The Development of a Basketball Battery for Middle School Male Students

Robert Chappell
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THE DEVELOPMENT OF A BASKETBALL BATTERY FOR MIDDLE SCHOOL MALE STUDENTS

A Thesis
Presented to
the Faculty of the Department of Physical Education and Recreation
Western Kentucky University
Bowling Green, Kentucky

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

by
Robert H. Chappell
July, 1971
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CHAPTER ONE

INTRODUCTION

Need for the Study

There has always been a great deal of interest in the measurement of playing ability in team games and many researchers concerned with physical education have made efforts to measure individual aspects of games in relation to the total game situation. However, any objective measurement of skill in a team game will present difficulties, for in many instances the final battery of tests bears little resemblance to the game situation. Games are usually broken down into a number of component parts for the purpose of testing, but the sum of these parts seldom adds up to the total game.

Tests to predict basketball playing ability have been used by researchers in the United States of America but they have varied considerably in content and design. This has occurred because researchers are seemingly not of the same opinion as to what are the most important "core-elements" of the game. Therefore, it is believed that there is a need to determine what are the main constituents of the game of basketball, as well as to use these criteria in a battery of tests which could predict basketball playing ability.
At the present time most teachers and coaches within the high school situation select basketball squad members on the basis of individual isolated tests, and thus the administration of a battery of tests which have a high degree of correlation with a subjective rating of basketball playing ability would suggest some type of standardized selection. The administration of such a test battery within high schools might save much time in team selection, especially when the tests can be completed by a squad within, for example, one hour. This would allow more time to be spent on team practices, evaluating large numbers of participants, and less on screening players.

The achievement and progress of skill attainment made by the students as measured by the tests could be determined and this, it is hoped, would increase the students' interest in the program. The results from the standardized tests might also help to equate teams for class and intramural competition, and could be used to grade basketball skill acquisition.

Statement of the Problem

This study was undertaken for the purpose of investigating an adaptation of the Lehsten Basketball Test as a means of determining basketball ability in high school students, and using these test items to design an accurate, administratively practical and feasible battery of tests to be used in the high school physical education program.

Since the Lehsten Basketball Test was developed in 1948, it would appear that new, more accurate tests could be utilized. Lehsten,
in personal communication, was in agreement with this suggestion. This investigator, to make a more applicable test, felt that the approach whereby a battery of basketball tests could be economically utilized in the high school teaching situation would prove to be valuable.

Sub-Problems

1. To ascertain if the Lehsten Basketball Test could be improved by altering the test items or by standardizing these items.

2. To determine if these test items could be used practically and feasibly in the high school physical education program.

Definition of Terms

Several definitions follow which add to the understanding of the problem studied:

1. Skill—refers to the learning of patterns so that a series of activities can be performed well and with confidence.

2. Core elements—refers to the basic constituents of a particular game, the combination of which constitutes the complete game.

3. Reaction time—refers to the time interval between the onset of the stimulus and the initiation of the response by the subject, under the condition that the subject has been instructed to respond as rapidly possible.

4. Motor ability—refers to the measured ability to perform basic skills under standard conditions of instruction and demonstration.

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5. Motor educability—refers to the ease with which one learns new athletic skills.

Limitations on the Study

The following limitations were placed on the study:

1. Only male subjects in the ninth grade at Franklin-Simpson High School, Franklin, Kentucky, were considered and therefore the results are only applicable to this sex and age group.

2. Although as many experimental variables as possible were controlled, the investigator was aware of, but not able to control, emotional stability, motivation, and other factors.

Underlying Hypotheses

The hypotheses stated below will be tested by the investigator:

1. A battery of tests based on the Lehsten Basketball Test will not provide a means of predicting basketball playing ability in high school students.

2. A battery of tests based on the Lehsten Basketball Test will not prove to be an administratively practical test in the high school physical education program.

3. The results from the battery of basketball test items cannot be used to equate teams, grade basketball skill acquisition, and measure skill attainment and progress in the high school physical education program.

