

## LATE RESEARCHES IN BASKETBALL

by

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For years the generally accepted method of choosing a team has been upon the judgment of the coach, reinforced by the performance of stellar players who were outstanding in scoring field goals on the offense and by superior guards smothering the scoring opposition. Many times a coach removes a player from the game merely on the coach's own judgment. By the same token other players do not get an opportunity to play because this particular individual did not attract the coach's attention.

Baseball has had its batting and fielding averages computed for years, thereby making it easy to weigh the ability of the dominant players in this sport. Using the same procedure in basketball, it is the opinion of the speaker that a relative rating of basketball players can be had. We call this the "batting and fielding averages" because this terminology elicits the interest of these competing players on account of their previous experiences in baseball. Most every able-bodied boy in America has played either hard ball or soft ball. I think this is also true in basketball. The problem was to link up the interest of these boys and get them to enter into a scheme that indicated their prowess definitely in basketball as has been done in baseball.

The development of a list of offensive elements was the first step. With that idea in mind a list of offensive elements was made and each activity or play was weighed subjectively. The weight of the item was carefully considered as it related to an important part of offensive tactics and also insofar as it contributed to the execution of sound fundamentals and to winning success. Of course, the objective was to stimulate the learner to make as few mistakes as possible. Experience has shown that it is the repetition of mistakes that defeats a player or a team. The same mistake made too many times always proves disastrous.

Under the heading, "The Kansas Basketball Evaluation Study", is shown the positive items as opposed to the negative items. Every play of importance, both in the positive and the negative offensive study, has been weighed in evaluation points. The old kindergarten theory of a good reward for a good deed and a poor reward for a bad deed has been carried out.

In the above offensive study the data were collected by former varsity players well versed in the meaning of these evaluation points, by mature majors in the Department of Physical Education, and by some other well qualified student assistants. Twelve men students were used in the collection of facts, six for



each team. The men worked in pairs, one acting as a recorder and the other as an observer. One pair made a record of all the passes and catches, one pair made a spot record of all the shots taken by players' numbers, and the other pair recorded the remaining material. Data were collected during all the home games on both the Kansas team and the visiting teams. The technique used in the collection of these data is the same as described in the first evaluation study.

It will be observed that in the first year only the offensive evaluation chart was used. In the second year of the study, 1938-'39, the evaluation technique was extended to include a defensive rating system for both the team and the individual players. A new term, "defensive efficiency", is used in the defensive rating which is comparable to the first study on the offensive rating. You will please note that in Table III the term "defensive efficiency" is the result of the formula:

$$\frac{\text{total positive defensive evaluation points}}{\text{sum of positive and negative defensive points}}$$

We now have a form of study which incorporates the offensive and the defensive rating comparable to the batting and fielding averages in baseball.

It is the conviction of the speaker that research of this type is worth while. The accuracy of this study depends upon the efficiency of the recorders. As stated heretofore, the selections were carefully made and the same individuals performed their tasks in all games. Therefore, there is every reason to believe that the results were very nearly correct. The great benefit accruing to a coach from this type of study is that the mistakes made during the game are pointed out, thus causing the players to be more conscious of them. This chart will enable the coach to link up the practice period value of executing proper fundamentals with matched game or competitive situations.

For instance, we teach our players before receiving the ball when going down the court never to get closer to the sideline than 8 feet because should that player fumble the ball when very near the sideline it will go out of bounds and the player will lose evaluations points; whereas the same ball thrown to him when he is within 8 feet of the sideline can properly be recovered for no loss of evaluation points to the player and to the team.

Again, in our offensive set up we insist that our offensive players do not retreat toward the division line nearer than 8 or 10 feet, because when the offensive team is forced back collectively by a defensive team, the player on the offensive team having the ball is in danger of getting "tied up" if he were closer to the division line than 8 feet.

Innumerable instances such as the two outlined above are always presenting themselves to the coach, enabling him to forcibly teach better fundamentals to his proteges. The coach can say - By overcoming certain self-evident faults you can increase your batting and fielding averages. And in the discussions that always follow when the players and their coach are huddled around the batting and fielding average chart in the dressing room the following day these above mentioned points always come out during the "bullfest".



Further, it stresses the additional importance of game fundamentals and it also provides an itemized history of the contest which is intensely interesting to the players in the upper brackets. It stimulates those in the lower brackets to better their fundamentals. And too, it makes it possible for a coach to select his men on a more accurate basis. His judgment is reinforced by the itemized history of the contest.

The speaker is indebted to Dr. E. R. Elbel and Dr. V. W. Lapp, of the Department of Physical Education, for their aid in working out the rating of the basketball players. To Dr. Elbel for his invaluable assistance in an advisory capacity in weighing the offensive and defensive elements and in the careful selection of the recorders. To Dr. Lapp for his painstaking work in compiling the statistics and presenting the results in readable form. Dr. Lapp initiated the thought of writing to each player on the varsity squad, asking them to evaluate each of their teammates according to their individual playing efficiency. It is through Dr. Lapp's untiring devotion and indefatigable patience that this research is possible.



RATING BASKETBALL PLAYERS -

THEIR BATTING AND FIELDING

AVERAGES COMPUTED

PLAYING SEASONS OF 1937-38 AND 1938-39

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## THE KANSAS BASKETBALL OFFENSIVE EVALUATION CHART

This study was undertaken in an attempt to find a means of evaluating offensive basketball. For years the generally accepted method of evaluating a basketball team or an individual has been on the number of scores that were made by the team or by the player. The development of a list of offensive elements was the first step. With that idea in mind a list of offensive elements was made and each activity or play was weighed subjectively. The weight of the item was given due consideration concerning its importance insofar as it contributed to the execution of sound fundamentals and to winning success. Of course, the objective was the successful scoring of field goals or free throws by the player.

