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A Comparison of Basketball Shooting Percentages at Home and Away

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A COMPARISON
OF BASKETBALL SHOOTING PERCENTAGES
AT HOME AND AWAY

by

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This thesis submitted by Merle W. Gustafson in partial fulfillment of the requirements for the Degree of Master of Science in the University of North Dakota is hereby approved by the Committee under whom the work has been done.

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CHAPTER I

INTRODUCTION

Statement of the Problem

Basketball is the greatest contribution America has made to the sports field. The game was invented by Dr. James Naismith at Springfield College, Springfield, Massachusetts, in 1891. In its inception, basketball was intended as a game that could be played indoors with a minimum of equipment. It was designed to fill the gap between the football and baseball seasons.

The original teams had nine players on a side, but because of the congestion which resulted when eighteen players moved rapidly in a small area, the teams were later reduced to five members each.[1]

The only major sport played in this country that has been invented by an American is the game of basketball.

Buchanan[2] stated: "Millions of people have become basketball fans, and it is estimated that 98 per cent of the high schools in America have varsity teams."

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[1]Howard A. Hobson, Scientific Basketball, (New York: Prentice-Hall, Inc., 1949), p. 3.

[2]Lamont Buchanan, The Story of Basketball in Text and Pictures, (New York: Stephen-Paul Publisher, 1948), p. 15.

A universal appeal for basketball is demonstrated by the fact that many of the foreign countries now have teams playing the game. The success of foreign teams in play against the United States in the past ten years was spectacular enough to prove that those countries which have adopted the sport have made rapid advancements in the teaching of the skills and techniques of the game.

The keen rivalries and the intense desire to win have produced in America many basketball coaches who have added much to the game by making studies of a scientific nature. The constantly changing rules of the game illustrate the fact that the sport is still in the beginning stage; however, the object of the game remains the same and that is to score the all-important goal.

Purpose of the Study

The purpose of this study was to determine:

1. The factors which affect team shooting percentages when playing on the home court and when playing on an opposing court or a neutral court.

2. The most consistent scoring areas.

3. A system by which the various factors which might affect shooting percentages can be charted and measured.

4. A shooting percentage standard for a winning and

losing team effort.

Limitations

There are several factors which may have limited this study. Some of these were:

1. The number of contests studied was limited because of state regulations.

2. The relative strength of two competing teams may have been so unequal as to produce a large deviation between teams in shots attempted and the percentage made.

3. The abilities of the competing players varied greatly.

4. The methods of coaching and styles of play were variables.

5. The reliability of high school students in helping to make a study of this type may be questioned.

6. The degree of co-operativeness varied greatly in teams and coaches consulted.

Justification for the Study

The author felt there was a definite need for a study of this kind because, if properly used, it may be of great aid to high school coaches and to the coaching profession as a whole. Since there are various opinions of the advantages of playing at home, the evidence reported in this work could help to prove or disprove many theories on this subject.

Definition of Terms

1. Area shooting: classifying the attempts at the basket according to the part of the playing court from which they were made.

2. Short area: the area within a radius of twelve feet from the basket.

3. Medium area: the area located between the twelve foot radius and a twenty-five foot radius.

4. Long area: a radius beyond twenty-five feet from the basket.

5. Assist: a pass made by one player to another which directly accounts for a basket.

CHAPTER II

REVIEW OF RELATED STUDIES

Basketball is a game which lends itself to research of a scientific nature. Most of the investigations relating to factors which affect shooting percentages, however, have been done on the college level. Hobson[3] said, "We know when a team wins and when it loses; but measurement of the factors that contribute to the victory or the loss is not well established."

Hobson[4] made a study of 460 college basketball games in which various performances were recorded. He included college games from all sections of the country and gathered his data over a period of thirteen years. He found that the offense made measurable progress during the years he kept records, both in the number of baskets made and in the percentage of shots made good.

Elbel and Allen[5] devised an evaluation chart by which

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[3]Howard A. Hobson, op. cit., p. 7.

[4]Ibid., p. 2.

[5]E. R. Elbel and Forrest C. Allen, "Evaluating Team and Individual Performance in Basketball," Research Quarterly, Volume XII, No. 4, (December, 1941), p. 2.

they rated members of the University of Kansas basketball teams for the years 1938-1939 inclusive. They worked on the theory that the information one could get from the box score of a basketball game was too sketchy to be of any real worth. They established a list of the positive factors of offensive basketball which they felt contributed to victory.

Some of the material they included in the positive list were: baskets made, assists, of which they had two kinds, immediate and secondary, good passes, offensive rebounds, defensive rebounds, jump balls secured, interceptions made and several other factors. The negative factors included: bad passes, traveling, fouls, fumbles, shots missed, free throws missed, and other errors. The data on the positive list were rated on the basis of one to ten points, according to how much the authors felt they contributed to victory. The negative factors were rated on a scale of one to eight points depending on the extent to which it was felt they detracted from playing winning ball.

The actual charting was done by twelve teams of physical education majors, in teams of two, one of whom acted as an observer and the other as a recorder. Following each game the positive and negative factors were totalled, then equated algebraically to see what the balance of plus or minus was for each individual. The findings were then recorded on a separate chart

for each individual, making it possible for the coach to see who was playing the type of basketball which contributed most to victory. The data were made known to each player in an effort to make him aware of his mistakes, and to help him take advantage of the things he was doing well.

Summarizing the results of their research Elbel and Allen[6] stated:

> The results of the study indicate rather clearly that much information which could be helpful, and is readily available in basketball games is not used. It has called attention particularly to certain factors which are apparently important to the winning team but receive little recognition. Many of these factors in the form of mistakes, occur so frequently during the course of the game that they appear to have little effect upon the outcome of the contest. It would seem that the data not only clearly indicate the importance of team play, but recognize the achievements of the player who is an important factor in the scoring by his teammates, though he scores few points himself.

Voltmer and Watts[7] devised a rating scale to evaluate a player performance in basketball. Their study was much like the one conducted at Kansas University in that they tested many of the same abilities and rated the participants on a positive and negative basis, depending on how much they felt each particular skill was worth.

Another important merit of statistics was stated by

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[6]Elbel and Allen, op. cit., p. 555.

[7]E. F. Voltmer and Ted Watts, "A Rating of Player Performance in Basketball, "Journal of Health and Physical Education, (February, 1960), pp. 94-95.

Charles E. Anderson,[8] in that through their use the coach was able to show each player exactly what he was doing in a game. Statistics tend to create friendly competition among the players.

After each game, the coach may counsel each boy and point out to him the departments in which he is weak and where more practice is needed.

A word of caution is necessary since statistics give an objective measurement of each player, but do not give the more subjective measurements. The various charts tell exactly what each player did or did not do. However, the use of statistics in their proper place in the realm of basketball prove invaluable to the basketball coach, when he tries to evaluate his individual players and the team as a whole.

Forrest Anderson[9] stated:

> If you violate all other cardinal fundamentals of basketball but can manage to 'hang that ball in there' when it counts, you will do all right. Despite failing or deficiencies in other departments of play, if you are able to shoot, and shoot when the opportunity is good, basketball will be fun because shooting is the most popular phase of the game.

The goal shooting attempts charted in this study are

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[8]Charles E. Anderson, "Statistics in Basketball, "The Athletic Journal, Volume XXXIII, No. 3, (November, 1952), pp. 20, 49, 50.

[9]Forrest Anderson, Basketball Techniques Illustrated, (New York: A. S. Barnes and Co., 1952), p. 39.

listed under five categories. These are:

1. The push shot is the common one-hand shot in which the propelling motion is given to the ball by one hand.

2. Jump shots are called by different names in other sections of the country, but the name, jump shot, has become universally stable. In executing the mechanics of the shot, the player dribbles toward the goal, comes to a complete stop, bends the knees, and leaps forward and upward.[10] The ball is held in both hands until the highest point is reached. At the very instant he is about to begin his descent, the player starts the ball towards the basket, giving a slight kick with the knees.

3. The two-hand chest shot is one of the basic fundamentals in basket shooting. The ball is held in front of the body, level with the chest, and propelled toward the goal with both hands giving equal force.

4. The hook shot is a mechanical type of shot developed to a high degree by some players. It is one of the most difficult shots to guard. In executing the shot, the player usually starts the movement from a stopped position, with his back or side toward the basket. He executes a step away from the basket with the foot corresponding to the hand he intends to shoot with. As he takes his eyes away from the basket a

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[10] Ibid., p. 47.

moment, he pivots on the ball of the opposite foot, directs his eyes at the basket, jumps and delivers the ball over the shoulder directly over the pivot foot. The arm and hand describe an arc similar to a hook.