4. There are no differences in the results from the adaptation of the Lehsten Basketball Test with regard to the height and weight of the subjects.
Summary

This study was undertaken for the purpose of investigating an adaptation of the Lehsten Basketball Test as a means of determining basketball playing ability in high school students. It was hoped to develop a test battery which would measure constituent basketball skills, the scores from which could be correlated with a subjective rating of basketball ability. This test ideally could be used practically in the high school physical education program. Such a standardized test could save time in team selection, could be a guide in the equating of teams for intramural and class competition, could aid the grading of basketball skill acquisition, could measure skill attainment, and could act as a means of motivation.
CHAPTER TWO

SURVEY OF RELATED LITERATURE

The first attempt to measure scientifically all of the fundamental skills of the game of basketball was made by Brace\(^1\) in 1924. His tests were devised and scored according to a T-scale scoring plan. In 1929 Bliss\(^2\) designed scoring tables for seven basketball tests for boys and men from junior high school to college, but, as with the tests conducted by Brace, the results were not related to performance in the game situation.

In 1932 Edgren\(^3\) examined eight basketball tests, four tests of general motor ability and the Brace Motor Ability Tests of Neuromuscular Coordination. On the basis of these, five tests, speed pass against a wall, moving target, free jump, Edgren ball handling test, and bounce and shoot were selected to form a reliable battery for which a validity coefficient of .77 was obtained between the test battery and a subjective rating of the players' basketball performance.

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\(^1\)D. K. Brace, "Testing Basketball Techniques," American Physical Education Review, 29 (December, 1924), 159-165.

\(^2\)J. G. Bliss, Basketball, (Philadelphia: Lea and Febiger, 1929), 52.

Johnson in 1934 devised nineteen basketball tests to indicate present and potential basketball ability. He obtained a reliability and validity of .89 and .88 for the former and a reliability and validity of .93 and .84 for the latter. In the same year, Young and Moser constructed a test to determine basketball ability in women, following an analysis of the game into its component parts. On the basis of these parts or "core-elements" the authors selected a battery of five tests similar to those previously used by Edgren. The results from these tests were then compared with the scores obtained from a subjective ranking of the subjects and a validity coefficient of .86 was reported.

Schwartz devised a battery of five basketball tests for girls in 1937 and means were formulated on the basis of the results. Similar studies were done by Largo and Russell in 1938 and by Chairman in 1954. The former compiled achievement scales for junior high school girls in dribble for distance, and basketball throw and catch, while the latter determined norms in the form of T-scores and percentile

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ranks for bounce and shoot, half minute shooting, and push pass. Leilich\textsuperscript{9} used these three tests in 1952 to construct achievement scales for the Professional Studies and Research Committee of the Midwest Association of College Teachers of Physical Education for Women. However, none of the above studies related the scores obtained in these tests to a subjective rating of playing ability in the game situation.

In 1938 Glassow, Calvin and Schwarz\textsuperscript{10} attempted to find an objective measure of basketball playing ability to use as a method of grading college classes. Scores obtained in bounce and shoot, zone toss, wall speed, jump and reach, and pivot and shoot were correlated with a subjective ranking of playing ability. It was found that the bounce and shoot, zone toss and wall speed tests combined were as valid a battery as the five tests, and a validity coefficient of .60 was obtained for these three tests.

Dyer, Schurig and Apgar\textsuperscript{11} analyzed the fundamental motor elements of basketball skill in 1939 and devised four tests to measure basketball ability in college, high school and junior high school women. The battery consisted of moving target, Edgren ball handling test, bounce and shoot, and free jump and shoot. The


authors found that the battery of tests was a valid, reliable and objective measure of basketball ability in college women and secondary school girls.