The items used in the evaluation chart and their weights are listed below:

A. Positive Items	Weight in Evaluation Points
1. Field goals	10
2. Free throws	5
3. Immediate assists	4
4. Secondary assists	3
5. Recovers ball off opponent's backboard	2
6. Recovers ball off own backboard	2
7. Taps and recovers own jump ball	2
8. Recovers teammate's jump ball	1
9. Makes a good pass to a teammate	1
10. Catches a teammate's pass	1
<u>B. Negative Items</u>	
1. Error of omission	1
2. Held ball obtained by an opponent	1
3. Fumbles ball and it goes out of bounds	2
4. Fumbles ball and it is obtained by opponent	2
5. Taps ball out of bounds	2
6. Wild pass out of bounds	3
7. Wild pass to an opponent	4
8. Violation of rules	5
9. Personal offensive foul	8

In the use of the weighted items the algebraic sum of the positive and negative points is computed. This sum for each game represents the total effectiveness of the team or player.

For the purpose of illustration the Kansas chart of a conference game is shown in "Exhibit A" with team and individual points computed.

The data were collected by student assistants, majors in the Department of Physical Education. Twelve men students were used in the collection of facts, six for each team. The men worked in pairs, one acting as a recorder and the other as an observer. One pair made a record of all the passes and catches, one pair made a spot record of all the shots taken by players' numbers, and the other pair recorded the remaining material.

### Definition of Terms

The terms used in the evaluation chart study are, for the most part, in common usage in the game of basketball and need not be defined. However, some of the terms have not usually been connected with basketball and for this reason are defined.



1. Immediate assist, a pass made to a player who scores a field goal.
2. Secondary assist, the pass directly preceding an immediate assist.
3. Error of omission, a mistake in judgment or observation, such as a failure to pass to a teammate who is in a better position for scoring.
4. Held ball obtained by an opponent, a player having complete control of the ball and by poor judgment or poor technique on his part an opponent is able to "tie him up" to such an extent that an official calls a held ball.
5. Team efficiency,  $\frac{\text{team positive evaluation points}}{\text{team positive plus negative evaluation points}}$
6. Player efficiency,  $\frac{\text{player's positive evaluation points}}{\text{player's positive plus negative evaluation points}}$
7. Scoring ability index, number of goals times per cent of goals made plus one-half (free throws times per cent of free throws made)
8. Ball handling error rate,  $\frac{\text{ball handling errors}}{\text{good catches plus good passes plus ball handling errors}}$

### Team Analysis

By using the technique outlined, data were collected on the Kansas team during nine home games and on the opponents during the last three home games. From this material comparisons were made on the Kansas team using the averages for the four non-conference games and for the five conference games. In the last three home games, the Kansas team was compared with its opponents. Different styles of basketball would undoubtedly yield a different average for the number of shots, passes, etc. The frequency of these occurrences are listed as follows:

TABLE 1.

#### Nine Game Averages

1. Score: 42.7 points
2. Goals: attempted 61.5; made 16.5; %26.9
3. Free throws: attempted 16; made 9.56; %59.7
4. Personal fouls: 10.2
5. Offensive personal fouls: .78
6. Violations: 3.7
7. Rebounds from own backboard: 21.3
8. Rebounds from opponent's backboard: 22.3
9. Passes and good catches: 361.3 passes; 345 catches
10. Wild passes: total 7.57; out of bounds, 2.67; to opponents, 4.9
11. Held balls: obtained by opponents, 3.1
12. Fumbles: total 6.1; out of bounds, 3.1; to opponents, 3
13. Tapped ball: out of bounds, 1.3
14. Jump ball: tapped and recovered own jump ball, .22
15. Jump ball: recovers teammate's jump ball, 10.8
16. Assists: total, 24; immediate, 13; secondary, 11
17. Evaluation points:  $1103.0 - 73.2 = 1029.8$  points per game
18. Evaluation points per player per minute of play: 5.14 points
19. Evaluation points per score: 24.1 points
20. Team efficiency: 93.8%

It is interesting to note that there are 16.3 more passes than catches. If one adds the fumbles (6.1) and the wild passes (7.57), the difference is almost erased. When one considers the possibilities for offensive mistakes, it would appear that the negative evaluation points (73.2) is relatively low.



In order to compare averages of the four non-conference home games and the five conference home games, the data are presented in outline form.

TABLE II.

Four Non-Conference Games and Five Conference Games:

1. Score: non-conference average, 42 points  
conference average, 43.2 points
2. Goals: non-conference average shots attempted, 68.75; average made, 16.75; %24.4  
conference average shots attempted, 55.8; average made, 16.4; %29.4
3. Free throws: non-conference average shots attempted, 14.0; average made, 8.5; %60.7  
conference average shots attempted, 17.6; average made, 10.4; %59.9
4. Personal fouls: non-conference average, 10.5  
conference average, 10.0
5. Offensive personal fouls: non-conference average, .25  
conference average, 1.2
6. Violations: non-conference average, 3  
conference average, 4.2
7. Rebounds from own backboard: non-conference average, 22.0  
conference average, 20.6
8. Rebounds from opponent's backboard: non-conference average, 19.0  
conference average, 25.0
9. Basses and good catches: non-conference passes, 374.75; catches, 362  
conference passes, 350.6; catches, 331.4
10. Wild passes: non-conference, 8.5; out of bounds, 2.75; to an opponent, 5.75  
conference, 6.8; out of bounds, 2.6; to an opponent, 4.2
11. Held balls obtained by opponents: non-conference, 2  
conference, 4
12. Fumbles: non-conference, 6.25; out of bounds, 3.25; obtained by opponent, 5  
conference, 6.0; out of bounds, 3.0; obtained by opponent, 3
13. Tapped ball out of bounds: non-conference, 1.25  
conference, 1.4
14. Tapped and recovered own jump ball: non-conference, .5 times  
conference, no times
15. Recovers teammate's jump ball: non-conference, 13.75  
conference, 8.4
16. Assists: non-conference, 25.25; immediate, 13.5; secondary, 11.75  
conference, 23.0; immediate, 12.6; secondary, 10.4



