to gather data.

M. Gladys Scott,¹ in her study, emphasized the importance of selecting tests to meet specific needs and to motivate students by their use. She also stressed the necessity for simplified scoring so the tests would be meaningful to the player as well as useful as far as the obtained results were concerned.

Clayne R. Jensen and Larry Dotson² did a study to determine what serving methods would be most effective for use by beginners, college players, and national champion players. They concluded that for poorly skilled (beginning) players, the underhand serve is probably the most accurate

¹M. Gladys Scott, "The Use of Skill Tests," Journal of Health, Physical Education and Recreation, 9:364-6+, June, 1938.

²Clayne R. Jensen and Larry Dotson, "An Analysis of Serving Methods in Volleyball," Athletic Journal, 46:34+, March, 1966.

and most suitable. This, however, does not mean that it is the most effective on the basis of how difficult it was to receive and return.

Gladys Bassett, Ruth Glassow, and Mable Locke³ in their study were concerned with definite placement of the ball, with certain areas scoring higher than others. In addition, the execution of a good serve consisted of getting the ball across the net, placing the ball, and putting speed or force into the serve. They concluded that serving tests are objective and, because test elements are constant, a certain reliability might be expected in the test if a sufficient number of trials were given.

Esther L. French and Bernice I. Cooper⁴ devised an objective test in volleyball which could be used to test accuracy and placement. Naomi Russell and Elizabeth Lange⁵ improved on the reliability of the test by administering it twice to the girls, gaining more reliable results.

³Gladys Bassett, Ruth Glassow, and Mable Locke, "Studies in Testing Volleyball Skills," Research Quarterly, 8:60-72, December, 1937.

⁴Esther L. French and Bernice I. Cooper, "Achievement Tests in Volleyball for High School Girls," Research Quarterly, 8:150-57, May, 1937.

⁵Naomi Russell and Elizabeth Lange, "Achievement Tests in Volleyball for Junior High Girls," Research Quarterly, 11:33-41, December, 1940.

Nancy A. Lamp,⁶ in her study, found that height was of importance in reaching for and controlling balls. The serve test had the lowest correlation with height of any of the tests for girls, but second highest for boys. Strength appeared to be slightly more important than height for the serve test for girls. She used an underhand serve test to determine her results.

⁶Nancy A. Lamp, "Volleyball Skills of Junior High School Students as a Function of Physical Size and Maturity," Research Quarterly, 25:189-200, May, 1954.

CHAPTER III

PROCEDURE

Selection of Subjects

One hundred and twenty-four ninth grade girls at Pius XI High School, Milwaukee, Wisconsin were selected for the study. These girls presumably had no previous formal classroom instruction in volleyball skills. They were measured for height and divided into three groups: short, average, and tall. The short group contained forty-one girls ranging in height from 58 inches to 63.499 inches. The average group contained forty-six girls ranging in height from 63.5 inches to 65.599 inches, while the tall group had thirty-seven girls ranging in height from 66 inches to 69.999 inches.

Selection of Test

In an effort to determine the effect height had on the execution of an underhand and overhand serve in volleyball for accuracy and placement, a selection of a valid and reliable test had to be made.

After examination of different tests, the writer decided to use the test conducted by Naomi Russell and

Elizabeth Lange¹ and to administer it as they did. It is the same as the French-Cooper Test,² but two trials of ten serves are administered instead of one trial. "By means of test-retest method, reliability coefficients ranging from .870 to .915 were obtained. Validity of the test was determined through subjective ratings of the players by seven judges."³

Program of Skill Development

Subjects for the experiment were enrolled in physical education classes which met twice a week for a nine-week unit. Each class consisted of from 18 to 23 girls.

In these classes the underhand and overhand serving techniques were incorporated within a regular volleyball unit. During the first few sessions of classes both types of serves were explained and demonstrated, and throughout the unit frequent practice took place while the writer worked with individual students who needed additional help.

Underhand Serve Teaching Procedures During lesson

¹Russell and Lange, op. cit., pp. 33-41.

²French and Cooper, op. cit., pp. 150-57.