Knox developed a basketball battery composed of a speed dribble, wall bounce, dribble-shoot and "penny-cup" tests in 1947 and correlated the results obtained with success at making a ten-man high school varsity squad in Oregon. The final correlation coefficient was .88 while it was also noted that there was an eighty-nine per cent agreement between the results from the basketball tests and squad membership for tournament play, and six members of the "all-star" team achieved scores on the test that were not reached by ninety-five per cent of the subjects. Although perfectly valid the Knox Basketball Test only distinguishes between varsity and non-varsity players, and not between the ability levels of the actual squad members.

Loose and Glines and Peterson administered the Knox Basketball Test to high school subjects in an attempt to equate basketball teams. The competition between equated teams was very close and Glines and Peterson further obtained a correlation of .89 between scores on the basketball test and the total points the players scored in the competition. In testing high school students


Glines also found that seventeen of the twenty top scorers on the test were selected for the varsity or junior varsity teams and the five boys with the highest scores on the tests eventually formed the starting line-up on the varsity team. A similar study was done by Boyd, McCachren and Waglow who obtained a bi-serial correlation of .96 between the scores on the test and those subjects selected for the junior varsity basketball squad.

In 1948 Lehsten designed a battery of five items after making an extensive survey of the literature and an analysis of the game into its component parts. A validity correlation of .80 was obtained between results on the tests and a subjective rating of the subjects' ability in the game situation. The squad plan of class organization was utilized in the test so that with careful management a class might be tested on all items in fifty minutes. Therefore this test appears to have great potential as a means of determining the basketball playing ability of high school subjects.

The latest research in this field was conducted by Stroup in 1955 who equated teams on the basis of scores obtained in goal shooting, wall passing, and dribbling. Approximately eighty-four percent of the games were won by the team with the highest skill score.


17 Francis Stroup, "Game Results as a Criterion for Validating a Basketball Skill Test," Research Quarterly, 26 (October, 1955), 353-357.
average and thus the author concluded that these tests could be used as a measure of a team's strength and for equating teams.

The review of literature suggests that previous researchers in the field of basketball tests vary as to the selection of the component skills of the game. These individual skills will in turn influence the selection of tests that researchers use as a criterion of evaluating basketball skill.

Edgren in 1932 included speed, passing, dribbling, shooting, general ball handling ability, agility, endurance and coordination as criteria for evaluating basketball skill. Young and Moser went into greater detail when listing the component skills in basketball as throwing and catching for speed and accuracy, handling the ball in relation to the body and shooting. On the basis of these components a five item battery was designed for women but its use would be restricted when administered to high school boys.

Large and Russell made a simpler classification of basketball skills which in essence agreed with that made by Dyer and Schurig who listed ball handling, basket shooting and jumping as the key elements of the game. However, the former study was only concerned with formulating achievement scales while the latter study, although devising a four test battery which could be used in the high school teaching situation, underestimated the value of general motor ability tests.

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18 Edgren, op. cit., 159-171.
19 Young and Moser, op. cit., 3-23.
20 Large and Russell, op. cit., 43-56.
21 Dyer, Schurig and Apgar, op. cit., 128-147.
Knox\textsuperscript{22} emphasized speed factors in measuring the component skills of basketball as his four tests all contain elements of speed. Lehsten\textsuperscript{23} developed the concept of speed in 1948 as he listed reaction time as an extremely important element of basketball skill along with such factors as sensory-motor coordination, footwork, shooting, passing, motor ability and motor agility.

Leilich\textsuperscript{24} found four factors to be basic for a battery of basketball tests: basketball motor ability, speed, ball handling, involving passing accuracy and speed, and ball handling involving accuracy in goal shooting. The author included these factors in a bounce and shoot test, half-minute shooting and push pass test, but these tests are similar to previous work in this field and therefore offer little new information on the breaking down of basketball into its component skills and their measurement.

Summary

The tests designed to measure individual skills in basketball related to playing ability in the game situation have not varied greatly since the first battery of tests was devised by Edgren in 1932. The constituent skills of basketball have been tested by means of bouncing and catching tests, dribble and shoot tests, speed dribble, and wall bounce tests. Various authors have listed similar "core-elements" in basketball but have differed in the way that these could be tested.