17. Evaluation points: non-conference, 1132.75; - 69 = 1063.75  
conference, 1079.2 - 76.6 = 1002.6
18. Evaluation points per minute of play: non-conference, 26.59  
conference, 25.07
19. Evaluations points per score: non-conference, 25.36  
conference, 23.22
20. Playing efficiency: non-conference, 94.3%  
conference, 93.4%
21. Ball handling error rate: non-conference, 2.2%  
conference, 2.5%

It is interesting to note that the scores are almost identical and that the number of goals are about the same. However, in the conference games, the team took 13 less shots per game. This means that the team's shooting average was considerably better, being 29.4% for the conference games and 24.4% for the non-conference games. From the standpoint of ball handling, there were 24 more passes and 31 more catches per game in the non-conference matches than in the conference games. Both the playing efficiency and ball handling error rate were poorer in the conference games than in the non-conference games.

It should also be noted that for each game point scored in the non-conference games, 20.36 evaluation points (25.36 - 5) were earned by some other method. An analysis of the data shows that scoring a field goal plays a relatively small part in scoring evaluation points, and that ball handling, recovery of rebounds, etc. must be considered to a larger extent.

In the last three games data were obtained on both the Kansas team and its opponents. This material is summarized in the following list.

TABLE III.

Conference Game Records Made by Kansas and Opponents:

1. Scores: Opponents, 102                      Kansas, 139
2. Goals: Opponents took 184 shots, made 39 goals; average %21.2  
Kansas took 165 shots, made 56 goals; average %33.9
3. Free throws: Opponents took 44 shots, made 24; average %54.5  
Kansas took 42 shots, made 27, a verage %64.3
4. Personal fouls: Opponents, 36                      Kansas, 27
5. Offensive personal fouls: Both teams made 3 personal fouls while they had the ball and called offensive fouls.
6. Violations: Opponents, 16                      Kansas, 15
7. Rebounds off own backboard: Opponents recovered 45;                      Kansas recovered 70



8. Rebounds off opponent's backboard: Opponents recovered 40; Kansas recovered 78
9. Good passes and catches: Opponents, 607 good passes; 485 catches  
Kansas, 1043 good passes; 998 catches
10. Wild passes: Opponents, 20; 6 out of bounds, 14 to an opponent  
Kansas, 19; 6 out of bounds, 13 to an opponent
11. Fumbles: Opponents, 20; 9 out of bounds, 11 to an opponent  
Kansas, 20; 10 out of bounds, 10 to an opponent
12. Tapped ball out of bounds: Opponents, 4 times; Kansas, 4 times
13. Held balls: Opponents obtained 17; Kansas obtained 16
14. Jump ball: Opponents tapped and recovered own jump ball 1 time  
Kansas tapped and recovered own jump ball no times
15. Jump ball: Opponents recovered teammate's jump ball 32 times  
Kansas recovered teammate's jump ball 23 times
16. Assists: Opponents made 54 assists; 29 immediate, 25 secondary  
Kansas made 82 assists; 46 immediate, 36 secondary
17. Evaluation points: Opponents, 1997 positive; 244 negative  
Kansas, 3327 positive; 237 negative
18. Evaluation points per minute: Opponents, 14.6 Kansas, 25.8
19. Evaluation points per score: Opponents, 14.6 Kansas, 22.2
20. Playing efficiency: Opponents, 89.1% Kansas, 93.4%
21. Ball handling error rate: Opponents, 4.9% Kansas, 2.6%

(Totals are shown.)

In comparing the totals one can see that the opponents made more attempts at both field goals and free throws than did the Kansas team. However, it should be noted that the home team scored more goals (56 for 33.9%) than the opponents (39 goals for 21.2%). This same thing is true of the free throws with Kansas making 27 free throws for 64.3% and the opponents making 24 free throws for 54.5%.

When one examines the personal fouls Kansas made less (27) than the opposition (36). However, the Kansas fouls yielded the greater number of free throws (44) to the visiting teams (42). It seems that the Kansas personal fouls occurred more often when a man was in the act of shooting than did the fouls of the opponents, by the rate of 8 to 15. In this case the total is somewhat misleading, as the discrepancy occurred almost entirely in one game that Kansas won by 20 points. The most outstanding difference to be pointed out occurred in two places; in the recovery of rebounds and in ball handling.

In the recovery of rebounds, one sees that the Kansas players recovered 70 rebounds off their own backboards, while the opponents recovered 45 off their backboards. The same ratio holds when one notes the rebounds of the opponent's



backboards - Kansas securing 78 while the visitors were collecting 40 rebounds. The recovery of rebounds seems to be the most outstanding difference in the teams.

The ball handling of the teams shows that Kansas caught and passed 2041 times and the opponents 1092 times. This difference could be entirely due to various styles of play. However, when one considers the errors in ball handling, such as wild passes, fumbles and held balls obtained by opponents, we see that Kansas made 55 errors and the opponents made 57 errors in ball handling. While the number of errors remained about the same, it should be pointed out that the opponent's ball handling error rate (4.9%) was almost twice that of the home team (2.6%).

In considering the total negative evaluation points, both Kansas and the opposition made about the same number of mistakes (237 for Kansas and 244 for the visitors). However, Kansas earned 3327 positive evaluation points as compared to 1997 positive evaluation points earned by the opponents. When these figures are reduced to playing efficiency, we find that the home team has a playing efficiency of 93.4% as compared with 89.1%.