5. The lay-up shot is called by various names, even among members of the same team. It is a shot used in the short area, usually at the end of a dribble towards the basket. The player, if he wishes to shoot with the right hand, gathers the ball in both hands, jumps off the left foot, and at the top of the jump removes the left hand and releases the ball in a soft, pushing motion towards the basket.

6. The tip-in shot is used to get a rebound back toward the basket after a missed attempt. The shooter should have the fingers of one or both hands well spread, depending on the type of tip-in he wishes to attempt. The shooter tries to leap as high as possible, timing the jump so he will reach the ball at the highest point of the rebound. Upon touching the ball, he pushes it back gently towards the basket.

Elbel and Allen[11] stated:

> There is quite general agreement that the box score does not give a very complete statistical picture of the game and is consequently of little value to the coach or player from the standpoint of game analysis. Much takes place during the course of a basketball game which in the final analysis, contributes materially to the success or failure of a team. Many of these factors are not apparent

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[11]Elbel and Allen, op. cit., p. 539.

to the average observer or are they evidenced in the generally accepted summary of the game.

CHAPTER III

METHOD OF STUDY

The object of this research was to analyze the shooting of a selected high school basketball team under game conditions and at the same time, to see how the shooting varied from the home court to the opponents' court.

A list of the teams played can be found in Appendix A, page 64. The following procedure was used in collecting the data. The students, who were chosen by the author to do the actual charting, each took one chart at random from the collection. After the students knew whom they would chart, the following directions were given by the coach: Mark each shot attempted with the number of the player attempting the shot. This attempt was to be marked accurately from the area the shot was taken, the long, medium or short areas. The student was to place a circle around the player's number if the attempt was made. The type of shot taken was to be shown by placing the following letters beside the number and circle, if made: "L" for lay-up, "H" for hook, "T" for tip-in, "P" for push shot, "C" for two-hand chest shot and "J" for jump shot. The two student managers and the author compiled the

statistics gathered by the students the day following each game. This was done by totalling each player's attempts and shots made from each area. The different types of shots taken were then placed on another chart showing the types of shots. To obtain the proper shooting percentage, the student manager and the coach divided the total number of shots made by the total number of shots taken. The charts with this data relating to basket shooting can be found in Appendices B and C. on pages 65 and 66.

The gymnasiums in which the games were played were rated according to the data listed in Appendix D, page 67. These data were gathered by the author and his assistant coach. The information that could be obtained from the opposing coach or school custodian was collected. If this was not possible, the author and the assistant coach, after the completion of the game, would gather the needed material, such as dimensions of floor. This was done by using a steel measuring tape.

The information, relating to the size of the crowd and the proportion of students and adults, was obtained by estimating or counting the number of tickets sold in the various schools.

The lighting in each gymnasium was taken by using a light meter. This was done by an adult basketball fan. In Appendix D., page 67, the study made on lighting facilities

can be found. It was felt that the best time to take the light reading was at the end of the first quarter when the greater portion of fans were still in the gymnasium.

After all gymnasiums had been evaluated, it was found that the light meter reading in all the gymnasiums was the same. In order to obtain some idea about the amount of lighting in the gymnasiums involved, the author interviewed the rival coaches and obtained the number of lights in the playing area and the wattage in the bulbs used. Multiplying the number of bulbs by the watt power of each bulb, a comparative amount of light present was obtained.

It was felt by the writer that the size of competing schools, importance of game, and the type of defense used, might affect the shooting percentages of high school boys. The collection and the evaluation of this material was done by the author and his assistant coach at the conclusion of each game. A sample of the chart used can be found in Appendix E. on page 68.

CHAPTER IV

ANALYSIS OF DATA

The official basketball rule book states:[12] "The purpose of a basketball team is to throw the ball into its own basket and to prevent the other team from securing the ball and scoring." Therefore, the prime objective of the game is to attempt and make the basket.

A large percentage of basketball enthusiasts, whether they be fans, coaches, or the players themselves, interpret the words of the rule book lightly and do not seek many of the less important implications that may have effect on the performance of their favorite team. It is evident that the immediate success or failure of a basketball team is shown in the box score of the game played. Usual accounts list the names of the players, field goals scored, free throws scored, and fouls committed by each team. Yet, in some of the large metropolitan papers, a more complete box score arrangement is provided which includes those factors already mentioned and will add assists, free throws missed, field goals attempted,

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[12]National Association of State High School Athletic Associations, Official Basketball Rules for 1964-65, p. 2.

and rarely, in the running account of the game, show the relative time of scoring.

The idea that the public is concerned over data like these may forecast a trend in the study of factors that are incidental and relative to the actual scoring of the goal.

Area Shooting Results of Team Studied

In this study, all the games played by the Osnabrock, North Dakota, high school basketball team of 1963-64 were charted and a study made of the gathered information. One of the many details noted was the total number of baskets attempted by the team, as shown in Table I. Other information shown was the percentage of shots made good, the average attempts per game, and the average goals per game.

Table I

TOTAL GAME SHOOTING BY TEAM

Number of Games	Field Goal Attempts	Field Goals Made	Per Cent	Average Attempts Per Game	Average Goals Per Game
24	1578	679	43.0	65.75	28.29

During the total time played which amounted to 768 minutes, there were 1578 field goal attempts, or two and five-hundredths attempts per minute. A field goal attempt every

twenty seconds indicated that the action was fairly fast. The fact that forty-three per cent of the shots attempted were converted into goals was significant in that some authorities on basketball were in agreement that a somewhat lower average was to be expected, even among teams of more advanced technical skill.[13]

Table II shows the total shots taken by the Osnabrock team from the various areas of the court and the results.

Table II

AREA SHOOTING BY OSNABROCK HIGH SCHOOL

Number of Games	Long Shots	Area Baskets	Per Cent	Medium Shots	Area Baskets	Per Cent	Short Shots	Area Baskets	Per Cent
24	354	126	35.6	521	209	40.1	703	344	48.9

The figures shown in Table II reveal that the short area was the most heavily favored in the number of attempts made at the basket. However, the percentage made in the medium area was just as favorable, considering the distance was greater. The long area was the least used and the percentage of shots made indicated the more limited success.

A further break-down of area shooting can be made by

[13]Howard Hobson, Scientific Basketball, p. 51.

comparing the percentage of shots made good from each area in a winning effort as contrasted to the same data gathered on a losing effort. This information can be found in Table III.

Table III

AREA SHOOTING WHILE WINNING AND LOSING

	Games	Total Score	Long Area *S	Long Area *B	Long Area Per Cent	Medium Area *S	Medium Area *B	Medium Area Per Cent	Short Area *S	Short Area *B	Short Area Per Cent
Winning Effort	20	1359	289	108	37.4	445	182	30.9	612	298	48.7
Losing Effort	4	214	55	18	32.7	76	27	35.5	91	46	50.5

*S-Shots attempted *B-Baskets Made

A study of the data in Table III shows that in the long area the winning team percentage was four and seven-tenths per cent higher than in their losing efforts. However, in the medium area, the losing team's percentage was four and six-tenths per cent higher. This also was true in the short area where the losing team's percentage was one and eight-tenths per cent higher than that in a winning situation. These results indicated that the losing team's percentage from the long area was poor because of such factors as good defensive play on the part of the winner, or the pressure created from having

to shoot from the outside. The age, experience, and skill of the individual performers would also make a difference. The table showed that from the short area, in both winning and losing, the attempts taken and the percentages made good were high, which showed that this was the most desirable area. Some factors that might influence the success shown in this area could be interceptions, height, weight, and the shooting of the more mechanical shots in close to the basket.

Area Shooting Percentages of Winning Team

The area shooting percentages of the winning team for each individual game can be found in Table IV, page 20.