\textsuperscript{22}Knox, \textit{op. cit.}, 45.

\textsuperscript{23}Lehsten, \textit{op. cit.}, 103-109.

\textsuperscript{24}Leilich, \textit{op. cit.}
The most recent research in this area was reported by Stroup in 1955 and consequently new and possibly better test items might be utilized to measure basketball playing ability in view of the apparent emphasis on differing basic skills required in the modern game of basketball. However, the battery of tests designed by Lehsten in 1948 appeared to be the most comprehensive.
CHAPTER THREE

EXPERIMENTAL DESIGN AND PROCEDURES

The basis of the tests used throughout this investigation were those used in a study by Lehsten.\(^1\) From the review of literature in this field it appeared that the battery of tests designed by Lehsten in 1948 was the most comprehensive as the author had made an extensive survey of the literature and had analyzed the game into its component parts.

Eight items originally comprised the battery taking into account the factors of speed, shooting, passing, reaction time, sensory motor coordination, footwork, motor ability and motor agility. Eventually a five item battery was evolved and checked against the eight item battery and a .97 correlation and a validity correlation score of .80 were obtained. The main asset of the test according to the author was that a high school class might be tested in one fifty minute period, but the author was not specific as to how this could be achieved. In the original study eighty-four subjects were tested.

Tests Used

In the final selection of the test items Lehsten attempted to relate these to the skills required in the game of basketball.

\(^1\)Lehsten, *op. cit.*, 103-109.
The final five test items and the factors they were purported to measure were:

1. Baskets per minute—ball handling, speed, sensory motor coordination.
2. Forty foot dash—velocity, reaction time, motor agility.
3. Vertical jump—velocity, agility, power.
4. Dodging run—speed, motor agility, velocity.
5. Wall bounce—motor agility, sensory motor coordination, velocity.

However, Lehsten concluded that the Dodging run test item could be used dribbling a basketball in order to test the additional factor of ball handling, and that the Forty foot dash could be extended to fifty foot due to the increase in the number of full size basketball courts available to high school boys.

This investigator felt that three additional test items might be included in the test battery in order to achieve a higher correlation and validity:

1. As ball handling ability appears to be of great importance in basketball and the Baskets per minute and the Dodging run are the only test items in the battery which measure ball handling, possibly another test would help to measure this factor. It was felt that as an additional test, the subject should throw a basketball against the backboard and attempt to tip it into the ring with the dominant hand.

2. In the modern game of basketball in high schools it is essential that the players are able to handle the basketball efficiently with the non-dominant hand as well as the dominant hand.
This will necessitate the subject making the necessary adjustments in motor agility, coordination and the use of the dominant eye. Therefore, it was proposed that the Dodging run test item could be repeated as an additional test, namely, dribbling a basketball with only the non-dominant hand.

3. As scoring baskets is the ultimate aim in basketball it was felt necessary to include an additional test which measured this factor. Therefore, the number of baskets scored from seven selected positions within twelve feet of the basket was recorded. Following each shot the subject was responsible for retrieving the ball before advancing to the next shooting position.

In the Lehsten battery, the test items varied in the way in which they were measured. In the Vertical jump the number of inches was measured; in the Baskets per minute, the number of baskets scored in a minute were measured; in the Forty foot dash, the number of seconds taken was recorded; in the Dodging run, the number of seconds taken to cover the course twice was recorded; whilst in the Wall bounce, the number of times the basketball was bounced against the wall target in ten seconds was recorded. To do this would require several administrators, several stopwatches, and the actual testing would be time consuming and would leave the majority of the participating subjects inactive.

Therefore all test items with the exception of the Vertical jump were conducted for thirty seconds and the total number of completed measurable scores were recorded as follows:

1. Baskets scored in thirty seconds.
2. Fifty foot dash--the number of dashes completed in thirty seconds, measured to the nearest quarter of a dash.

3. Tip-in test--the number of baskets scored in thirty seconds.

4. Dodging run with both hands--the number of runs completed in thirty seconds, measured to the nearest quarter of a run.