The data show that for each score point the visitors earned 17.2 evaluation points and Kansas earned 22.2 evaluation points. By deducting the 5 evaluation points for each score point one sees that 12.2 evaluation points were earned as compared with 17.2 for Kansas. While Kansas had the ball earning the extra evaluation points it is certain that the opposition was not scoring. However, as pointed out previously, the various styles of play may effect the total number of evaluation points, but the style should not have a great deal of effect on errors in ball handling.

In making direct comparisons between specific teams, a summary table made up from the evaluation summaries shows much the same facts as the totals between Kansas and the opposition.

TABLE IV.

Summary from Evaluation Chart:

Team	Score	Goals	% of goals	Free throws	% of free throws	Personal fouls	Errors in ball handling	Total passes and catches	% of errors in Ball handling	Recovery of rebounds	Players efficiency
Kansas	48	17	33	14	77	13	18	623	2.8	39	91.3
School A	33	12	16	9	56	15	18	441	3.9	41	91.4
Kansas	35	16	35	3	37	5	27	738	3.5	43	91.9
School B	33	15	29	3	60	8	26	326	7.4	24	86.6
Kansas	56	23	31	10	63	9	10	680	1.4	66	96.6
School C	36	12	20	12	51	13	13	325	3.8	20	89.1



School A played the home team fairly even on most of the comparisons except that they could not hit the goal, making only 16% of their field goals, while Kansas was making 33% of their attempts.

School B played the closest game from the score standpoint. Their loss can be credited to a poorer shooting percentage than Kansas and possibly the direct cause of the loss was Kansas' ability to recover the rebounds, the control of which gave them additional chances to score and prevented Team B from scoring during the added time that the home team controlled the ball.

School C excelled only in the number of free throws while Kansas had a 63% average in free throwing as compared to a 51% average.

Like the total table, this summary table shows that the fundamentals of the game - shooting, ball handling and rebound recovery - are necessary to offensive power and for winning games.

#### Individual Player Rating

During the season a running tabulation was kept on each player who played in the home contests, showing the individual's performance in each game and his total endeavors for the season. (Sample record, Exhibit B.)

Since the close of the season other items have been devised, such as ball handling error, playing efficiency, and scoring ability. These points do not appear on the original tabulation sheets.

In rating an individual basketball player's offensive ability, many points should be taken into consideration, and the method as a whole needs some modification, depending upon the position played and the style of basketball used. Naturally, the guards will recover more rebounds from the opponents' backboard than the forwards. It also follows that the forwards should recover more rebounds off their own backboard, and certainly the center or "quarterback" man will handle the ball more often than other offensive players. These general trends are apparent as soon as one begins an intensive study of the data gathered.

The players have been listed (see Table V, Evaluation Point Totals) by the number of minutes played during the home games. By a brief study of this table one can see that there is a high relationship between minutes played and the total number of evaluation points. The next column should have more meaning in that points are considered in relationship to the total number of minutes played. The column on playing efficiency was arrived at by the formula given in the definition of terms (no. 6). This rating is probably the most meaningful in the table, but it does not tell the complete story.

Ball handling is the basis for offensive ability, and for this reason a ball handling table has been tabulated (see Table VI).



TABLE V.

Ratings Based on Evaluation Point Totals

Player	Minutes*	Eval. Points Earned	Points per Minute	Player efficiency Percentage
A	328.5	2098	6.38	97.3
B	266	1307	4.91	92.2
C	263.5	1300	4.93	96.4
D	221.5	1256	5.67	94.9
E	141.5	560	3.96	90.5
F	117	628	5.37	94.1
G	100	460	4.60	94.2
H	74.5	344	4.62	93.0
I	70.5	310	4.39	91.7
J	70.0	395	5.64	91.6
K	59.5	297	4.99	94.3
L	34.5	120	3.48	84.5
M	22.5	117	5.22	91.5

\*Time as recorded by W. A. Dill, compiled by the Dill method of playing time recording.

TABLE VI.

Ball Handling		Goal Shooting				Passing and Catching				
Player	Position	Scoring ability	Goals made	% of goals made	Free throws made	% of free throws made	Total passes and catches	Errors in ball handling	% of errors in ball handling	Ball handling rank
A	g	1	47	32.6	28	59.6	1273	15	1.17	2
B	f,c	2	23	27.1	20	66.7	845	26	2.9	7
C	g	3	13	33.3	5	71.4	1004	17	1.7	3
D	c	4	14	28.0	5	62.5	961	18	1.8	4
E	f	6	10	30.3	5	71.4	372	18	4.6	12
F	f	7	12	17.9	8	57.1	341	7	2.0	5
G	f,g	9	2	20.0	2	50.0	348	4	1.13	1
H	f	5	13	30.2	4	66.7	166	11	6.2	13
I	f	8	7	21.2	2	33.3	192	8	4.0	11
J	f	10	3	16.7	2	40.0	346	11	3.1	8
K	g,c	11	2	25.0	1	50.0	244	6	2.4	6
L	g	13	0	0	0	0	116	4	3.3	9
M	f	12	1	33.3	2	66.7	85	3	3.4	10

\*guard, forward, center



In this tabulation of the percentage of goals made (see Table VI), one can see that player C and player M have both the same score, 33.3%. However, player C was the most valuable on the basis of other items. Player A with 32.6% is undoubtedly more valuable than either. This method must be tempered with judgment. In order to arrive at an index number for rating scoring ability an arbitrary formula was used (see definition of terms, No. 7). This gives a rather high index number which when reduced to a one-two-three basis rating gives a logical order.

Errors in ball handling include the total number of wild passes, fumbles, and held balls obtained by an opponent. In order to arrive at a ball handling error rate, the total number of passes and catches was assumed to be an accurate index as to the relative number of times chances for errors were present. By using the formula given in definition of terms, No. 8, an index was established. The guards handled the ball more often than did the forwards, and the two players with the lowest ball handling error rate (players A and G) are guards. However, player G also played as a forward. The lowest error rate for a forward was 2.0 for player F.