Table IV

SHOOTING PERCENTAGES IN WINNING EFFORT
BY GAMES FROM LONG, MEDIUM AND SHORT AREAS

Game Number	Winner's Score	Long Area *S	Long Area *B	Long Area Per Cent	Medium Area *S	Medium Area *B	Medium Area Per Cent	Short Area *S	Short Area *B	Short Area Per Cent
1	46	13	3	23.1	30	8	26.7	27	9	37.0
2	82	15	7	46.7	24	10	41.7	36	21	58.3
4	50	6	2	33.3	21	7	33.3	21	9	42.9
5	70	21	11	52.4	29	11	37.9	21	11	52.4
6	50	18	7	38.9	23	5	21.7	32	16	50.0
7	56	8	2	25.0	18	7	38.9	31	16	51.6
8	41	15	0	00.0	12	6	50.0	20	5	25.0
9	77	10	3	30.0	24	12	50.0	36	14	38.9
11	99	19	10	52.6	31	16	51.6	37	22	59.5
12	81	17	6	35.3	26	7	26.9	28	18	63.3
13	87	14	4	28.6	21	11	52.4	40	16	40.0
14	65	12	6	50.0	16	6	37.5	31	13	41.9
15	75	13	4	30.8	13	7	53.8	42	21	50.0
17	58	15	9	60.0	12	6	50.0	23	13	56.5
18	96	11	5	45.5	18	10	55.6	53	26	49.1
19	40	11	4	36.4	20	7	35.0	19	9	47.4
20	74	13	5	38.5	29	14	48.3	38	17	44.7
21	74	19	4	21.1	25	11	44.0	35	19	54.3
22	69	31	12	38.7	19	7	36.8	22	10	45.5
23	69	18	4	22.2	34	14	41.2	20	13	65.0
Totals	1359	289	108	37.4	445	182	30.9	612	298	48.7

*S-Shots Attempted *B-Baskets Made

It is interesting to note the difference in the number of shots taken from the respective areas in the different games, as well as the success from certain areas as compared to others. There were 289 shots attempted from the long area by the winning team representing an average of twelve and four-hundredths attempts per game over the twenty-four game schedule. There were 108 baskets made from this same area, which means an average of four and fifty-hundredths per game. From the medium area, the winning team shot 445 times for an average of eighteen and fifty-four hundredths attempts per game. The team made 182 baskets, an average of seven and fifty-eight hundredths per game. The short area indicated 612 shots attempted, an average of twenty-five and fifty-hundredths per game. From this same area, 298 shots were made good; which illustrated an average of twelve and forty-one hundredths per game.

The number of shots attempted from the short area indicated that it was the best area from which the players could shoot with relatively high degrees of success. Another indication was that the average number of goals scored per game decreased quite rapidly as the distance from the basket increased. Penetration into the middle area was increased if a zone defense was used. Many teams attempt to go no closer against it, preferring to draw the defense away from

the basket.

A comparison of data obtained during the first part of the season can be made with that taken during the latter portion. For example: The first five games played showed that the winning team scored 298 total points as compared to 343 scored in the last five games of the season. In the first five games, there were 337 goals attempted and 137 baskets made, an average of forty and seven-tenths per cent. In the last five games, there were 330 goals attempted and 157 baskets made, for an average of forty-seven and six-tenths per cent. The facts given indicated that approximately the same number of shots were attempted in both the first five and last five games of the season by the winning team. This indicated that the offensive play was quite well established before the playing season began. The higher percentage of success in the last five games also showed that there was notable improvement made in the specific skills of basket shooting.

The area shooting percentage for this same team, as a loser, can be found in Table V, page 23. As a loser, fifty-five shots were taken from the long area, with an average of thirteen and seventy-five hundredths attempts per game. While losing, eighteen attempts were made good for an average of three and five hundredths baskets per game. In the medium

area, seventy-six shots were attempted, for an average per game of eighteen, and twenty-seven baskets were made, an average per game of six and seventy-five hundredths. In the short area, the losers attempted ninety-one shots, an average of twenty-two and seventy-five hundredths per game. They made forty-six baskets which was eleven and fifty-hundredths per game average.

A comparison of the area shooting results over the entire season showed that, as a loser, the team was forced to attempt more shots from out on the court than as a winner.

Table V

SHOOTING PERCENTAGES IN LOSING EFFORT IN GAMES FROM LONG, MEDIUM AND SHORT AREAS

Game Number	Loser's Score	Long Area *S	*B	Per Cent	Medium Area *S	*B	Per Cent	Short Area *S	*B	Per Cent
3	55	13	4	30.8	16	5	31.3	26	15	57.7
10	45	10	2	20.0	17	5	29.4	25	12	48.0
16	50	25	10	40.0	17	9	52.9	12	4	33.3
24	64	7	2	28.6	26	8	30.8	28	15	53.6
Totals	214	55	18	32.7	76	27	35.5	91	46	50.5

*S-Shots Attempted *B-Baskets Made

As noted previously, while losing, the team had more difficulty in entering the short area than as a winner and shot more poorly once in position.

The large number of attempts from the long and medium areas, together with the small number from the short area indicated that, as a loser the team was forced, in many instances, to take shots on the court in which chances for success were less certain.

Another comparison can be made by using Tables IV and V, pages 20 and 23, to indicate the high and low percentages from the three areas as a winner as well as the highs and lows from the same areas as a loser. The tables showed that as a winner in the long area, sixty per cent was the high percentage attained, and forty per cent was the high as a loser. On the other hand, the low percentage as a winner was zero, and as a loser twenty per cent was the low. From the medium area as a winner, fifty-five and six-tenths per cent was the high and fifty-two and nine-tenths per cent was high as a loser. A comparison of low percentages showed, as a winner, twenty-one and seven-tenths per cent and twenty-nine and four tenths per cent as a loser. In the short area, as a winner, sixty-five per cent was high whereas as a loser, the high percentage was fifty-seven and seven-tenths per cent. The low from the short area, as a winner, was twenty-five per

cent and as a loser it was thirty-three and three-tenths per cent.

The implications from Tables IV and V are that, in the medium area, the players shot with more consistency, with a difference in high and low of two and seven-tenths per cent as a winner and seven and seven-tenths per cent as a loser. The greatest difference, of course, is in the long area with a difference of twenty per cent as a winner and the same as a loser. The results here seem to indicate that the short area is the most heavily favored shooting area. Also, as the distance from the basket increased, the success of the shooters decreased.

Finally, it was noted that as a winner there were slightly fewer average shots taken per game from the long and medium areas as compared to the same areas as a loser. Yet, the percentage of shots made as a winner was better than as a loser. In the short area, the winner's average shots per game was greater than the loser's.

The implication here seems to be that the higher number of shots and lower percentage from the long and medium areas were due to pressure created from having to shoot from the outside and the good defensive play on the part of the winner.

Comparison of First and Second Half Area Shooting of Winning and Losing Efforts

Records were kept of the shooting attempts and baskets made by the team in both winning and losing efforts for each half of the games throughout the study. It was felt that the data obtained might show a pattern from which definite conclusions might be drawn. Table VI, page 27, gives the total shooting percentages from the three different areas for the winning teams for the first and second halves.

The first half statistics show that as a winner, the team shot one hundred and fifty times, an average of seven and seventy-five hundredths attempts and made fifty-three baskets, an average of two and sixty-five hundredths baskets per game, for a percentage of thirty-five and three-tenths per cent from the long area. From the same area in the second half, the team attempted one hundred and forty-nine shots, an average of seven and forty-five hundredths attempts and made fifty-five, for an average of two and seventy-five hundredths baskets per game. The second half shooting percentage from the long area was thirty-six and nine-tenths per cent.

The shooting percentages of the winning team from the three shooting areas for the first and second halves can be found in Appendix F on page 69.

Table VI

THE TOTAL SHOOTING PERCENTAGES OF THE WINNING TEAM FROM THE LONG, MEDIUM AND SHORT AREAS FOR THE FIRST AND SECOND HALVES

Totals	Half	Long Area *S	*B	Per Cent	Medium Area *S	*B	Per Cent	Short Area *S	*B	Per Cent
First Half		150	53	35.3	234	108	46.2	305	148	47.5
Second Half		149	55	36.9	271	74	35.1	316	159	50.3

*S-Shots Taken *B-Baskets Made

These data show that, as a winner, the team attempted practically the same number of shots each half. It also shows that the percentages from the long and short areas were almost the same. Accounting for the large number of shots taken from this long area may have been attempts to draw the defense away from the basket and experienced and capable personnel for shooting from the long area. The continued success from this area may have been due to becoming more familiar with the gymnasium, and the giving-up attitude of the opponent.

As a winner, the team attempted two hundred and thirty-four shots in the first half from the medium area, an average of eleven and seventy-hundredths attempts per half. One hundred and eight attempts were successful for an average of five and forty-hundredths baskets each half. The percentage

was forty-six and two-tenths. The medium area shooting in the second half for all games as a winner showed two hundred and seventy-one basket attempts, averaging thirteen and fifty-five hundredths attempts per half and seventy-four goals, an average of three and seventy-hundredths per game, for a second half percentage of thirty-five and one-tenth.