5. Shooting--the number of baskets scored in thirty seconds from the seven selected stations.

6. Wall bounce--the number of returned bounces made in thirty seconds.

7. Vertical jump--the number of inches recorded.

8. Dodging run with the non-dominant hand--the number of runs completed in thirty seconds, measured to the nearest quarter of a run.

Selection of the Subjects

Two physical education classes, with a total of fifty-eight subjects, were selected from the ninth grade at Franklin-Simpson High School, Franklin, Kentucky. The subjects were of varied basketball ability but all were capable of performing the basketball skills in a competitive situation. The subjects were placed into two groups for ease of administration.

Materials

The following materials were necessary for the administration of the tests: a stop watch, a tape measure, seven basketballs, four basketball backboards and rings, twelve marker cones, eight clip boards, a jump and reach board, pencils and squad cards.
Instructions to the Subjects

All subjects were given a brief, yet comprehensive description of the purpose of the study. Standardized instructions were prepared and read to all subjects. Appendix A contains these instructions. The investigator demonstrated and explained the test items and then described the organization of the testing and recording. Any questions that the subjects had were then answered.

After each subject had completed the tests, the individual concerned was asked not to demonstrate or discuss with others who were following what was involved in the battery of tests.

Organization of the Tests

The test items were administered in regularly scheduled physical education classes utilizing the rotating squad method. Figure 1 shows the organization of the test stations. Equal numbers of subjects were assigned to each station and the subjects passed onto each station in the following order until the eight tests had been completed:

1. Baskets scored in thirty seconds.
2. Fifty foot dash.
3. Tip-in test.
4. Dodging run with both hands.
5. Shooting.
6. Wall bounce.
7. Vertical jump.
8. Dodging run with the non-dominant hand.
Fig. 1.—Organization of the test stations

1. Baskets in thirty seconds
2. Fifty foot dash
3. Tip-In
4. Dodging Run with both hands
5. Shooting
6. Wall Bounce
7. Vertical Jump
8. Dodging Run with the non-dominant hand
Throughout the testing period, an attempt was made to hold the battery test variables constant. They were administered in a friendly, relaxed atmosphere in an attempt to nullify tension within the subject.

An attempt was also made to minimize fatigue factors as all tests were administered before mid-day and a short rest was given at the completion of each test item.

Total Subjective Rating Criterion

At the next class meeting after the testing had been completed, the subjects were scheduled in intersquad basketball games for the purpose of observation by the jury. The subjects were also observed by this jury during the next successive class period in similar game situations. The jury was composed of the Freshman basketball coach, the class physical education instructor, and a graduate student from Western Kentucky University who had played university level basketball.

The following check list rating sheet, which was prepared by the investigator in consultation with basketball coaches, was utilized to standardize the subjective rating.

1. Ball sense, perceptual motor factors.
2. Ball and body handling management:
   a) changing direction, agility
   b) appreciation of spatial relations
   c) speed of the body, i.e., motor agility
   d) accuracy of passing, shooting and dribbling
3. Psychological factors such as competitiveness and aggression channeled into producing efficient performance.
4. Physical attributes such as height, jumping power, general muscular power and minimum standards of endurance and mobility.

The players were rated on a scale from one to ten points, with ten as very good, seven as good, four as average, two as poor and one as very poor. Each subject was observed twice by the jury and thus received six ratings. The total score (maximum sixty points) was entered on the personal data sheet under the heading of Subjective Rating.

Recording of the Collected Data

Information concerning the subjects was recorded before the actual testing began. This included name, grade, height, weight, date of birth and dominant hand.

As each of the test items were administered, the results (completed number of tasks) were recorded on the student's personal record sheet (Appendix B) and converted to "T" scores. The results from the subjective rating were also recorded on the personal data sheet.