In order to find further ratings for the purpose of analysis, the scores from the evaluation chart were computed on a point per minute basis and a rating from 1 to 13 given the various players. The material in this chart (Table VII) is of value until one reaches the players with only a few minutes of playing time. Here the chart breaks down because these players did not perform all of the items mentioned, and are rated too highly. This material is discussed somewhat in the summaries dealing with the individual players.

TABLE VII.

Rating on Activities per Minute\*

Player	Position	Time played	Eval. points per min.	Goals per min.	Free throws per min.	Personal fouls per min.	Immediate assists per min.	Ball off opp. back-board per min.	Ball off own back-board per min.	Recoveries tm. jump ball per min.	Good passes per min.	Good catches per min.	Fumbles per min.	Wild passes per min.	Negative points
A	g	1	1	2	2	6	8	4	11	11	5	3	1	4	1
B	f	2	8	5	3	5	2	8	7	10	9	9	6	9.5	9
C	g	3	7	8	11	9	10	1	13	2	4	7	4	6	5
D	c	4	2	7	9	10	3	10	9	9	3	2	9	3	3
E	f	5	12	6	6	7	7	9	4	8	11	12	7	9.5	10
F	f	6	4	3	4	11	6	7	1	1	10	10	5	5	6
G	f,g	7	10	11	10	12	7	2	12	3	7	8	2	1	2
H	f	8	9	1	5	8	4	12	10	4	13	13	12	8	7
I	f	9	11	4	8	1	9	3	2	7	12	11	3	7	8
J	f	10	3	10	7	3.5	12.5	6	3	12	1	1	13	12	12
K	g,c	11	6	12	12	7	11	11	8	6	2	4.5	10	2	4
L	g	12	13	13	13	3.5	5	5	6	5	8	6	11	11	13
M	f	13	5	9	1	13	1	12	5	13	6	4.5	8	13	11

\*A ranking of 1 is the best performance.



TABLE VIII.

Offensive Ability Rankings

Player	Position	Varsity Ranking	Freshmen's Ranking	Coach's Ranking	Scoring Ability	Ball Handling Errors	Playing Efficiency
A	g	1	1	1	1	2	1
B	f,c	3	2	2	2	7	8
C	g	2	3	3	3	3	2
D	c	4	4	4	4	4	3
E	f	6	6	7	6	12	12
F	f	5	5	5	7	5	6
G	f,g	9	9	9	9	1	5
H	f	10	12	11	5	13	7
I	f	7	8	8	8	11	9
J	f	8	7	6	10	8	10
K	g,c	12	10	10	11	6	4
L	g	11	11	12	13	9	13
M	f	13	13	13	12	10	11

\*Guard, forward, center.

At the close of the season a letter was sent to the 16 letter men of the varsity and the 17 numeral men on the freshman squad. (Sample letter and rating blank, Exhibits C and D.) These 33 boys were asked to rate the 13 varsity players on their offensive playing ability. The 13 players included in the study were ranked by 21 players and the coach. On the basis of offensive playing ability, these rankings plus other significant rankings from the evaluation data are shown in Table VIII.

Of particular interest is the similarity of the rankings that were given by the varsity, the freshmen and the coach. There are only 3 players where the disagreement is more than 2 rankings apart. All are unanimous on 5 players. It should be remembered that in spite of the apparent discrepancies between the judgment ratings and the computed ratings, the latter are built up of isolated abilities. As pointed out earlier, the guards and center have a better chance of making a higher score in ball handling due to their positions and the style of basketball used in this school.

No attempt was made in this study to give any of the players a composite ranking, but it should be noted that player A was a guard known nationally as an All-American player.

On the basis of the individual evaluation tables certain facts are brought out that can best be shown in individual analyses. For that reason, the abilities of the players are discussed as single units.



Summary of Individual Player Analysis

Player A. Guard.

This player was in 9 home games for 328.5 minutes and had a player efficiency rating of 97.3%. He was the number one man in almost any way that he could be rated. He earned 2098 evaluation points and 122 score points. He made 47 goals (32.6%) and 28 free throws (59.6%) and had a ball handling error rate of 1.17%. In earning the high scorer position on the squad he made more passes than catches. This is partly due to his willingness to cooperate and to his position as a guard. There were three men on the squad that took more shots per minute of playing time. Of these three men none had as good an average of made shots. During his long playing time he made only 13 personal fouls; two of his teammates with less playing time exceeded his total number of fouls and five teammates made more fouls per minute of playing time. He was an excellent ball handler, a dandy shot and a team player. The coach, his fellow players, the freshman squad, and the statistics are in complete agreement on his offensive ability and listed him as the number one player on the squad.

Player B. Forward and Center.

From the standpoint of time, this player played more minutes (266) than any other player except Player A. He was also second high scorer, earning 66 points by making 23 goals (27.1%) and 30 free throws (66.7%). From the standpoint of evaluation points, he was also second earning 1307 points, and had a playing efficiency of 92.2%. In ball handling errors he rated 2.9%. Six of his teammates rated poorer in this department. However, in spite of his errors in ball handling he made more passes at the opportunt time to players who scored than any other individual. Even on immediate assists per minute he rated second to only one other player, and this player played only 22.5 minutes during the season. There were four men on the squad that took more shots per minute. He was the only forward on the team to make more passes than catches who played more than 22.5 minutes. He had only 8 personal fouls and was the only player with over 200 playing minutes to have so few fouls. He was rated third by his fellow players, and second by his coach and the freshmen players.

Player C. Guard.

