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A DEGREE OF DIFFICULTY

TUMBLING SCORE CARD

by

John W. Taves

ABSTRACT

The purpose of this study was to develop a degree of difficulty score card for sixth grade boys and girls in Davenport, Iowa.

A score card was constructed. Five hundred and fifteen subjects were tested using the tumbling score card. As a result each item was given a point value in accordance with the percentage of subjects who passed the item.

A DEGREE OF DIFFICULTY SCORE CARD  
FOR TUMBLING STUNTS

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A Seminar Report  
Presented to  
the School of Graduate Study  
Wisconsin State University at LaCrosse

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Master of Science in Physical Education

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by  
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## CHAPTER I

### INTRODUCTION TO THE PROBLEM

The tumbling unit is an important part of a school's physical education program. Evaluation of a child's tumbling skills is an important part of this unit. The researcher in more recent years has used a tumbling score card to motivate and evaluate his students during their tumbling unit. The researcher constructed his own score card and empirically assigned point values to the different items on the card. The researcher became dissatisfied with the score card because it seemed that some of the items were valued too high, while others were valued too low. It was also felt that the number of stunts listed under each category should be based on the amount of time spent on instruction for those stunts. The author conceived the idea that an accurate tumbling score card could give an instructor a better idea of a good progression of stunts for tumbling units. The researcher, in talking to other instructors who used somewhat the same method of evaluating, found that they were also interested in a more valid score card for tumbling. It was therefore decided that there was a definite need for the development of a degree of difficulty tumbling score card for sixth grade boys and girls.

To the author's knowledge, no previous investigation has been made of a degree of difficulty tumbling score card for the sixth grade level.

#### Statement of the Problem

It is the intent of this study to develop a degree of difficulty score card in tumbling stunts for sixth grade boys and girls in the Davenport public schools. It is also the intent of this study to validate the items which are on the score card.

#### Need for the Study

The construction of this score card can be an aid to physical education teachers in evaluation and can assist them in developing good progressions in teaching tumbling. The score card can also help to motivate students in tumbling.

#### Delimitations

This study was conducted with sixth grade boys and girls in selected schools in the Davenport, Iowa public school system.

Limitations

Motivation of the subjects could not be controlled, and there was no way to determine whether the effort of each subject was his best. Variations in the quality of instruction by the participating teacher could also be a limitation of this study.

## CHAPTER II

### REVIEW OF RELATED LITERATURE

The writer found no previous study directly related to the investigation and construction of a degree of difficulty score card in tumbling for boys and girls in the sixth grade. Ader developed a score card to measure tumbling skills of tenth grade boys. The boys were tested on the stunts before their tumbling unit was started. After testing was completed, each stunt was given a point value according to the number of subjects who passed each stunt. The stunts were rated from one to twelve. The stunts rated the least difficult were given the lowest value and the most difficult were assigned the highest value.<sup>1</sup>

College women were used as subjects in determining a rating scale for tumbling activities in the studies conducted by Cotteral.<sup>2</sup>

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<sup>1</sup>John Ader "A Study to Determine the Tumbling Skills of Tenth Grade Boys" (Unpublished Seminar Report, Wisconsin State University, LaCrosse, 1965).

<sup>2</sup>Bonnie Cotteral and Donnie Cotteral, The Teaching of Stunts and Tumbling, (New York: The Ronald Press Company, 1936), pp. 276-280.

Ernest J. Gershon, instructor at Wisconsin University at LaCrosse, developed a score card in beginning tumbling for professional physical education college men.<sup>3</sup>

McClow in his book graded his exercises for difficulty but did not mention how he arrived at his figures. His purpose was to develop a difficulty rating for each stunt so that no time need be wasted in learning an exercise that might be too difficult for one group or too easy for another group.<sup>4</sup>

Parry developed a test of twenty tumbling skills which were arranged with an attempt at a graded increase in difficulty from one to twenty.<sup>5</sup>

A degree of difficulty score card for gymnastic apparatus was developed by Peterson. The judgments of thirty-three physical education instructors were pooled to develop a degree of difficulty.<sup>6</sup>

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<sup>3</sup>Ernest J. Gershon, "Beginning Tumbling Score Card", Wisconsin State University, La Crosse.