Treatment of the Collected Data

Sets of cards were key-punched at the Computer Center, Western Kentucky University. These cards contained the following information: student number, individual item scores for the eight tests, age in months on the day the test, grade in school, height and weight, total raw score, and subjective rating. The cards were then dispatched to the University of Kentucky for analysis into the various aspects of this study. In detail the following analyses were requested:
1. Intercorrelations of the various test items.
2. An item analysis in which the individual item scores were correlated with the total battery scores.
3. Correlations of total battery scores with subjective rating of the subjects.

Summary

The tests used throughout this investigation were those outlined in the study by Lehsten. Fifty-eight male students from the ninth grade at Franklin-Simpson High School, Franklin, Kentucky, were selected as subjects for the study.

An attempt was made to hold the testing variables constant throughout the administration of the tests. Instruction and demonstration were standardized while the effect of fatigue was reduced as much as possible by using the rotating squad method. Itemized individual performances and total scores were recorded on personal data sheets along with such information as grade, height, weight and date of birth. The individual performances were then converted to "T" scores. The subjects received a subjective rating of basketball playing ability on two separate occasions by a panel of three experts; each subject could receive a maximum of sixty points.

Sets of cards were key-punched at the Computer Center, Western Kentucky University, and were then dispatched to the University of Kentucky for analysis of the various aspects of the study.
CHAPTER FOUR

ANALYSIS OF DATA

The data used in the final analysis was obtained by testing fifty-eight subjects in the ninth grade at Franklin-Simpson High School, Franklin, Kentucky. The approach in this study was to score the performance of these subjects on a battery of eight basketball test items and to correlate these with the factors of age, height and weight, as well as a subjective rating by coaches of the subjects' ability to play basketball in the game type situation.

Table 1 shows the intercorrelations between the eight test items comprising the battery and the subjective rating. This statistical procedure is supported by numerous articles and studies in the field and is discussed at length by Guilford.¹

A correlation of .73 between the composite battery score and the subjective rating was found. This finding suggested that there was a substantial relationship between the total points scored in the eight test items and the subject's ability to play basketball. Items in which a reasonably high relationship existed included: Dodging run with both hands and Dodging run with dominant hand (.60),

Fifty foot dash and Dodging run with both hands (.56), Baskets in thirty seconds and the Tip-in (.44) and Wall bounce and Vertical jump (.44).

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Items in which there was a definite but small relationship included: Wall bounce and Dodging run with non-dominant hand (.39), Baskets in thirty seconds and Shooting (.37), Fifty foot dash and Vertical jump (.32) and Dodging run with both hands and Shooting (.22).

There was only a slight relationship between Wall bounce and Dodging run with both hands (.19), Vertical jump and Dodging run with both hands (.10), Shooting and Wall bounce (.09), and a negative correlation between Shooting and Fifty foot dash (-.05), so due to
these low intercorrelations it appeared that disparate items were being measured.

Baskets in thirty seconds, Dodging run, Tip-in and Wall bounce test items all appeared to show velocity in relation to ball handling ability and had a relatively high correlation with the subjective rating. The Vertical jump seemed to be related to the Fifty foot dash, Dodging run and Tip-in test items. The common element in these tests appeared to be velocity, dynamic power, or a combination of these elements.

The Dodging run tests and Fifty foot dash had speed and agility in common. Shooting seemed to have little in common with the other seven test items and had a low correlation with the subjective rating.

Leg speed and reaction time appeared to be the most important factors in the Fifty foot dash and the two Dodging run test items. Speed and reaction time in relation to ball handling ability were the most important factors in the Wall bounce, Baskets in thirty seconds and Tip-in test items, while power or instant speed was the most important factor in the Vertical jump. Therefore speed and reaction time appeared to be important factors in the Dodging run tests, the Fifty foot dash, the Wall bounce and Tip-in test items.

Intercorrelations between the Eight Test Items and the Additional Factors of Age, Height and Weight

Table 2 shows the intercorrelations between the eight test items and the additional factors of age, height and weight. There was no significant relationship between these eleven factors. This
agreed with Lehsten's research. It was also noted that no other researchers in this area had listed these particular factors as being important criteria in measuring basketball ability.