Player C played 263.5 minutes, earning 1300 evaluation points and 31 score points, scoring 13 goals (33.3%) and 5 free throws (71.4%). He handled the ball on passes and catches 1004 times which is the second greatest number on the squad and had a ball handling error rate of 1.7% which is next to that of players A and G. This player took a total of 39 shots and this is the smallest number of shots for any of the players that had over 200 minutes of playing time. As a guard he was in position to recover rebounds from off the opponent's backboard. He recovered 48 times, as compared to Player A's 50 times, and on a basis of recoveries per minute of playing time he is the leader for the team. This player passed the ball 128 times more than he caught it. On the basis of the data gathered this player is a good ball passer and rebound recoverer, which is a great asset to the team. On ball handling he has a very low percentage of errors and has a playing efficiency of 96.4% which makes him the number two man on the squad. His teammates rated him second on offensive ability, and his coach and the freshmen rated him third.



Player D. Center.

Player D was the fourth man on the squad to play over 200 minutes with a total time of 221.5 minutes. He earned 33 score points and 1256 evaluation points, which was fourth high for the squad. While playing he scored 14 goals (28%) and made 5 free throws (62.5%). In ball handling errors he had a low score of 1.9% and was one of the four men to score less than 2% errors. His all around playing efficiency was 94.9%, which was also fourth for the squad. As far as ball handling was concerned, he was third in the total number of passes and catches. He made 17 more passes than catches. There were only four men on the squad that took fewer shots per minute. The data show that this player handled the ball many times for a low error rate of 1.870. He was second on the squad in evaluation points per minute and that shows he did not shoot too often. On playing efficiency he was the best center on the squad, and the players, the coach and the freshmen all rated him as the number four man.

Player E. Forward.

This player was a forward and had 141.5 minutes of playing time to his credit. He earned 560 evaluation points and 25 score points. He scored 10 goals (30.3%) and made 5 free throws (71.4%). In ball handling he had an error rate of 4.6 which was second highest on the squad. From the standpoint of player efficiency he was 12th. There was only one other player on the squad that had a lower rate of personal fouls. Player E played 141.5 minutes or over  $3\frac{1}{2}$  games of 40 minutes each and made only 3 personal fouls. He is the first player in the list to catch the ball more than he passed it by 4 catches. He also is the first man on the list to be listed as a forward only. Player B played both forward and center during the season. It seems to be a characteristic of the forward position to demand more catching than passing. The data indicate a low personal foul rate, a poor efficiency rating as compared to the players who played 200 minutes and an error rate in ball handling 4 times as high as that of players A and G. He was rated as sixth by his fellow players and the freshmen, and seventh by the coach.

Player F. Forward.

This player was listed as a forward and he played 117 minutes, making 12 goals (17.9%), and 8 free throws (57.1%). He earned 628 evaluation points and 32 score points. On the player efficiency chart he rated 6th with a percentage of 94.1. His rate of error in ball handling was 2.070, which placed him in fifth place. Like the preceding player, he had more catches than passes in ball handling. Only one other player (H) had more attempted shots per minute of play and only two squad members made a smaller percentage of their shots. On balls recovered off his own backboard he rates as the number one man. This is also true for the recovery of his teammate's jump balls. On the basis of personal fouls per minute, this player ranked 11th for the squad, only two making more than he did. The data indicate that the player was fairly efficient, but that his shooting average was far too low. He makes a first class man on handling rebounds off his own backboard and getting the ball after a teammate's jump, but he committed too many personal fouls. His teammates, freshmen and coach rated him fifth.

Player G. Forward and Guard.

This player was listed as both a forward and a guard. He played 100 minutes, made 460 evaluation points and 10 score points, 4 goals (20.0%), and shot 2 free throws for 50.0%. He earned a rating on player efficiency of 94.2%, which places



him in 5th place for the squad. In errors for ball handling, he rated first with a rate of 1.13%. As a guard he had an opportunity to recover rebounds off the opponent's backboard to such an extent that he rated No. 2 for the squad on a basis of rebounds per minute. He passed the ball more than he caught it, and on the basis of shots per minute there are only 3 players who took less shots. This player is 12th on the basis of personal fouls committed per minute. The data indicate that he was an excellent ball handler, and a good rebound recoverer, but he did not shoot enough. On the basis of efficiency his coach, teammates and freshmen rated him ninth.

#### Player H. Forward.

Player H was a forward with 74.5 minutes of playing time to his credit. He earned 344 evaluation points and 30 score points, made 13 baskets (30.2%) and 4 free throws (66.7%). This player also had the highest number of shots attempted per minute of play. On the basis of player efficiency he rated 93.0%. But on his ball handling ability he had an error rating of 6.2%, or 5 times that of players A and G. He was the 8th player on the basis of time played and he ranked 8th on the basis of personal fouls. When it came to passing and catching the ball, he made 22 more catches than passes. This player was a good scorer but he shot more than any other player per minute of play. He made too many errors in ball handling and in this department he ranked 13th. He ranked 7th on his playing efficiency, and the players rated him 10th, the coach 11th, and the freshmen 12th.

#### Player I. Forward.

Player I was in the games for 70.5 minutes as a forward. He earned 395 evaluation points and 16 score points, and made 7 goals for 21.2% and threw 2 fouls for 33.3%. On the basis of personal fouls per minute he was number one man with less than any other member of the squad. He had a ball handling error rating of 4.0% and a playing efficiency of 91.7%. As a forward he recovered enough balls from the opponent's backboard per minute to rank as the No. 2 man of the squad. He also was the No. 3 man in recovering the ball off his own backboard, and he ranked 3rd on the basis of total recoveries per minute. In the amount of playing time this player ranked 9th and on the basis of playing efficiency he also ranked 9th. Like the other forwards, he also caught the ball more than he passed it and ranked 3rd in the attempted goals per minute of playing time. This player was good at recovering rebounds, not too good a shot, and among the 3 players to have an error rating over 4%. He did not commit many personal fouls. He was rated 7th by the players, and 8th by the coach and freshmen.