Here it was found that results in all categories were better in the first half than in the second half of the game. The success shown in the first half may have been due to such things as the concern for getting a comfortable lead by half time, the unpreparedness on the part of the defense, as well as individual defensive assignments. The decrease of medium area shooting in the second half may have been due to a combination of factors such as the protection of a leading score, unwillingness to surrender the ball to a zone defense, or inability to rebound might account for some of the drop in accuracy. Other things that may have an influence on the second half shooting may be fatigue or defensive adjustments made at the half that placed more emphasis on the shooter and made the attempts more hurried.

The shooting from the short area in a winning effort was quite well balanced for both the first and second halves. In the first half, there were three hundred and five attempts, an average of ten and one-tenth per half. The team made one

hundred and forty-eight successful attempts, averaging seven and forty-hundredths per half, for a first half percentage of forty-seven and five-tenths. The data for the second half show three hundred and sixteen attempts, an average of fifteen and eighty-hundredths each half, as against one hundred and fifty-nine made or seven and ninety-five hundredths successful attempts per half. The second half percentage was fifty and three-tenths per cent.

The uniformity of performance in this area for each of the two halves suggests that the offensive patterns were successful in fulfilling their design in this area throughout the entire game.

Table VII, page 30, shows the first and second half shooting percentages in losing team efforts. The team attempted thirty-four shots from the long area the first half, an average of eight and fifty-hundredths and made eleven, averaging two and seventy-five hundredths attempts per half for a percentage of thirty-two and four-tenths. In the second half, the team shot twenty-one times, averaging five and twenty-five hundredths shots and making seven baskets, or one and seventy-five hundredths per half for a percentage of thirty-three and three-tenths.

The large number of attempts in the first half may have been due to the effective defensive alignment, the offensive

idea to open the defense for closer shots later on, and the fact that the team had exceptionally good outside shooters.

The medium area shooting in a losing team effort in the first half totals forty-one attempts, an average of ten and twenty-five hundredths for each first half played. The team made twenty, a per half average of five and showed a total percentage of forty-eight and eight-tenths. In the second half, thirty-five shots were taken, averaging eight and seventy-five hundredths per half, and seven shots made for an average of one and seventy-five hundredths and a percentage of twenty.

Table VII

THE SHOOTING PERCENTAGES WHILE LOSING FROM THE LONG, MEDIUM AND SHORT AREAS FOR THE FIRST AND SECOND HALVES

Game Number	Half	Long Area *S	*B	Per Cent	Medium Area *S	*B	Per Cent	Short Area *S	*B	Per Cent
3	1	9	3	33.3	8	3	26.7	13	7	53.8
	2	4	1	25.0	8	2	25.0	13	8	61.5
10	1	7	2	28.6	8	4	50.0	11	4	36.4
	2	3	0	00.0	9	1	11.1	14	8	57.1
16	1	15	5	33.3	9	6	66.7	6	2	66.7
	2	10	5	50.0	8	3	37.5	6	2	66.7
24	1	3	1	33.3	16	7	43.8	10	6	60.0
	2	4	1	25.0	10	1	10.0	18	9	50.0
Totals	1st half	34	11	32.4	41	20	48.8	40	19	47.5
	2nd half	21	7	33.3	35	7	20.0	51	27	52.9

*S-Shots Attempted *B-Baskets Made

As a loser, the team shot fewer shots and had a lower percentage in the second half. The reasons for this poor showing may have been fatigue or defensive adjustments that placed more stress on the shooter and made the attempts more hurried.

In the short area, as a loser, the team shot forty times in the first half, a per half average of ten, and made nineteen baskets, averaging four and seventy-five hundredths per half. The first half percentage from the short area was forty-seven and five-tenths. The second half shooting, as a losing team, in this area showed more attempts, fifty-one for a per half average of twelve and seventy-five hundredths. The team scored twenty-seven baskets for an average of six and seventy-five hundredths and a percentage of fifty-two and nine-tenths.

In the first half the shooting was poor. This could have been caused by insufficient warm-up time, difficulty in adjusting to the opponent's court, superior height or more effective defense.

The Area Shooting Percentages at Home

It has been stated and has been a belief that the basketball team which is playing on its own court has an advantage over its opponents.

Dean[14] stated:

> During a player's experience it is necessary for him to make many adjustments to different playing conditions. Some of the following conditions are met: Space in field houses; cramped playing conditions in small gymnasiums; glass, steel, wood, and fan-shaped backboards; various type balls; different baskets; and lighting systems. Space illusions are detrimental to basket shooting and very much to the player who is easily excited. Different kinds of baseboards were a decided impairment to good shooting if for no other reason than the psychological. However, there is a physical adjustment to be made because of the difference in the degree of resiliency in the board. Adjustments cause errors, hence, the reason for the home floor advantage. These differences show the need for uniformity in equipment.

One of the items noted in this study was the shooting success of the Osnabrock basketball team in games played at home and on foreign courts. Tables VIII and IX, pages 34 and 35, show the results of all home games charted for both the first and second halves from the three areas for the entire game and for games played away from home.

The first half long area shooting on the home court shows seventy-three attempts in eleven games, an average of six and sixty-five hundredths shots per half, and twenty-nine baskets made, an average of two and sixty-five hundredths. The first half percentages for all games at home was thirty-eight and seven-tenths per cent from the long area. The second half attempts from this area at home numbered thirty-eight

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[14]Everett S. Dean, Progressive Basketball, (New York: Prentice Hall, Inc., 1950), pp. 126-127.

and six-tenths shots each game. There were twenty-seven baskets made, an average of two and forty-five hundredths, for a percentage at home during the second half of thirty-eight and six-tenths per cent.

In games played away from home, the first half shooting from the long area was one hundred and eleven attempts, an average of eight and fifty-four hundredths per half; and thirty-five made, an average of two and sixty-nine hundredths. The percentage for the first half was thirty-one and five-tenths. The second half showed one hundred attempts averaging seven and sixty-nine hundredths shots per half. The team made thirty-five shots which was an average of two and sixty-nine hundredths per half, for a percentage of thirty-five.

There were a total of one hundred and forty-three attempts made from the long area in all home games, an average of thirteen a game and fifty-six baskets made, or five and nine-hundredths a game. This represents a percentage of thirty-nine and two-tenths.

In the games away, there were two hundred and eleven shots from the long area, or sixteen and twenty-three hundredths per game, and seventy baskets scored, or five and thirty-eight hundredths each game, for a total percentage of thirty-one and one-tenth.

Table VIII

SHOOTING PERCENTAGES FOR OSNABROCK HIGH SCHOOL AT HOME

Game of Season	Half	Long Area *S	*B	Per Cent	Medium Area *S	*B	Per Cent	Short Area *S	*B	Per Cent
3	1	9	3	33.3	8	3	26.7	13	7	53.8
	2	4	1	25.0	8	2	25.0	13	8	61.5
4	1	5	2	40.0	8	3	37.5	6	0	00.0
	2	1	0	00.0	13	4	30.8	15	9	60.0
6	1	6	2	33.3	12	3	25.0	16	11	68.8
	2	12	5	41.7	11	2	18.2	16	5	31.3
7	1	7	2	28.6	10	6	60.1	18	9	50.0
	2	1	0	00.0	8	1	12.5	13	7	53.8
10	1	7	2	28.6	8	4	50.0	11	4	36.4
	2	3	0	00.0	9	1	11.1	14	8	57.1
11	1	8	5	62.5	18	9	50.0	19	12	63.1
	2	11	5	45.6	13	7	53.8	18	10	55.6
12	1	7	2	28.6	16	5	31.3	14	10	71.4
	2	10	4	40.0	10	2	20.0	14	8	57.1
15	1	5	3	60.0	7	5	71.4	20	8	40.0
	2	8	1	12.5	6	2	33.3	22	13	59.1
17	1	8	6	75.0	6	1	16.7	13	9	69.2
	2	7	3	42.9	6	5	83.3	10	4	40.0
18	1	6	1	16.7	11	7	63.6	27	13	48.1
	2	5	4	80.0	7	3	42.9	26	13	50.0
20	1	5	1	20.0	19	8	42.1	15	5	33.3
	2	8	4	50.0	10	6	60.0	23	12	52.2
Totals	1st Half	73	29	38.7	123	54	43.9	172	88	51.2
	2nd Half	70	27	38.6	101	35	34.7	184	97	52.7
Game Totals		143	56	39.2	224	89	39.7	356	185	52.0