The eight test items were further investigated by means of the $R^2$ scores to determine the test items that were least important as predictors of basketball ability. Table 3 shows this information.

There was a significant decrease in the $R^2$ score when the fifth independent variable was eliminated. This indicated that a four

\[1\] Lehsten, op. cit., 103-109.

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**TABLE 2**

INTERCORRELATIONS BETWEEN THE EIGHT TEST ITEM SCORES AND THE ADDITIONAL FACTORS OF AGE, HEIGHT AND WEIGHT

The eight test items were further investigated by means of the $R^2$ scores to determine the test items that were least important as predictors of basketball ability. Table 3 shows this information.

There was a significant decrease in the $R^2$ score when the fifth independent variable was eliminated. This indicated that a four

\[1\] Lehsten, op. cit., 103-109.
item battery of basketball tests consisting of the last four independent variables, the Tip-in, Vertical jump, Baskets in thirty seconds and the Fifty foot dash, approached the validity level of the eight item battery as a means of predicting basketball ability. These four tests also had the highest correlation with the subjective rating of basketball ability.

Thus it appeared that a battery of tests consisting of two motor ability tests and two tests involving ball handling ability in relation to speed and motor agility comprised a reliable method of predicting basketball playing ability. This information agreed with the Lehsten test both in battery item content and predictive ability. However, the Tip-in test was an entirely new prediction factor of
basketball ability and in this investigation it had the highest correlation with the subjective rating. Knox,\(^2\) in his study, included three tests involving ball handling ability and one motor agility test. The test items varied slightly in design from this investigation but both studies measure the same basic basketball skills. Both Chairman\(^3\) and Leilich\(^4\) compiled achievement scores for three basketball tests similar to those developed by Lehsten\(^5\) but it appeared that both of these authors underestimated the use of motor agility tests as a means of predicting basketball ability. Stroup\(^6\) also used these three tests as a means of equating teams for competitions.

A four item battery consisting of the Tip-in test, Vertical jump, Baskets in thirty seconds and the Fifty foot dash could therefore be used as a standardized method of selecting high school freshmen basketball players in contrast to a longer test.

Summary

Fifty-eight subjects were tested on an eight item battery of basketball skills. Additional factors of age, height and weight were recorded and this information was correlated with a subjective rating of the subjects' ability to play basketball in the game type situation. The correlation coefficient between the total point scores from the

\(^2\)Knox, \textit{op. cit.}, 45.  
\(^3\)Chairman, \textit{op. cit.}, 450-455.  
\(^4\)Leilich, \textit{op. cit.}  
\(^5\)Lehsten, \textit{op. cit.}, 103-109.  
\(^6\)Stroup, \textit{op. cit.}, 353-357.
eight item battery and the subjective rating was .73. This indicated that there was a substantial relationship between the total points scored in the eight basketball tests and the ability to play basketball.

Intercorrelations between the eight items in the test and the additional factors of age, height and weight indicated that there was only a very small correlation between these eleven factors. Further investigations showed that the four test items consisting of the Tip-in test, Vertical jump, Baskets in thirty seconds and the Fifty foot dash combined, had a significant relationship with the subjective rating of basketball ability. Therefore the four item battery of basketball skills could be reasonably used as a standardized method of selecting freshmen basketball players in high schools. The tests might also be used to equate teams for intramural and class competition, grade basketball skill acquisition, measure skill attainment and progress and act as a means of motivation.
Summary

The purpose of this study was to investigate an adaptation of the Lehsten\textsuperscript{1} basketball test as a means of selecting high school basketball players, and using these test items to design an accurate, administratively practical battery of tests that could be used in the high school physical education program. The subjects consisted of fifty-eight students from the ninth grade at Franklin-Simpson High School, Franklin, Kentucky.

The test items were administered to the group during regular physical education class time by utilizing the rotating squad method. Every attempt was made to hold the testing variables constant during the administration of the tests. Such things as instruction, demonstration and motivation were standardized while the effects of fatigue were reduced as much as possible by administering the tests before noon.