#### Player J. Forward.

This man had a playing time of 40 minutes. During this time he made 8 score points, 3 goals (16.7%), 2 free throws (40%), and earned 395 evaluation points. His error rating in ball handling was 3.1% and his playing efficiency rated at 91.6%. He was 10th in the amount of time in home games and ranked 10th in playing efficiency. As a forward he recovered the ball off his own backboard to rank 3rd on the per minute basis, and caught the ball more than he passed it. As a forward he was not a good shot as only one boy on the squad had a lower rank and the player who was lower did not make a basket in his five attempts. He was ranked 8th by his teammates, 6th by the coach and 7th by the freshmen.



Player K. Guard and Center.

With a playing time of 59.5 minutes this player made 297 evaluation points, 5 score points, 2 goals (25%) and 1 free throw (50.0%). His error rate in ball handling was 2.4% and of the 5 players with a better rating 3 were guards, one was a forward, and one was a center. His playing efficiency was 74.3, and of the three players who ranked better than he, two were guards and one was a center. In rebounds off the opponent's backboard, he rated 11th and in goals per minute he ranked 12th. This player had some excellent men to compete with and on a team without an all-American guard he might have had more opportunity to play. Like the other guards and centers, he passed more than he caught the ball. On rebounds off his own backboard per minute he ranked 8th and he ranked 6th on the recovery per minute of a teammate's jump ball. The data indicate that this player was a good ball handler and an efficient player, but that he did not shoot enough in proportion to his playing time. He was rated 12th by his teammates, and 10th by the coach and freshmen.

Player L. Guard.

This boy had a total time of 34.5 minutes, 120 evaluation points, and no score points. He is the only player of the 13 in the study that did not score during the home season. He attempted 5 goals and 2 free throws. His error rate in ball handling was 3.3% and this was better than four of his teammates who played longer. From the standpoint of playing efficiency he made a score of 84.5%, the lowest on the squad. The point most in favor of this boy was his rank in free throws attempted per minute (not making any) in which he was tied with Player J for 3rd place. This player ranked the lowest of the guards and was the only one to catch the ball more than he passed it. He was rated 11th by the varsity and freshmen, and 12th by the coach.

Player M. Forward.

This player ranked 13th in minutes of play (22.5), earned 11% evaluation points and 4 score points. He made one goal (33.3%) and 2 free throws (66.7%). He ranked 10th both in player efficiency (91.5%) and in error rate 3.4%. He had the highest rate of personal fouls per minute of any of the 13 boys. This player had a very definite height disadvantage as he was by far the shortest man on the squad and can be considered small in stature even in comparison with boys not playing college basketball. He was ranked 13th by all his fellow players and 13th by his coach.

The summaries have been presented and discussed in the body of the paper. In addition, some general conclusions seem to be warranted:

1. The study is of value in that a record was made of the number of times various activities are performed in college basketball.
2. An accurate record of the offensive abilities of players was made available, independent of the score book.
3. By examination of the material after a game a coach can see which men were performing their duties and which fundamentals need extra work.
4. The players have a definite interest in the charts and watch their improvement in deficient abilities.
5. There remains ample room for additional studies.



Exhibit A

	eval. pts. + unts -	Corlis	Happ	Pralle	Reid	Florell	Golay	Ebling	Schmidt	Johnson	Durand	Hunt	Kappelman	Team Total
No. of player		3	4	5	6	8	10	12	18	20	7		15	
No. of min. played		23	29.5	40	5	2.5	11.5	5.36	5.35	12.5	3	.5	1	
Total of Eval. Pts.		126	137	239	24	9	32	166	149	30	22	0	3	939
Eval. pts per min.		5.5	4.6	5.9	4.83	3.6	2.8	4.6	4.3	2.4	7.3	0	3	4.68
Goals attempted		6	4	18	1	2	2	8	8	2	0	0	0	51
Goals made		4	2	6	0	0	0	3	2	0	0	0	0	17
% of Goals made		66.7	50	33.3	0	0	0	37.5	25	0	0	0	0	33.3
Free throws att.		1	1	5	1	1	0	8	1	0	0	0	0	18
Free throws made		1	1	3	1	1	0	7	0	0	0	0	0	14
% of Free throws		100	100	60	100	100	0	88	0	0	0	0	0	77
Personal fouls		0	1	1	1	0	2	2	4	2	0	0	0	13
Goal Eval. pts.	10	40	20	60	0	0	0	30	20	0	0	0	0	170
F. T. Eval. pts.	5	5	5	15	5	5	0	35	0	0	0	0	0	70
Immediate assists	4	4	4	4	0	0	12	16	12	4	0	0	0	56
Secondary assists	3	0	9	6	0	0	0	3	15	0	0	0	0	33
Ball off backboard of opponent	2	6	8	6	0	4	2	14	0	2	2	0	0	44
Ball off own backboard	2	8	2	2	0	0	4	8	4	0	6	0	0	34
Taps & rec. own ball	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Recovers own teammates jump	1	0	1	0	0	0	1	1	3	1	0	0	1	8
Good passes	1	34	51	72	9	3	18	40	61	16	8	0	1	313
Good catches	1	34	42	78	10	1	15	42	64	15	0	0	1	310
Total No. possible Evaluation points	1	131	142	243	24	13	52	189	179	38	24	0	3	1036
Error of omission	-1	0	0	0	0	0	0	0	-1	0	0	0	0	-1
Held ball obtained by opponent	-1	0	0	-2	0	0	0	0	0	0	0	0	0	-2
Fumbles and goes out-of-bounds	-2	-2	0	0	0	0	0	-6	0	0	-2	0	0	-10
Fumbles and obtained by opp.	-2	0	0	-2	0	0	0	-2	-4	0	0	0	0	-8
Taps ball out-of-bounds	-2	-2	0	0	0	0	0	-2	-2	0	0	0	0	-6
Wild pass out-of-bounds	-3	0	0	0	0	0	-3	0	-3	0	0	0	0	-6
Wild pass to opp.	-4	0	0	0	0	-4	-4	-8	-4	0	0	0	0	-20
Violation	5	0	5	0	0	0	-5	-5	-15	0	0	0	0	-30
Foul- Offensive Evaluation pts.	-8	0	0	0	0	0	-8	0	0	-8	0	0	0	-16
Total Negative Evaluation pts.		-4	5	-4	0	-4	-20	-28	-28	-8	-2	0	0	-99