*S-Shots Taken *B-Baskets Made

Table IX

SHOOTING PERCENTAGES FOR OSNABROCK
HIGH SCHOOL AWAY FROM HOME

Game of Season	Half	Long Area *S	*B	Per Cent	Medium Area *S	*B	Per Cent	Short Area *S	*B	Per Cent
1	1	5	1	20.0	11	3	27.3	12	7	58.3
	2	8	2	25.0	19	5	26.3	15	2	13.3
2	1	10	3	30.0	14	7	50.0	21	10	47.6
	2	5	4	80.0	10	3	30.0	15	11	73.3
5	1	13	5	38.5	11	5	45.4	8	3	37.5
	2	8	6	75.0	18	6	33.3	13	8	61.5
8	1	5	0	00.0	7	5	71.4	10	5	50.0
	2	10	0	00.0	5	1	20.0	10	0	00.0
9	1	8	2	25.0	11	5	45.5	21	6	28.6
	2	2	1	50.0	13	7	53.8	15	8	53.5
13	1	6	2	33.3	15	9	60.0	22	9	40.9
	2	8	2	25.0	6	2	33.3	18	7	38.9
14	1	8	4	50.0	4	3	75.0	18	6	66.7
	2	4	2	50.0	12	3	25.0	13	7	53.8
16	1	15	5	33.3	9	6	66.7	6	2	66.7
	2	10	5	50.0	8	3	37.5	6	2	66.7
19	1	6	3	50.0	14	6	42.9	8	4	50.0
	2	5	1	20.0	6	1	16.7	11	5	45.5
21	1	7	1	14.3	15	8	53.3	10	4	40.0
	2	12	3	25.0	10	3	30.0	25	15	60.0
22	1	15	6	40.0	8	4	50.0	8	4	50.0
	2	16	6	37.5	11	3	27.3	14	6	42.9
23	1	10	2	20.0	17	6	35.3	10	4	40.0
	2	8	2	25.0	17	8	47.1	10	9	90.0
24	1	3	1	33.3	16	7	43.8	10	6	60.0
	2	4	1	25.0	10	1	10.0	18	9	50.0
Totals	1st Half	111	35	31.5	152	74	48.7	164	70	42.7
	2nd Half	100	35	35.0	145	46	31.7	183	89	48.6
Game Totals		211	70	33.1	297	120	40.4	347	159	45.8

*S-Shots Taken *B-Baskets Made

The fewer number of attempts from the long area in the games played at home may be partly explained by the fact that there were two fewer home games. Also, the increase in the number of long shots in games played away from home was influenced somewhat by smaller courts that enabled zone defenses to jam the closer areas. The relatively even distribution of shot attempts from this area in all halves, both at home and away was somewhat affected by the capable outside shooter that the Osnabrock team had. In order to loosen up the zone defense, the team was instructed to shoot from the outside regions.

The first half shooting for all home games in the medium area showed one hundred twenty-three attempts, an average of eleven and eighteen-hundredths each half and fifty-four baskets or four and ninety-one hundredths per half, a percentage of forty-three and nine-tenths. The medium area shooting for all games in the second half showed that one hundred and one shots were taken, averaging nine and eighteen-hundredths per half, and thirty-five shots were made good, an average of three and eighteen-hundredths for the second half. The percentage of shots made good for the second half was thirty-four and seven-tenths.

The medium area data in games played away from home showed that, in the first half, one hundred fifty-two attempts

were made, an average of eleven and sixty-nine hundredths per half, for a percentage of forty-eight and seven-tenths. There were one hundred forty-five attempts in the second half, or eleven and fifteen-hundredths each half. There were forty-six baskets scored, or three and fifty-four hundredths baskets per half, for a lower percentage rate of thirty-one and seven-tenths.

The total number of attempts from the medium area in all home games was two hundred and twenty-four or twenty and thirty-six hundredths a game. There were eighty-nine goals made or eight and nine-hundredths a game. The medium area percentage for home games was thirty-nine and seven-tenths. In the games away from home, there were a total of two hundred and ninety-seven shots attempted from this same area, an average of twenty-two and eighty-five hundredths per game, and one hundred twenty goals made, averaging nine and twenty-three hundredths per game. The percentage in games away from home in this area was forty and four-tenths.

The number of attempts made in the medium area for games played at home indicated that more attempts were made during the first half of play, more baskets were scored, and a much higher percentage resulted. This may have been caused by obtaining an early lead, if possible, and the physical condition of the playing personnel in the early stages of the

game. The lower percentage of attempts made good in the second half tended to show that defensive changes may have occurred at half time and more emphasis may have been placed on stopping the shooter. Possibly, fatigue and laxity on the part of the team could have existed also. In games away, getting an early lead during the first half could have been due to capable shooters, physical condition, and poor defensive arrangement. This, also, may have contributed to the greater number of attempts and the good percentage from the medium area. The second half results follow quite closely the first half results in the home performances.

It must be noted that in this area the percentages for the game remained quite constant whether the game was played at home or away. The slightly higher shooting percentage from the medium area in games played away from home was an encouraging factor in designing an offensive attack.

During the first half of all home games, there were one hundred and seventy-two shots taken in the short area, an average of fifteen and sixty-four hundredths per half. There were eighty-eight goals scored or eight per half for a shooting percentage of fifty-one and two-tenths. There were one hundred and eighty-four attempts during the second half, averaging sixteen and seventy-three hundredths per half, and ninety-seven baskets scored, or eight and eighty-two hundredths per half, for a fifty-two and seven-tenths per cent rating

for the second half.

Games away from home showed one hundred and sixty-four shots attempted the first half, or an average of twelve and sixty-two hundredths per half. There were seventy shots made good in the first half, an average of five and thirty-eight hundredths. The percentage of shots made good was forty-two and seven-tenths. In the second half, there were one hundred and eighty-three shots attempted, an average of fourteen and six hundredths per half. In the same half, eighty-nine goals were scored, or six and eighty-five hundredths per half, for a percentage of forty-eight and six-tenths.

The total number of attempts from the short area in all home games was three hundred and fifty-six, or thirty-two and thirty-six hundredths each game. There were one hundred and eighty-five shots made good, averaging sixteen and eighty-two hundredths a game. The total short area percentage of shots made good in all home games was fifty-two. In all games played away from home, there were three hundred and forty-seven shots attempted in the short area, or twenty-six and sixty-nine hundredths per game. There were one hundred and fifty-nine goals scored, an average of twelve and twenty-three hundredths each game for a percentage rating of forty-five and eight-tenths.

The number of attempts taken in the short area were

evenly divided between the first and second halves. The games at home showed a higher per cent of attempts made good in the second half. This tended to show that some favorable adjustment was made between halves. Comparatively, the percentages in this area in games away the first half suggested that factors such as strangeness of surroundings, hurried attempts, and strange defense in close may have hindered team performance. The second half performance indicated, again, the steady improvement made in this area both at home and away. Also, this was gratifying to the writer because this was the intended basic offense. The game percentages for the games away from home, though, were much lower than that for the home games, and it tended to prove that the team did not shoot nearly as well in this area while it was playing in strange gymnasiums.

Types of Shots Scored from The Long, Medium and Short Areas

Basket shooting, the objective of all basketball teams, was accomplished in various ways. The variety of shots developed ranges from the established, proved methods to new and experimental types that come into existence frequently. The conventional, fundamental shots were used by some teams, while others allowed any and all attempts, especially if an individual has had some success with a particular shot.

The types of shots scored from the various areas by

the Osnabrock High School Basketball Team can be found in Table X, page 42. It was noted that the jump shot was the most frequently successful type of shot listed. The lay-up was fairly successful. This can be attributed to the fact that basically this was the intended type of offense. The two-hand chest shot was next high as a contributor to the team's success. This was due primarily to the team having an outstanding two-handed shooter. The number of one-handed shots was low because nearly all of the players used the jump shot. The hook shots and tip-ins contributed very little to the team's scoring because the team was small and did not get the good opportunities to tip-in any great number of rebounds. Also, the offense was geared to using the middle for driving because of a center shortage.

The types of successful shots employed by the Osnabrock team in the early and late stages of the season can be somewhat determined by taking a sample of the first five games of the season and comparing that data with similar results obtained in the last five games.

The jump shot accounted for ninety-three baskets in the first five games. This showed a ration of two-to-one over all other types of shots combined. There were one hundred and one jump shots made in the last five games which showed that the same ratio existed. A point can be made clear by the

study of this table which shows that the jump shot is more popular today than it ever has been.