Itemized individual performances and the total scores were recorded on the personal data sheets along with such information as date of birth, height, weight and the dominant hand. The subjects received a subjective rating of basketball playing ability on two

\textsuperscript{1}Lehsten, \textit{op. cit.}, 103-109.
separate occasions by a panel of three experts with the maximum rating being sixty points.

Sets of computer cards were key-punched at the Computer Center, Western Kentucky University, and were then dispatched to the University of Kentucky for an analysis of the variables within the study.

Conclusions

The following general conclusions were drawn from the data gathered in this investigation. These generalizations apply only to the conditions and subjects involved in the study.

1. There was a significant relationship between the scores in the eight item battery of basketball skills and the subjective rating of basketball ability in the game type situation.

2. There was a very slight relationship between the eight test items and the additional factors of age, weight and height.

3. Speed and reaction time appeared to be the most important factors in the Dodging run tests, Fifty foot dash, Wall bounce and Tip-in test items.

4. The most important test items as predictors of basketball ability were the Tip-in test, Vertical jump, Baskets in thirty seconds, and the Fifty foot dash.

These results indicated that there was a substantial relationship between the results from the four item test battery and a subjective rating of basketball ability. The evidence suggested that these four test items could be used as a standardized method of selecting high school freshmen basketball players, equating teams in the high school physical education program, grading basketball skill
acquisition, measuring skill attainment and progress, and could act as a means of motivation.

Recommendations

1. The selection and screening of basketball players by administering the four test items, i.e. the Tip-in test, Vertical jump, Baskets in thirty seconds and the Fifty foot dash, may be profitable.

2. Further testing with subjects in the same age range as used in this study would be of considerable value in order to verify the conclusions reached in this study. If the work of this study was substantiated by future research, tentative norms could be established for the four item battery, at all age levels.

3. The four item battery could be used as a means of motivation, a method of grading, and as a means of equating teams in the high school physical education program.
APPENDIX A

STANDARDIZED INSTRUCTIONS

Test number 1. On the sound of the whistle using either hand shoot as many baskets as you can from underneath the basket. You have thirty seconds.

Test number 2. On the sound of the whistle run as many fifty foot dashes as you can in thirty seconds.

Test number 3. On the sound of the whistle lob the ball against the backboard from the indicated line and then try to tip the ball into the basket. See how many times you can do it in thirty seconds.

Test number 4. On the sound of the whistle dribble round the course as many times as possible in thirty seconds.

Test number 5. On the sound of the whistle start at Station 1 and work through to Station 7 taking one shot at each station, collecting the rebound. You have thirty seconds.

Test number 6. On the sound of the whistle pass the ball against the wall within the square as many times as possible in thirty seconds.

Test number 7. With your feet together and your heels on the ground reach up as far as possible and note the height. Hold the piece of chalk and jump up as high as possible and touch the board. Subtract the first stretched height from the jumped height.
Test number 8. On the sound of the whistle using only your weak dribbling hand dribble round the course as many times as possible in thirty seconds.

Any questions? (Answer any questions.)
APPENDIX B

PERSONAL DATA SHEET

Name

Age    Years   Months

Height

Weight

Do you prefer to use your left or your right hand.

<table>
<thead>
<tr>
<th>Test</th>
<th>Score</th>
<th>&quot;T&quot; Score</th>
<th>Subjective Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Baskets in thirty seconds.</td>
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<td></td>
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</tr>
<tr>
<td>2. Fifty foot dash.</td>
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<td></td>
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<tr>
<td>3. Tip-in.</td>
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<td></td>
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<tr>
<td>4. Dodging run, both hands.</td>
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<td></td>
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<tr>
<td>5. Shooting.</td>
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<tr>
<td>6. Wall bounce.</td>
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<td></td>
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<tr>
<td>7. Vertical jump.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>8. Dodging run, non-dominant hand.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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