Exhibit B

	BAKER	WASHBURN	MORNING SIDE	SOUTHWESTERN	OKLAHOMA	IOWA	NEBRASKA	MISSOURI	KANSAS STATE	SEASON TOTAL							
Min. played	7.5	21	28.5	10	38.5	7	45.5	7	52.5	23	75.5	23	98.5	14	112.5	29	141.5
Total Eval. pts.	9	85	94	32	126	22	148	21	169	102	271	127	398	64	462	98	560
Eval. pts. per min.	1.2	3.5	2.7	3.2	2.8	1.6	2.9	3.0	2.9	4.5	3.3	5.3	3.8	4.6	4.1	3.4	3.96
Goals attempted	2	4	6	2	8	3	11	2	13	8	21	6	27	2	29	4	33
Goals made	0	2	2	2	4	0	4	0	4	1	5	4	9	1	10	0	10
% Goals made	0	50	33	100	50	0	36	0	30	17	24	67	33	50	34	0	30.3
Free throws att.	0	4	4	0	4	0	4	0	4	1	5	1	6	0	6	1	7
Free throws made	0	3	3	0	3	0	3	0	3	1	4	1	5	0	5	0	5
% Free throws	0	75	75	0	75	0	75	0	75	100	80	100	83	0	83	0	71.4
Personal fouls	0	2	2	0	2	0	2	0	2	1	3	0	3	0	3	0	3
Goal Eval. Pts.	0	20	20	20	40	0	40	0	40	10	50	40	90	10	100	0	100
F. T. Eval. Pts.	0	15	15	0	15	0	15	0	15	5	20	5	25	0	25	0	25
Immediate Assists	0	16	16	0	16	0	16	0	16	8	28	4	28	4	32	12	44
Secondary Assists	0	0	0	3	3	0	3	3	6	3	9	0	9	3	12	3	15
Ball off Opponents backboard	0	2	2	0	2	0	2	2	4	2	6	6	12	6	18	4	22
Ball off own backboard	0	4	4	2	6	0	6	2	8	8	16	18	24	2	26	14	40
Taps-recovers own ball	0	0	0	0	0	2	2	0	2	0	2	0	2	0	2	0	2
Recovers teammate's jump	0	0	0	0	0	1	1	1	2	1	3	0	3	1	4	2	6
Good passes	4	17	21	9	30	9	39	13	52	35	87	34	121	19	140	44	184
Good catches	8	23	31	8	39	10	49	15	64	33	97	34	131	19	150	38	188
Total No. Positive Eval. Pts.	12	97	109	42	151	22	173	36	209	105	314	131	444	64	509	117	626
Error of omission	0	0	0	0	0	0	0	-1	-1	0	-1	0	-1	0	-1	0	-1
Held ball obtained by opponent	0	-2	-2	0	-2	0	-2	-1	-3	0	-3	0	-3	0	-3	-2	-5
Fumbles and goes out of bounds	0	0	0	0	0	0	0	-2	-2	0	-2	-2	-4	0	-4	0	-4
Fumbles, and obtained by opponent	0	-4	-4	0	-4	0	-4	0	-4	0	-4	0	-4	0	-4	-2	-6
Taps ball out of bounds	0	-2	-2	-2	-4	0	-4	0	-4	0	-4	-2	-6	0	-6	-2	-8
Wild passes out of bounds	-3	0	-3	-3	-6	0	-6	-6	-12	-3	-15	0	-15	0	-15	0	-15
Wild passes to opp.	0	-4	-4	0	-4	0	-4	0	-4	0	-4	0	-4	0	-4	0	-4
Violations	0	0	0	-5	-5	0	-5	-5	-10	0	-10	0	-10	0	-10	5	
Foul offensive Eval. points	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Negative Eval. points	-3	-12	-15	-10	-25	0	-25	-15	-40	-3	-43	-4	-43	0	47	-19	-66



## Exhibit C

## DIRECTIONS

Consider the following items of the player's offensive ability:

1. His scoring ability.
2. His ability to recover rebounds.
3. His ability to pass accurately.
4. His ability to receive the ball on passes.
5. His ability to recover jump balls.
6. His ability to avoid held balls.

After considering the above points, rate the players in the alphabetical list from 1 to 13. The player you consider best should be rated number 1, and the poorest should be numbered 13.

Rating of "offensive ability"	<u>Names</u>
_____	Corlis
_____	Durand
_____	Ebling
_____	Floroll
_____	Golay
_____	Harp
_____	Hunt
_____	Johnson
_____	Kappelman
_____	Pralle
_____	Reid
_____	Schmidt
_____	Sullivan



## Exhibit D

University of Kansas  
Lawrence

Department of Physical Education

May 10, 1938.

TO THE BASKETBALL SQUAD:

In connection with the basketball research that we have been doing this winter we need your opinion. You have worked with your group of boys and know them better than an outsider, and hence your opinion is better than mine.

Each member of the Varsity and Freshman squad is being asked to rate a group of this year's varsity players. Will you please read the directions on the enclosed sheet carefully, and in the seclusion of your room give us a careful opinion? If your name is in the list, give yourself an honest rating.

Please note that you are not being asked to sign these sheets and we have no method of identifying them. It is hoped that you will cooperate in this matter.

Very truly yours,

V. W. Lapp.