Table X

TYPES OF SHOTS SCORED FROM THE LONG, MEDIUM AND SHORT AREAS BY THE OSNABROCK, NORTH DAKOTA, BASKETBALL TEAM

	Push Shot	Jump Shot	Chest Shot	Hook Shot	Lay-up Shot	Tip-in Shot
Long Area	6	67	61	0	0	0
Medium Area	11	134	9	0	0	0
Short Area	8	184	5	24	122	10
Totals	25	385	75	25	122	10

Ranking the types of shots by the area from which they were made, it was found that the one-handed push shot was limited in its use from all the areas; the jump shot was the most successful in the short area; the long area was the most popular for use of the two-handed chest shot. All of the hook shots, lay-ups and tip-in shots were taken from the short area. With the push shot scoring from all areas, it showed that it was an excellent weapon from any area on the floor. The jump shot scored so well for the team that was studied

that it must be considered an excellent offensive weapon.

Related Factors that May Affect Shooting Percentages of High School Basketball Teams

Basket shooting may be influenced by many different factors that are not obviously apparent.[15] The basketball player performs in various gymnasiums and under changing conditions that might affect his performance from one game to another. The extent to which the individual was affected by the change from familiar surroundings to strange localities may have some bearing on the basket shooting pattern established.

In gathering data for this study, it was felt by the writer that it might be well to include some factors that were not generally associated with having some bearing on the playing performance of basketball teams.

The author felt that playing under various spectator conditions might have some influence on shooting percentages.

Some data that might have an influence on the shooting averages of high school teams can be found in Table XI, page 45. In gathering the data, the crowd was estimated by some authority of the school in which the gymnasium was located, and the estimated attendance was based on the known seating capacity and a count made as the people entered the gymnasium.

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[15] Everett S. Dean, op. cit., pp. 126-127.

The proportion of students and adults present was estimated in a like manner. The proximity of the spectators to the playing court was determined by questioning coaches of teams played in games away from home and by measurement of the Osnabrock gymnasium. The shooting percentage was forty-two and eight-tenths in games where there were less than two hundred spectators present. With the attendance figure between two hundred and one and five hundred spectators, the percentage of attempts made by the team was thirty-eight and four-tenths per cent. In games where the attendance was over five hundred, the shooting average was forty and eight-tenths per cent. When the crowd was small, the team seemed to shoot better since in most of the home games the crowd number was below two hundred. Therefore, the team seemed more familiar with this condition. The larger crowds may have caused lack of confidence or stage fright in the performance of the players. Crowds larger than home attendance average seemed to be associated with lower shooting percentages.

The shooting percentage in games where the proportion of adult spectators was fifty per cent, the team's shooting average was forty-two and five-tenths per cent. When the crowd consisted of fifty per cent or more students, the percentage was thirty-eight. There is no real difference, but it does show that better shooting was done when the crowd was

composed mainly of adults. Perhaps, the players were more tense playing before students as sudden loud noises could have distracted their attention and caused some missed shots.

Table XI

SHOOTING PERCENTAGES OF THE OSNABROCK TEAM UNDER VARIOUS CROWD CONDITIONS

Game Number	Estimated Attendance	Proximity To Playing Court	Distribution Per Cent		Average Team Shooting Percentage
			Students	Adults	
1	167	0'	88	79	28.9
2	182	2'	50	47	48.9
3	280	2'	32	68	39.9
4	325	2'	37	63	36.5
5	179	0'	51	49	41.6
6	172	2'	40	60	36.9
7	204	2'	47	53	38.5
8	182	3'	53	47	25.0
9	210	3'	51	49	39.6
10	252	2'	48	52	32.5
11	190	2'	32	68	54.6
12	136	2'	37	63	41.8
13	500	2'	28	72	40.3
14	550	2'	46	54	43.1
15	194	2'	32	68	44.9
16	165	0'	54	46	42.1
17	155	2'	46	54	55.5
18	150	2'	37	63	50.1
19	525	2'	46	54	39.6
20	170	2'	35	65	43.8
21	415	2'	43	57	39.8
22	438	2'	56	44	40.3
23	700	2'	48	52	42.8
24	1110	5'	56	44	37.7
Totals	7551	47'	1093	1371	984.7
Average	314.62	1.95	45.54	57.12	41.00

Another factor that was given consideration in trying to determine shooting percentage was the type and conditions of backboards that the Osnabrock team encountered during the playing season. Table XII records the data concerning backboards.

Table XII

SHOOTING PERCENTAGE OF THE OSNABROCK TEAM UNDER VARIOUS BACKBOARD CONDITIONS

Back Boards	Number of Games	Per Cent of Shots Made
Metal	14	42.49
Glass	10	38.98
Rigid	20	42.30
Loose	4	34.40

The findings showed that the glass backboards caused the most difficulty in scoring with a percentage of thirty-eight and ninety-eight hundredths. The team being studied was used to metal backboards in their gymnasium which may have caused the difference.

There was a greater difference in games played where the backboards were loose as contrasted with the rigid ones. The lower percentage of thirty-four and forty-hundredths in games where the loose backboards were employed may have been

caused by vibration when the ball struck the basket. The rebounds, also, may have become more difficult to judge and the tip-ins and second shots harder to make.

Table XIII

SHOOTING PERCENTAGES OF THE OSNABROCK TEAM IN COMPETITION WITH SCHOOLS OF VARIOUS ENROLLMENTS

School Enrollment	Number of School	Per Cent of Shots Made
0-150	6	43.6
151-300	8	41.2
301-400	3	38.0
Over 400	3	39.7

The findings revealed that the highest percentage of attempts was made against the schools with an enrollment comparable to that of Osnabrock. Schools with comparable enrollments were, in most instances, played twice, and included less capable personnel. This could account, in part, for the high percentage. The larger schools were played once each and the psychological fact of size may have contributed in part to the lower percentage of shots scored.

The estimated importance of the games played by the Osnabrock team was used as a criterion of measuring shooting

performances. The natural rivals were the teams located in the neighboring area and which have carried on athletic relations with Osnabrock for many years. The athletic district in which Osnabrock was located set up its district tournament according to wins and losses within the district. This was of major importance to the teams. Several schools played were classified as intrastate and were much larger than Osnabrock and were in the same region. This added double importance to the outcome of the game. Tournament games, because of their highly competitive nature, were considered important. In Table XIV, this information can be found.

Table XIV

SHOOTING PERCENTAGE OF THE OSNABROCK TEAM IN GAMES OF VARYING IMPORTANCE

Importance of Game	Number of Games	Per Cent of Shots Made
Natural Rivalry	12	40.30
District Rating	12	43.11
Intrastate	7	40.24
Tournament	4	40.15

The highest percentage of shots attempted was made in the district games. This was interesting as it showed that

good scoring was needed to obtain a high rating. There was little difference among the other three, but the percentage of shots made was quite high. The desire to excel may have had an effect on shooting in games where the rivalry was keen. Meeting a strange team for the first time may have had an effect on the shooting percentage in the intrastate group. Finally, the tournament percentage indicated that advancement was possible by some good shooting.

The regulation high school basketball court is eighty-four feet long and fifty feet wide. The Osnabrock floor is nearly official size, fifty feet wide and eighty-two feet long. It was, therefore, felt that a comparison of shooting percentages on a regulation size court could be made with percentages on courts that were of a different size. This information can be found in Table XV, page 51. The information concerning the dimensions of the opponent's courts was secured by questioning the coaches of the opposing teams. The dimensions of the Osnabrock court were known.

The height of the ceiling appeared to affect the shooting percentages to some extent. In gymnasiums where the ceiling was twenty-six feet high or more, the Osnabrock team made thirty-seven and seven-tenths per cent of all shots attempted, whereas, in gymnasiums where the ceiling was between twenty and twenty-five feet high the team shot a percentage

of forty-one and seven-tenths. When the ceilings were lower than twenty feet, the team made thirty-five and three-tenths per cent. Although a greater number of games were played in the gymnasiums with the higher ceilings, it appeared that enough games were played on courts with the lower ceilings to show that it was important in determining the success of a basketball team. The lower percentages of shots made in gymnasiums with lower ceilings may be due to inability of the players to have the ball follow the same arc while in flight, as would be the case in a gymnasium with a higher ceiling. It is also possible that the lower ceiling may have caused a feeling of congestion because of space shortage.

Some variation in shooting percentage may have been attributable to width of playing court. The team did shoot a higher percentage on the more narrow courts, perhaps, because the majority of the games were played on courts of this width and an adjustment was made.

A higher shooting percentage was made on courts of near regulation high school length. The higher percentage may also be contributed to by the adjustment made to this length of court at home. The lower average shown on courts that were shorter than sixty-one feet may have been caused by inability to correctly judge distance since the team played in larger surroundings ordinarily.