<sup>4</sup>Lloyd L. McClow, Tumbling Illustrated, (New York: A. S. Barnes and Company, 1931), p. 212.

<sup>5</sup>K. R. Parry, "A Graded Series of Tumbling Stunts," American Association of Health, Physical Education and Recreation, (February, 1937), pp. 110-111.

<sup>6</sup>Dale Peterson, "A Degree of Difficulty Scorecard for Gymnastic Apparatus", Seminar report, Wisconsin State University, LaCrosse, 1963.

Mueller organized apparatus exercises on the basis of difficulty. He divided the exercises into three categories: fair, good, and excellent. These standards were set for junior high school level.<sup>7</sup>

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<sup>7</sup>Grover Mueller, "Achievement Standards on Gymnasium Apparatus," Mind and Body, (May-June, 1934),

## CHAPTER III

### PROCEDURES

The items contained on a tumbling score card should be items which are presented during the students' tumbling unit. Therefore, the researcher first developed a list of tumbling items which might be included in a sixth grade tumbling unit. The tumbling items for this list were taken from the Davenport upper elementary physical education guide book. Each item was listed under one of ten basic tumbling categories. The ten categories were formed by reflective thinking by the researcher, they included springs, couple stunts, headstands, kips, cartwheels, forward rolls, backward rolls, hand and forearm balancing, walkovers, and back handsprings.

The basic information needed for the development of a degree of difficulty score card were: Which items should be on the card and how many items from each category should be contained on the score card? To determine what items should be included, the researcher decided to find out, by questionnaire, what stunts were being taught to sixth grade boys and girls in Davenport schools by the elementary physical education instructors. The questionnaire in

Appendix A was sent to the sixteen elementary physical education instructors in Davenport. Included in the first part of the questionnaire were the ten tumbling categories with a list of tumbling items under each category. The cooperating instructors were asked to put a mark next to the tumbling items they did not present during their tumbling unit. This was done to find the range of stunts each physical education instructor presented during his or her tumbling units. On the second part of the questionnaire there was a list of the ten basic tumbling categories. The instructors were asked to indicate the per cent of emphasis he or she placed on each of the ten tumbling categories during the sixth grade tumbling unit. They were asked to refer to the item list to find out which items comprised each category. The percentages of the ten categories were to total one hundred per cent. This was done to obtain information on how many items from each category should be included on the score card.

Ten instructors returned their questionnaires and indicated they were interested in taking part in the study. In order to develop a score card which contains a wide range of stunts for children of differing abilities, the researcher selected the instructors. This was done by

checking the stunt list on the first part of the questionnaire. The instructors who presented to their students a wide range of tumbling items during their tumbling unit were selected. This meant that five instructors, including the researcher, were selected to take part in the study.

The construction of a tumbling score card was developed from information obtained from the questionnaires of the five participating instructors. The researcher first wanted to determine how many items from each category belonged on the score card. This information was based on the per cent of emphasis given by each instructor's questionnaire. The number of stunts from each category was found by taking the participating instructors per cent of emphasis and selecting that per cent of stunts from the forty-eight stunts on the card. The number of stunts on the card was determined through reflective thinking by the researcher. The number of stunts for each category was selected according to the per cent of emphasis spent on that category by the participating instructors. Table I shows the number of items selected from each category. The schools' agreement on the per cent of emphasis was found by using Kendall's coefficient of concordance,  $W$ .