³Donald K. Mathews, Measurement in Physical Education (Philadelphia: W. B. Sanders and Company, 1958), p. 181.

one of the unit, the writer explained and demonstrated the serve using the open-hand position. Instructions were given to the students to stand facing the net squarely, ball resting in the palm of the left hand and held in front of the right side of the body, left foot 10 to 12 inches forward with weight on the back foot. It was pointed out that the right arm should act as a pendulum and stiffen as contact with the ball is made. At the same time the weight should be shifted to the forward foot. The students went through the motion several times without a ball. Lines were drawn on the court at 10, 15, and 20 foot intervals from the net. Students practiced using this serve, with the initial position of 10 feet from the net. After they had successfully completed five good serves from this position, they were told to move back to the next line. The writer emphasized correct body position and follow through of the arm to get the ball over the net. This was done during the last ten minutes of the class.

During lesson two the writer inquired which students had previously been able to get at least five good serves over the net at the 20 foot line. Those students were moved behind the end line, while others remained at the 10, 15, and 20 foot lines until they were able to execute five good serves at each of the respective lines. This phase of the instruction took ten minutes of class time.

Ten minutes of lessons three, four, and five were used to practice on the fundamentals. The writer worked with individuals instructing them to face the net squarely, to look at the ball, and to make contact with the ball from a stationary position after having shifted the weight from the back to the front foot. By this time almost all were serving from behind the end line.

During lessons six to fourteen eight minutes of class time was used to continue practice of the open-hand method. The writer explained and demonstrated the other two hand positions using knuckles and heel of hand, and the fist from the thumb side. The students were instructed to serve in the same manner as previously explained to them in lesson one, but to try the other two hand methods when contact was made with the ball. Placing the ball to different areas of the court by direction of arm swing and follow through was started by the eighth lesson and continued through the fourteenth lesson, using four minutes of each session. Five minutes of lessons nine through fourteen were spent in getting the arc of the serve lowered and increasing the speed of the serve through use of a firmer arm, through increasing the speed of the arm swing, and through properly timed shift of body weight.

Overhand Serve Teaching Techniques The writer de-

cided to use some teaching techniques as stated by Temple⁴ to present the overhand serve.

The students started out in lesson one by throwing a softball against a wall (using a catcher's whiplike throw) for ten minutes. They were instructed to stand at a 30 foot distance from the wall and to throw with as much force as possible.

The writer during lesson two explained and demonstrated the overhand serve. The students were instructed to hold the ball with both hands in front of the body and slightly to the right, weight mainly on the right foot, with the left foot 10 to 12 inches forward and pointing toward the net. They were instructed to toss the ball about three feet above the right shoulder and the right arm should swing at the ball with an overhand throwing motion of a catcher in baseball. The force of the stroke depends on speed of hand, extension of elbow, flexion of wrist, and transfer of weight from back to forward foot as contact with the ball is made. Review of the throw and work on the ball toss were included for eight minutes of the class time.

By lesson three the students stood 30 feet from the

⁴Ina Temple, "Developing Skill in the Overarm Serve," Volleyball Guide, July, 1965-67, pp. 23-31.

wall and served the volleyball with as much force as possible. Seven minutes of class time were used to give special attention to the throwing movement of the ball as previously instructed.

A long strip of tape, measuring $7'4\frac{1}{4}"$ from the floor, was placed on the wall during lesson four, and the students, standing 15 and 20 feet from the wall, practiced hitting the ball above the tape. They were instructed to execute five good serves at the 15 foot line before moving back to the 20 foot distance. The students worked on this drill for ten minutes while the writer gave individual instructions on fundamentals.

By the fifth lesson some students had gradually moved back to the 30 foot line, after first completing five successful serves. This practice was concluded at eight minutes.

In lesson six a few were ready to practice on the court, using a net, while others still used the wall. Fundamentals were again reviewed and practice lasted ten minutes.

For ten minutes of lessons seven through fourteen, the students practiced from the distance line they had progressed to. There was use of the court and net, and individual help was given. Instructions for the serve were repeated. Emphasis was placed on tossing the ball, looking at the ball, and using the entire body to help with the serve. The writer stressed hitting the ball with a cupped

hand and controlling it with the fingers.

Skill practice games were included in the last five lessons of the unit. These games were played for seven minutes near the end of the class period to help keep the students motivated, as well as to get practice on the serves in a game-like situation. Special emphasis was placed on executing a good serve. The subjects were urged to keep the ball low in relation to the net, to have enough force to carry deep into the opponent's court, and to try to get the ball to land close to the area to which it was aimed.

