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A Comparison of Intrinsic and Extrensic Motivation Used to Improve Free Throw Shooting Accuracy of High School Boys

Virgil D. Breding

A COMPARISON OF INTRINSIC AND EXTRINSIC MOTIVATION USED TO IMPROVE FREE THROW SHOOTING ACCURACY OF HIGH SCHOOL BOYS

by

Virgil D. Breding

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

W. C. Koenig
Chairman

John L. Quaday

John L. Rouke

William Johnson
Dean of the Graduate School

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I would like to dedicate the paper to my family, wife Marlene, and children Don, Kandis, and Kimberly.

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ABSTRACT

The participating high schools in this study were those at Killdeer and Halliday in North Dakota. The Killdeer and Halliday "A" and "B" basketball squads were used for the study. The Groups on each team were paired, on the basis of a matched pre-test, to within approximately one percentage point of each other.

The purpose of this study was to determine whether intrinsic or extrinsic motivation in practice has an effect as to the improvement of the percentage of free-throws made after an experimental period and, in addition, under game conditions.

The intrinsically motivated Group I practiced free throw shooting for self-improvement. Extrinsic Group II shot free-throws in competition for awards one night a week on a percentage basis of free throws made out of 25 attempts. Extrinsic Group III shot free-throws in competition for awards three nights a week on a percentage basis of free-throws made out of 75 attempts. Extrinsically motivated Groups II and III were compared, on a percentage basis, to determine a winner at the end of the basketball season.

Based on comparisons of the results from pre-test to post-test, all groups indicated a significant gain at the .05 level. All groups made a similar improvement and the between group comparisons indicated no significant differences

at the .05 level. Extrinsic Group III revealed a considerably higher percentage of successful attempts over other groups under game conditions.

CHAPTER I

INTRODUCTION

Statement of the Problem

In the game of basketball the ability to successfully complete a high percentage of free throws attempted is undoubtedly very important. The purpose of this study was to determine whether either intrinsic or extrinsic motivation in practice has an effect on the improvement of the percentage of free throws made after an experimental period and, in addition, during game conditions.

Scope and Limitations

The study was limited to the boys participating on the A and B basketball squads of the Killdeer school system, and to the A and B squads of Halliday High School. The sample, or number of boys used in this particular study, was quite small. The study was limited to the basketball season of 1966-67.

No restrictions were placed on the methods of shooting free throws.

Purpose of the Study

The purpose of the study was to evaluate different methods of improving free throw accuracy during an experimental

period .

Definitions of Terms

Awards--The awards were represented by material objects. In this study, medals were used as the incentive or award given to the winners.

Motivation--Motivation is the reason or incentive provided to help in the learning process.

Extrinsic Motivation--Extrinsic motivation was the use of medal awards to motivate players to improve.

Intrinsic Motivation--Intrinsic motivation was construed as the self desire to improve through individual satisfaction only.

Related Literature

Basketball

In 1949, an article was written by Huron J. Smith and Morty Morris[1] which stated that free throw shooting was a tedious, monotonous routine, especially if a player had to stand and shoot fifty free-throws in a row. The authors felt that this was humdrum activity without even the blessing of practicality. In order to improve on this phase of the game, they initiated a drill to simulate free throw shooting practice under game conditions. They also used charts listing the number of times a player shot in order to attain his daily quota of

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[1]Huron J. Smith and Morty Morris, "Foul Shooting," Scholastic Coach. Vol. 19 (February, 1949), p. 32.

twenty successful foul throw attempts. In addition to this, they listed boys who made either 15, 20 or 25 in a row. Statistics kept of individual shooting, as well as team shooting, were posted on the bulletin board. All this stressed the value of foul shooting and helped to stimulate interest. They also had a free-throw shooting contest every year, open to the entire school, with awards going to the winners and runners-up.

In 1950, Leon Lande[2] rated the different styles of free throwing and found that, of the 139 coaches surveyed, 69 per cent used the two-hand underhand method, 24 per cent used the one-hand push shot and 7 per cent used the two-hand overhead shot. No information was given as to the outcome of the shooting percentages of the different styles, under game conditions.