TABLE I

## ITEM EMPHASIS ON SCORE CARD

Schools' Ranking	Category	% of emphasis	Number of items on card
1	Springs	18	8
2	Couple stunts	12	6
2	Headstands	12	6
4	Kips	11	5
4	Cartwheels	11	5
6	Forward Rolls	8	4
6	Backward Rolls	8	4
6	Hand and Forearm	8	4
9	Walkovers	6	3
9	Back Handsprings	6	3

48 total items on score card

The size of the coefficient of concordance was found to be .47 showing the schools' agreement to be significant at the one per cent level. (Table II)

The researcher then selected the items for the score card. Items had a possibility of being selected for the score card if they were taught by at least four of the five participating instructors; otherwise, the item was eliminated. Items were selected as follows: Items which will give success to children of all types of skill, items which will challenge the highly skilled child, items which help in the development of agility, flexibility, strength, balance, and other physical needs of the child, and items of varying difficulty in each category. The forty-eight items were printed on five by seven inch oak tag cards by the researcher.

A testing administration guide for the items and a list of procedures, which are located in Appendix B, were prepared to accompany the score cards to the cooperating instructors.

The testing administration guide was developed so that all of the tumbling items would be tested in the same manner. Besides giving information on how some stunts

TABLE II

## KENDALL'S COEFFICIENT OF CONCORDANCE, W

Category	Schools' Rank of Emphasis					Sum of Ranks	D	D <sup>2</sup>
	1	2	3	4	5			
Back Handspring	5.0	9.0	5.5	9.5	8.0	37.0	9.5	90.2
Walkovers	9.0	9.0	5.5	9.5	8.0	41.0	13.5	182.2
Forward Springs	1.0	1.5	1.0	1.0	1.0	5.5	22.0	484.0
Cartwheels	5.0	4.0	5.5	3.0	8.0	25.5	2.0	4.0
Headstands	2.0	3.0	5.5	3.0	5.0	18.5	9.0	81.0
Couple Stunts	5.0	5.5	5.5	5.0	3.0	24.0	3.5	12.2
Hand and Forearm	5.0	5.5	10.0	6.0	8.0	34.5	7.0	49.0
Kips	5.0	1.5	5.5	3.0	8.0	23.0	4.5	20.2
Backward Rolls	9.0	7.0	5.5	7.5	3.0	32.0	4.5	20.2
Forward Rolls	9.0	9.0	5.5	7.5	3.0	34.0	6.5	42.2

W = .47

Sum R=275.0    Sum D<sup>2</sup>  
 Mean = 27.5    985.50

should be tested, the guide also gave a brief description of how to execute some of the items. This information was assembled to help the instructors who had not taught some of the stunts before.

The procedure list included material on presentation of items, on the marking of the score cards, on the length of the testing time, and on which cards were to be returned to the researcher.

In the procedures list the instructors were asked to make sure they presented all of the items on the score card and to test the items according to the testing administration guide. There was a score card for each child. When an item was completed successfully, a check mark was placed next to the item tested. The subjects were allowed to test an item as many times as they wanted to. The testing period lasted for five weeks. After the allotted testing time, the instructors were asked to send back the score cards of boys and girls in the sixth grade who were not twelve years or older before September of the school year in which the score card was constructed. All of this information was contained in the list of procedures which was sent to each participating instructor.

## CHAPTER IV

### ANALYSIS AND INTERPRETATION OF DATA

Data from five hundred and fifteen sixth grade boys and girls were used for this study.

For a skill test to be useful, it should distinguish between those who possess skill and those who do not. The ability of the test to distinguish between the students of varying abilities depends on the discriminating power of each item. To determine the validity of the score card, the index of discrimination of each item was determined with the aid of Flanagan's Index of Discrimination.<sup>8</sup>

Table III shows the per cent of subjects mastering each item in the upper twenty-seven per cent, the per cent of subjects mastering the item in the lower twenty-seven per cent, and the discrimination correlation coefficient for each item. As can be observed, every item met the minimum requirement of .20.

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<sup>8</sup>M. Scott, and E. French, Measurement and Evaluation in Physical Education, (Dubuque, Iowa: Wm. Brown Company, 1959), p. 131.