Administration of Test The last four meetings were used to administer the serving test. A diagram of the floor and its markings is in the appendix. The player stood behind the end line and served twelve balls across the net, the first two being practice balls. Two other students stood in the receiving court to recover and return the balls to a third person, who in turn handed them to the server. The attempt was made to place the ball in the high value areas. Balls landing on a line scored the higher value. If a foot fault occurred, the serve was nullified, but counted as a trial.

The writer stood on a chair midway along the sidelines of the receiving court and called out the scores to a scorekeeper, who did the recording. A sample of the score sheet is in the appendix.

CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

This study was undertaken to determine the effect of height in the execution of the underhand and overhand serve.

The following comparisons were made using the collected data.

1. Underhand Serve (Between Groups)
 - A. Short group to the average group.
 - B. Short group to the tall group.
 - C. Average group to the tall group.
2. Overhand Serve (Between Groups)
 - A. Short group to the average group.
 - B. Short group to the tall group.
 - C. Average group to the tall group.
3. Underhand with Overhand Serve (Within Groups)

The writer in analyzing the data, decided to accept or reject the null hypothesis at the 5% level of confidence.

Mean scores for the short, average, and tall groups in the underhand serve were 11.5, 15.7, and 15.12 respectively. The "t" ratio obtained when comparing the short to average group was 2.33, short to tall group was 1.91, and average to tall group was .34. In comparing (between groups) performance in the underhand serve, there were no statistically significant differences between the short and tall groups or the average and tall groups, but the average group scored significantly better than the short group. (See Table 1)

TABLE I
 COMPARISON OF TEST BETWEEN GROUPS
 USING THE UNDERHAND SERVE

GROUP	NUMBER OF STUDENTS	MEAN SCORE	GROUP	NUMBER OF STUDENTS	MEAN SCORE	"t"
SHORT	41	11.5	AVERAGE	46	15.7	2.33*
SHORT	41	11.5	TALL	37	15.12	1.91
AVERAGE	46	15.7	TALL	37	15.12	.34

*Indicates significance at the 5% level of confidence.

Lower mean scores for the short, average, and tall groups were obtained for the overhand serve as compared to the underhand serve and these were 5.29, 6.32, and 6.5 respectively. The "t" ratio obtained when comparing the short to average group was .572, short to tall .636, and average to tall .105. No statistically significant differences were found when comparisons were made between groups in regard to the performance of executing the overhand serve. (See Table II)

When comparison of the underhand and overhand serve was made within a group the "t" ratio for the short group was 3.27, average group 5.86, and tall group 1.84. Both the short and average groups scored significantly better in the performance of the underhand serve than the overhand serve. For the tall group there were no statistically significant differences in the performance of the underhand and overhand serves. (See Table III)

TABLE II

COMPARISON OF TEST BETWEEN GROUPS
USING THE OVERHAND SERVE

GROUP	NUMBER OF STUDENTS	MEAN SCORE	GROUP	NUMBER OF STUDENTS	MEAN SCORE	"t"
SHORT	41	5.29	AVERAGE	46	6.32	.572
SHORT	41	5.29	TALL	37	6.5	.636
AVERAGE	46	6.32	TALL	37	6.5	.105

COMPARISON OF UNDERHAND WITH OVERHAND SERVE
WITHIN A GROUP

<u>UNDERHAND SERVE</u>			<u>OVERHAND SERVE</u>			"t"
GROUP	NUMBER OF STUDENTS	MEAN SCORE	GROUP	NUMBER OF STUDENTS	MEAN SCORE	
SHORT	41	11.5	SHORT	41	5.29	3.27*
AVERAGE	46	15.7	AVERAGE	46	6.32	5.86*
TALL	37	15.12	TALL	37	6.5	1.84

*Indicates significance at the 5% level of confidence.

CHAPTER V

CONCLUSION

Within the limits of this study the conclusion reached was as follows:

1. Height for the junior high school girls in this study was not a significant factor in the performance of the underhand and overhand serve.

Suggestion for Additional Research

1. Repeat the study with students of an older age level. Girls at the 14 and 15 year age level usually attain their height with such a rapid growth spurt, that they can not fully perform with good muscle coordination. It also would help to conduct the study over a longer period of time to allow for more practice and a transfer of learned performance skills.