Table XV

SHOOTING PERCENTAGES OF THE OSNABROCK TEAM IN VARIOUS TYPES OF GYMNASIUMS

Dimensions of Gymnasiums in Feet	Number of Games	Per Cent of Shots Made
Height of Ceiling		
17-19	3	35.3
20-25	19	41.7
26-36	2	37.7
Width of Court		
36-46	20	41.2
47-50	4	37.8
Length of Court		
50-60	2	35.5
61-70	1	41.6
71-84	21	40.8
Coloration of Walls		
Green	10	39.6
Beige	12	43.7
Cream	1	40.3
Black	1	25.0
Coloration of Ceiling		
White	9	39.5
Beige	14	42.1
Cream	1	39.6
Coloration of Floor		
Light	10	39.7
Medium	12	43.1
Dark	2	35.5

The coloration of the walls, also, may have had some effect on the shooting percentages. In the survey made, it was found the lighter the color, the higher the percentage of shots made. Beige and light green were the more customary colors used, which were followed by cream and black. The best percentage was made in gymnasiums whose color was beige. Here, the percentage of shots made was forty-three and seven-tenths. Next, were the colors cream and light green with forty and thirty-nine and six-tenths per cent of the shots made, respectively. The percentage of twenty-five may indicate that black was a poor color for gymnasium walls, although only one game was played under that condition.

The various types of lighting found in the different gymnasiums may have had some effect on shooting percentages.[16] A light meter reading was taken in each gymnasium and it was found that the amount of light intensity was the same in all gymnasiums. To improve the study of the lighting in the various gymnasiums, the author counted the number of lights above the playing area and checked with the rival coach concerning bulb wattage. The number of bulbs multiplied by the watt power of each bulb gave some idea of the comparative amount of light present. This data can be found in Table XVI, page 53.

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[16]C. J. Allen and R. J. Holmes, "Gymnasium Lighting," Scholastic Coach, Volume XVIII, No. 3, (November, 1948), p. 26.

Table XVI

SHOOTING PERCENTAGES OF THE OSNABROCK TEAM IN VARIOUS TYPES OF LIGHTING

Amount of Light Measured in Watts	Number of Games	Per Cent of Shots Made
1800-2500	2	35.5
2501-3000	7	43.1
3001-3600	11	43.2
Over 3600	4	37.8

It was found that the greatest per cent of shots was made in gymnasiums which had adequate lighting. This was no doubt an influence because the Osnabrock gymnasium was included in this area. Twenty-five hundred and one watts to thirty-six hundred watts of lighting showed the highest per cent of shots made which included eighteen of the twenty-four games played.

The shooting percentages were also compared for games in which different defensive arrangements were used. Although, some teams used more than one defense in a game, the type which was employed by each team for the majority of the game was used as the criterion. This information is shown in Table XVII, page 54.

Table XVII

SHOOTING PERCENTAGES OF THE OSNABROCK TEAM AGAINST VARIOUS TYPES OF DEFENSE

Types of Defenses	Number of Games	Per Cent of Shots Made
Man-to-Man	9	39.0
Press	1	39.6
Zone	14	42.4

The results showed that the highest shooting percentages were made against teams that employed the zone defense. The zone defense operated on the principle that each defensive player was responsible for an assigned area or section of the playing floor when the offensive team had crossed the mid-court line and was attempting to score a goal. The relatively high shooting percentage made against teams in this category may have been caused by the Osnabrock team using set plays, consequently, getting better shots because of having more time to shoot. Also, it was the writer's feeling that the team had outstanding outside shooters.

The lowest shooting percentages were made against teams using the man-for-man defense. At all times, the man-for-man defense operated on the basis that each defensive

player was responsible for an assigned offensive player, after the offensive team had crossed mid-court and was attempting to score. The low average percentage of shots made against the teams using man-for-man defense was caused by the size of the Osnabrock team and the inability to enter the medium and short areas a sufficient number of times. Also, the strong individual defensive moves on the part of the opponent discouraged the offense from shooting.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

In summarizing this study, a senior high school basketball team was used to compare the shooting percentages at home and away.

It was found that six hundred and seventy-nine goals were made in the twenty-four games, for an average of twenty-eight and twenty-nine hundredths goals per game, a shooting average of forty-three per cent.

The study indicated that the favorite areas for shooting were the medium and short areas with the highest shooting percentage in the short area.

As a winner, the team was less inclined to shoot from the long area, but attempted more goals from the short area and had a higher percentage from that area.

As a loser, the team, again, was not inclined to shoot from the long area. The number of shots attempted and the percentage of shots made were the highest in the short area.

The team shot a lower percentage in the long area away from home. The highest shooting percentages were made

from the short area while at home. The percentage in the medium area was about the same at home and away.

The jump shot was the one type of shot used to score the most goals from the areas given.

The lay-up and two-handed chest shots were responsible for a large number of successful scoring attempts, while the tip-in shots scored the least number goals of the types given.

A sampling of the shooting that was done in the early and late portions of the season showed that the team improved the mechanics of the jump shot as the season progressed.

It was demonstrated that basket shooting percentages could be affected by many different factors that are not generally associated with having much effect on the playing performance of basketball teams. Some of these factors are psychological while others are of a physical nature.

Game shooting percentages were usually somewhat higher in instances where the spectators were close to the playing area.

In the games played, shooting percentages were the highest when played before crowds consisting mainly of adults.

The types of backboards used in various gymnasiums did not make any appreciable difference in the shooting. The condition of the backboards showed an effect, as lower percentages were made in games where loose backboards were used

than in games where the backboards were rigid. The action of the ball on the rim of the basket may have been influenced by the loose backboards.

Shooting percentages were the greatest in games played against schools comparable in enrollment to that of Osnabrock.

The estimated importance of the game was used as a criterion in determining shooting percentages. The highest shooting percentages were made in district contests used for tournament pairings. The lowest percentages were made against teams in tournament play.

The size of the court may have had an effect on the shooting percentage of the Osnabrock team. It was found that the gymnasiums with low ceilings and those with courts shorter than regulation high school length made the greatest difference.

Gymnasium lighting, it was found had a slight influence on shooting, and those gymnasiums with the greater amounts of light made for higher shooting percentages.

The types of defense played against influenced team shooting. The highest shooting percentages were made in competition with schools emphasizing the zone defense, and the lowest percentages were made against teams using man-for-man defense.

Conclusions

It was recognized from the outset that this study had its limitations. It was within the limitations of this study that the following conclusions were believed justified:

1. The short area was the most heavily favored shooting area, and accounted for the highest percentage of successful shots.

2. The long area was the least used area and showed the lowest shooting percentage.

3. With respect to type of shot most used, the jump shot has increased in popularity in comparison with the one-handed and the two-handed set shot.

4. Based upon the results of this study, gymnasium size has a considerable influence on team shooting.

5. The facilities and equipment in a gymnasium seem to affect the performance of the players. Performance improved with adequate lighting and the use of rigid backboards.

6. The team studied scored better at home than in games played in other locations.

Recommendations

On the basis of the findings in this study, the author recommends the following:

1. Concentration on improvement of shooting skills from the long area appears desirable.

2. The two-hand push shot, hook shot, and tip-in shots should be included in every player's repertoire, besides the popular ones of the day, the one-hand push and jump shot.

3. Careful use of statistics may aid the coach in determining long range progress of the team.

4. Coaches should insist on backboards constructed of standard material and size. It would also be wise to insist that backboards be firmly attached to supporting braces.

5. Also, in designing gymnasiums, allow for enough extra room that spectators may be seated at least five feet from the side lines of the playing court.

6. In designing gymnasiums, coaches should be allowed to suggest size, coloration, and lighting for the building.

Further recommendations are:

1. That a study of this type be conducted in another section of the country and that the results of the study be compared with those of this study.

2. That a study of this type be conducted on the college level.

3. That a study be conducted to decide which of the factors considered here are most important in determining good shooting percentages.