TABLE III

ITEM DISCRIMINATION USING FLANAGAN'S  
INDEX OF DISCRIMINATION

ITEM	% UPPER	% LOWER	COEFFICIENT
Back Straddle Roll	91	0	.88
Headspring	71	0	.82
Kip	67	1	.80
Roundoff Cartwheel	66	1	.79
Handspring	66	0	.79
Headstand	96	21	.77
Headstand Clap Hands	78	3	.76
Cartwheel	94	17	.76
One Hand Cartwheel	51	1	.73
Hands on Thigh Kip	49	0	.72
One Foot-No Hands	90	19	.71
Forearm Headstand	68	4	.71
Front Thigh Stand	100	54	.71
Continuous Headsprings	46	0	.71
Blast Off	91	29	.71
Forward Roll, Backward, Forward	100	57	.70
Backbend	77	7	.70
Back Extension Chest Roll	41	0	.69
Eskimo Roll	96	36	.69
Arabian Cartwheel	39	0	.68
Chest Balance	93	30	.68
Rolling Kip	67	1	.68
Backward Roll	100	63	.67
Handstand	37	0	.67

TABLE III (continued)

ITEM	% UPPER	% LOWER	COEFFICIENT
Diving Cartwheel	60	4	.67
Continuous Handspring	38	0	.67
Backward Roll into Headstand	35	0	.66
Rear Thigh Stand	98	43	.65
Knee Shoulder Stand	61	6	.64
Continuous Forward Rolls	100	69	.63
Arms Folded Kip	30	0	.62
Into Momentary Handstand	25	0	.59
Tip Up	88	31	.59
Full Turn Headstand	25	1	.58
Forearm Stand	24	0	.55
Front Walkover	21	0	.54
One Hand Handspring	21	0	.54
Tinsica	18	0	.51
Tripod	100	82	.51
Back Walkover	17	0	.51
Handwalk	16	0	.49
Layout Headspring	12	0	.43
Layout Kip	11	0	.42
Layout Handspring	11	0	.42
Forward Roll	100	96	.38
Back Handspring	7	0	.33
Round Off Back Handspring	5	0	.27
Continuous Back Handspring	4	0	.23

The development of a degree of difficulty rating for each stunt was the main purpose of this study. The researcher wished to indicate the degree of difficulty of each stunt by giving each stunt a point value which was directly related to the difficulty of the stunt. To do this the percentage of subjects who passed each stunt was obtained. The percentages ran from ninety-eight per cent to one per cent. By reflective thinking it was decided to use a point scale from one to eleven. A score of six was assigned to each stunt which had been passed by fifty per cent of the subjects. For each stunt passed by forty per cent or sixty per cent of the subjects a score of one more and one less than six was assigned, and similarly for every ten per cent interval above and below six. (Table IV)

After weighing each item, it was found that twenty-two out of the forty-eight items on the card were given a weighted value of ten points or more. This would indicate that in order to have a better balanced tumbling score card a number of easier items should be added.

## CHAPTER V

### CONCLUSIONS

It was the intent of this study to develop a degree of difficulty tumbling score card. This score card was constructed and each item on the score card was validated. A point value was given to each item in accordance with its difficulty.

It was a secondary objective of the study to give elementary physical education instructors a better idea of the progression of tumbling skills at the elementary level. The progression for teaching of stunts should be based on the degrees of difficulty of each stunt and can be determined on the basis of the point values assigned.

In summarizing the data, it is concluded by the researcher that a score card has been developed that will help the instructor in evaluation of his tumbling unit and will assist him in teaching the stunts according to their progression.

#### Recommendations

1. A study be conducted using the same score card with a different grade level.
2. A study be made to develop a separate score card for boys and girls.

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APPENDIX

CATEGORY	PER CENT OF EMPHASIS
FORWARD ROLLS	_____
BACKWARD ROLLS	_____
KIPS	_____
HAND AND FOREARM BALANGING	_____
COUPLE STUNTS	_____
HEADSTAND	_____
CARTWHEELS	_____
SPRINGS	_____
WALKOVERS	_____
BACK HANDSPRINGS	_____
TOTAL	_____

3. Please send this questionnaire back to Jack Faves at Johnson School as soon as possible. I need a sample of 500 children and I would appreciate your assistance.
4. Please indicate number of sixth graders in your school