In 1951, Leon Burgoyne[3] stressed the problem of the time element consumed in the shooting of free throws. This was complicated by other teams practicing at the same time. He felt the answer lay in incentivized shooting. These methods were similar to those of Smith and Morris previously mentioned. Along with these incentivized drills, the players attempted from 15 to 20 free throws to develop rhythm in shooting. This was usually done during the first two weeks

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[2]Leon Lande, "A Study of the Trends of Basketball Offenses and Defenses used in North Dakota High Schools," (Unpublished Master's Thesis, Department of Physical Education, University of North Dakota. August, 1950), pp. 62-63.

[3]Leon Burgoyne, "Incentivized Foul Shooting," Scholastic Coach. Vol. 21 (October, 1951), pp. 18-48.

of practice. Burgoyne also stressed the style of shot to be used by his players. The two-hand underhand shot was taught first, the two-hand push shot became the second choice and the one-hand shot was used as a last resort. It was also felt that proficiency in the shooting of free throws gave a team more than extra points in the boxscore. The team also received a boost in morale and confidence in its scoring power.

In 1952, Bob Chambers[4] wrote an article in which the practice of shooting free throws was applied under gamelike conditions which he felt cured staleness in the latter part of the season.

In 1959, a ladder tournament competitive drill was introduced by George E. Hill.[5] This incentive drill had the names of players listed on a board on placecards. Players were allowed to challenge only the two players above them on the board. The best percentages of shots made determined the winners. The manager rearranged the names and recorded the scores.

In 1959, Louis A. Basile's[6] Two-Must System illustrated another drill in free throw shooting. This system consisted of having to successfully complete two free throws in a row at each of four different baskets.

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[4]Bob Chambers, "Free Throw Shooting Drill Under Game Condition," Athletic Journal. XXXIII (October, 1952), pp. 25-34.

[5]George E. Hill, "A Ladder Tournament for Free Throw Accuracy," Athletic Journal. XL (September, 1959), p. 62.

[6]Louis A. Basile, "Two-Must System," Athletic Journal. XL (October, 1959), pp. 30-48.

In 1960, William L. Wall[7] listed some supplements or variations of four basic practice drills. In this pressure, or truth and consequence system, a player was required to make the free throw or run a predetermined number of laps. In one of these drills, the player assumed a one-on-one situation, where, if the first free throw were missed, the player ran five laps and, if the second one were missed, the player ran three laps. If none were missed, the player returned to the end of the line. The second drill was called follow the leader. If the first man in each group made the free throw, the second man was also required to make the free throw. However, if the first man missed the shot, the player ran either five or ten laps, depending upon how the second man did on the foul shot. Third was a substitution drill whereby, during scrimmage, if a free throw were missed, the player was automatically replaced. Fourth was the close-up-shop drill, whereby a group of either five or ten boys was required to make from 10-16 consecutive free throws. If one were missed, the process was restarted.

In 1960, Paul M. Maaske[8] studied the effect of the practice of shooting at small baskets on the accuracy of free throw shooting. The accuracy for the small basket group was significantly greater (P=.05) than the improvement in shooting accuracy for the official basket group.

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[7]William L. Wall, "Use Competition for Free Throw Practice," Athletic Journal. Vol. XLI (November, 1960), p. 60.

[8]Paul M. Maaske, "The Effect of the Practice of Shooting at Small Basket on the Accuracy of Shooting a Basketball." (Unpublished Master's thesis, Department of Physical Education, State University of Iowa, August, 1960), pp. 4-23.

In 1962, LaVern Jessen[9] conducted a study on competitive free throw shooting and concluded there was little significant difference between competitive and non-competitive practice. The competitive group used a ladder tournament while the non-competitive group practiced free throws without any element of competition involved.

In 1963, Veryl L. Sell's[10] study of the use of smaller rims, showed that the small basket group converted 49.6 per cent of the free throws attempted while the official-basket group made 46.6 per cent of the free throws tried.