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APPENDIX A

LIST OF TEAMS PLAYED

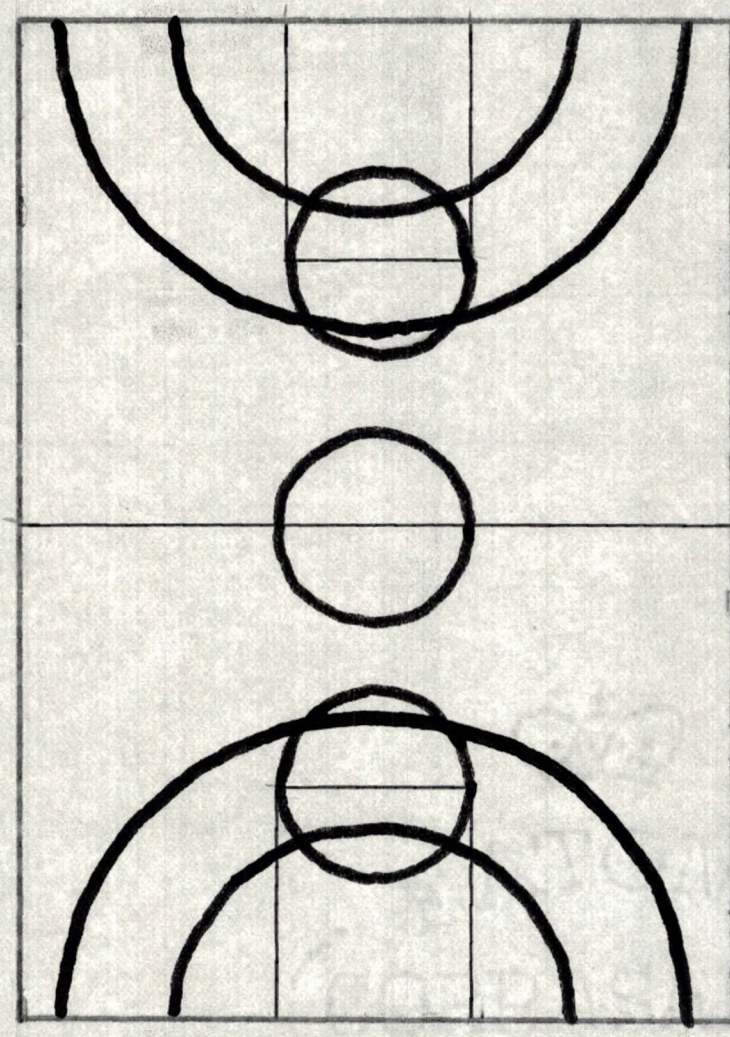
1. Nekoma
2. Lawton
3. Drayton
4. Saint Alphonsus of Langdon
5. Milton
6. Fairdale
7. Fordville
8. Crystal
9. Edmore
10. Edinburg
11. Nekoma
12. St. Thomas
13. Adams
14. Saint Alphonsus of Langdon
15. Border Central of Calvin
16. Fairdale
17. Milton
18. Lawton
19. Langdon
20. Munich
21. Milton District Tournament
22. Fairdale District Tournament
23. Saint Alphonsus of Langdon District Tournament
24. Drayton Regional Tournament

APPENDIX B

TEAM SHOT CHART

Player Number _____ Game Number _____

Date _____ Site _____



Area	F.G.A.	F.G.M.	Pcts.
Long			
Medium			
Short			
Long			
Medium			
Short			
Totals			

Mark shot attempts with number of player attempting the shot. Mark attempt accurately from the area where the shot was taken. Place a circle around the player's number if the attempt is good. Mark "L" for lay-up, "H" for hook, "T" for tip-in, "P" for push shot, "C" for two-hand chest shot, and "J" for jump shot.

APPENDIX C

TYPE OF SHOTS

Game Number _____

Date _____ Site _____

Player No.	Push Shot	Jump Shot	Chest Shot	Hook Shot	Lay-up Shot	Tip-in Shot
Totals						

APPENDIX D

GYMNASIUM RATING CHART

Game Number _____
Gymnasium _____
Date _____

1. Court
   a. Home _____
   b. Away _____
   c. Neutral _____

2. Lighting
   a. Light Meter Reading _____

3. Backboards
   a. Metal _____
   b. Glass _____
   c. Rigid _____
   d. Loose _____
   e. Other _____

4. Size of Court
   a. Dimensions
      1. Length _____
      2. Width _____

5. Ceiling
   a. Height _____
   b. Color _____

6. Walls
   a. Height _____
   b. Color _____

7. Floor Construction
   a. Wood _____
   b. Tile _____
   c. Composition _____

8. Crowd Disposition and Make-up
   a. Proximity of Crowd in Playing area
      1. Number of Feet _____
   b. Size of Crowd
   c. Proportion of Students and Adults (%)
      1. Students _____
      2. Adults _____

APPENDIX E

CONTRIBUTING FACTORS THAT MIGHT AFFECT SHOOTING PERCENTAGES AMONG HIGH SCHOOL BASKETBALL TEAMS

Game Number _____

_____ vs _____

Date _____

1. Relative Size of Competing Schools

Team _____		Team _____	
a. 0 - 150	_____	a. 0 - 150	_____
b. 151 - 300	_____	b. 151 - 300	_____
c. 301 - 400	_____	c. 301 - 400	_____
d. Over 400	_____	d. Over 400	_____

2. Importance of the Game to Competing Schools
   a. Natural Rivalry _____
   b. District Standing _____
   c. Tournament _____
   d. Intrastate _____

3. Defenses Used		Time Used
a. Man-to-Man		
1. Collapsing	_____	_____
2. Straight	_____	_____
3. Checking	_____	_____
b. Zone		
1. 2-1-2	_____	_____
2. 3-2	_____	_____
3. 2-3	_____	_____
4. 1-3-1	_____	_____

4. Offenses Used		Time Used
a. Fast Break	_____	_____
b. Set	_____	_____
c. Free Play	_____	_____
d. Combinations	_____	_____

APPENDIX F

TABLE VI

THE SHOOTING PERCENTAGES OF THE WINNING TEAM FROM THE LONG, MEDIUM AND SHORT AREAS FOR THE FIRST AND SECOND HALVES

Game Number	Half	Long Area *S	*B	Per Cent	Medium Area *S	*B	Per Cent	Short Area *S	*B	Per Cent
1	1	5	1	20.0	11	3	27.3	12	7	58.3
	2	8	2	25.0	19	5	26.3	15	2	13.3
2	1	10	3	30.0	14	7	50.0	21	10	47.6
	2	5	4	80.0	10	3	30.0	15	11	73.3
4	1	5	2	40.0	8	3	37.5	6	0	00.0
	2	1	0	00.0	13	4	30.8	15	9	60.0
5	1	13	5	38.5	11	5	45.5	8	3	37.5
	2	8	6	75.0	18	6	33.3	13	8	61.5
6	1	6	2	33.3	12	3	25.0	16	11	68.8
	2	12	5	51.7	11	2	18.2	16	5	31.3
7	1	7	2	28.6	10	6	60.0	18	9	50.0
	2	1	0	00.0	8	1	12.5	13	7	53.8
8	1	5	0	00.0	7	5	71.4	10	5	50.0
	2	10	0	00.0	5	1	20.0	10	0	00.0
9	1	8	2	25.0	11	5	45.5	21	6	28.6
	2	2	1	50.0	13	7	53.8	15	8	53.3
11	1	8	5	62.5	18	9	50.0	19	12	63.1
	2	11	5	45.6	13	7	11.1	18	10	55.6
12	1	7	2	28.6	16	5	31.3	14	10	71.4
	2	10	4	40.0	10	2	20.0	14	8	57.1
13	1	6	2	33.3	15	9	60.0	22	9	40.9
	2	8	2	25.0	6	2	33.3	18	7	38.9
14	1	8	4	50.0	4	3	75.0	18	6	66.7
	2	4	2	50.0	12	3	25.0	13	7	53.8

TABLE VI (CONT'D)

Game Number	Half	Long Area *S	*B	Per Cent	Medium Area *S	*B	Per Cent	Short Area *S	*B	Per Cent
15	1	5	3	60.0	7	5	71.4	20	8	40.0
	2	8	1	12.5	6	2	33.3	22	13	59.1
17	1	8	6	75.0	6	1	16.7	13	9	69.2
	2	7	3	42.9	6	5	83.3	10	4	40.0
18	1	6	2	16.7	11	7	63.6	27	13	48.1
	2	5	4	80.0	7	3	42.9	26	13	50.0
19	1	6	3	50.0	14	6	42.9	8	4	50.0
	2	5	1	20.0	6	1	16.7	11	5	45.5
20	1	5	1	20.0	19	8	42.1	15	5	33.3
	2	8	4	50.0	10	6	60.0	23	12	52.2
21	1	7	1	14.3	15	8	53.5	10	4	40.0
	2	12	3	25.0	10	3	30.0	25	15	60.0
22	1	15	6	40.0	8	4	50.0	8	4	50.0
	2	16	6	37.5	11	3	27.3	14	6	42.9
23	1	10	2	20.0	17	6	35.3	10	4	40.0
	2	8	2	25.0	17	8	47.1	10	9	90.0

*S-Shots Taken *B-Baskets Made