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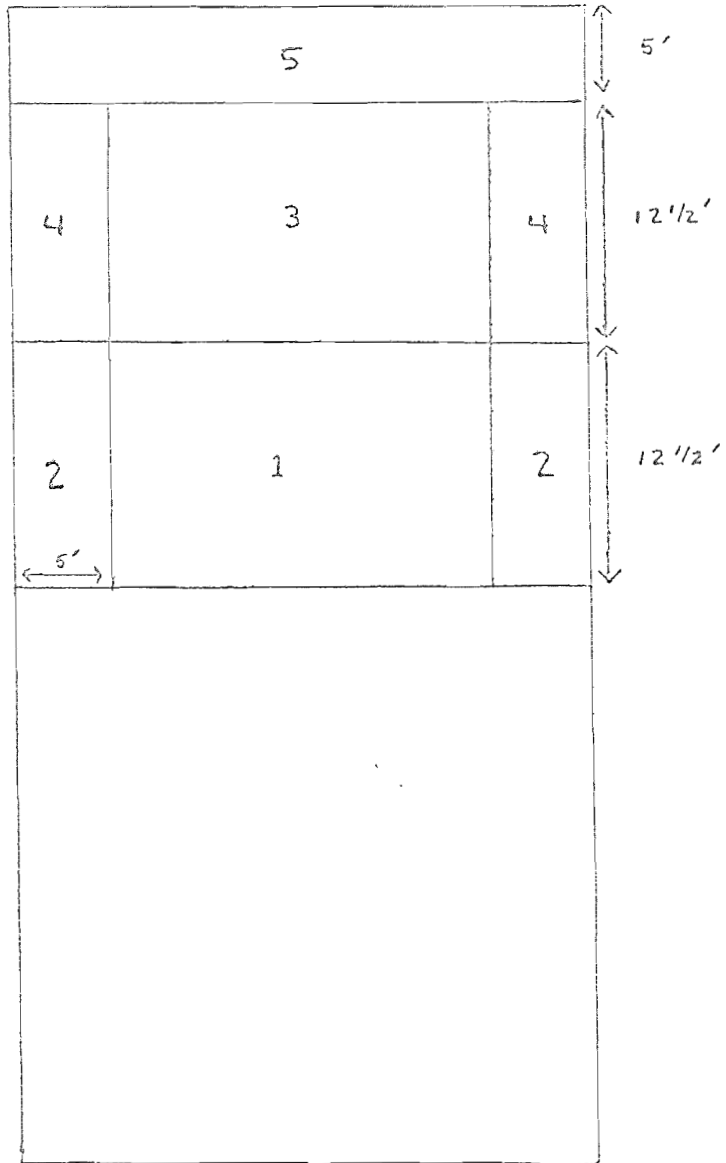
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APPENDIX

FLOOR COURT MARKINGS



SAMPLE SCORE SHEET

UNDERHAND SERVE

HEIGHT IN INCHES	TRIAL ONE										SUM	TRIAL TWO										SUM	AVE.
	1	2	3	4	5	6	7	8	9	10		1	2	3	4	5	6	7	8	9	10		
65.5	3	0	0	3	3	1	1	4	1	0	16	3	0	4	0	3	3	3	0	3	0	19	12.5
64.5	3	0	0	4	3	4	3	0	0	0	17	3	0	3	0	0	3	3	4	3	3	22	18.0
67	4	3	3	3	3	0	5	5	0	0	26	4	4	0	0	3	3	3	0	0	0	17	16.5

OVERHAND SERVE

HEIGHT IN INCHES	TRIAL ONE										SUM	TRIAL TWO										SUM	AVE.
	1	2	3	4	5	6	7	8	9	10		1	2	3	4	5	6	7	8	9	10		
67	0	3	0	1	5	3	0	0	3	0	15	0	3	4	0	1	1	1	4	0	0	14	14.5
62	0	2	3	0	0	0	0	0	2	0	7	0	0	1	3	5	0	0	0	1	0	10	8.5
62.5	3	0	3	0	0	4	3	0	0	1	14	4	0	4	5	3	0	0	0	3	0	19	16.5