Larry Selk[11] conducted further studies along these same lines in 1966. Several conclusions seemed warranted on the basis of the data that Selk collected. Practice in attempting free throws on a fifteen inch rim did not significantly increase the free-throw shooting accuracy of high school varsity basketball players in game competition, but indications were that, in five schools, a mean improvement of 7.4 per cent was shown by the group that worked with a fifteen inch rim. This did have meaning and indicated that small rim shooting could be worthwhile.

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[9]LaVern Jessen, "The Effect of Competitive and Non-Competitive Free Throw Shooting Practice on Free Throw Shooting Accuracy." (Unpublished Master's thesis, Department of Physical Education, University of North Dakota, August, 1962), pp. 13-16.

[10]Veryl L. Sell, "Use of Fifteen-inch Goal in Development of Shooting Accuracy in Basketball (High School)." (Unpublished Master's thesis, Department of Physical Education, State University of Iowa, August, 1963), pp. 4-23.

[11]Larry Selk, "A Comparison of Different Methods of Free Throw Practice Among Selected High School Basketball Players in North Dakota and Minnesota with Respect to Accuracy in Games." (Unpublished Master's thesis, Department of Physical Education, University of North Dakota, August, 1966), pp. 26-27.

Intrinsic and Extrinsic Motivation

Coaches who are responsible for the training or instruction of boys have to make decisions about the motivation used. The coach has the responsibility of selecting rewards or punishment, and success may depend upon the skill used to encourage the type of learning desired.[12]

Learning and motivation are indivisible. Any arrangements to help the learning process must provide motivation. In this study the approach to the problem of motivating the learner was from two standpoints: that of an individual controlling the behavior of another, and that of the learner himself setting his own goals.[13]

In choosing goals to set before the player, it might be possible to employ those intrinsically related to the task rather than those extrinsically related. Intrinsic motivation is self-desire to improve, such as, a boy shooting a basketball and finding satisfaction in making baskets. Extrinsic motivation employs materially or artificially established goals, such as the father who promises his son a car if he goes out for basketball. The car is an incentive extrinsically related to going out for basketball.[14]

The intrinsic motivations are very evident in the everyday experiences of coaches. Individuals practicing a particular

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[12]Ernest R. Hilgard, Introduction to Psychology. (New York: Harcourt, Brace and Company, 1957), pp. 268-270.

[13]Ibid.

[14]Ibid.

sport can be found on many of the play grounds of America. The learning and the final results have intrinsic motivation. A player going out for basketball may not find enough to hold himself to the task so that he must be controlled extrinsically by rewards or even threat of punishment.[15]

It is known that extrinsic motivation or use of rewards is very effective in learning. It may have some objectionable by-products, two of which are worth noting. First, extrinsic motivation could generate in a player an attitude of "What do I get out of this?" That is, the activity becomes worth while only when a reward is given. Second, too often, awards are competitive, so that, while a few players may be stimulated by the rewards, many are doomed to frustration. Is the gain of the victor worth the price of disappointment to the loser?[16]

Other Factors--Repetition in Learning

Many times the phrase is heard, "Practice makes perfect." It is used to justify continued repetition of a given act, such as practicing free throws, with the thought in mind that repetition in itself is useful.[17]

Through continued studies, Thorndike discovered that mere repetition of a situation does not produce learning. The

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[15]Ibid.

[16]Ibid.

[17]Howard L. Kingsley, Ralph Garry, The Nature and Conditions of Learning. (Englewood Cliffs: Prentice Hall, Inc., 1957), pp. 239-246.

results of such experiments led to emphasis on repetition and drill related to distribution of practice, knowledge of results, overlearning, whole learning versus part learning, incentives and their relationships to all learning. Repetition can help in doing a thing right and can help to eliminate doing things wrong, but without interest, attention, or purpose on the part of the learner, it is doubtful that much is accomplished.[18]

Usually it appears that the shorter the practice period, the more effective is the learning; but this period cannot be too short. Studies in eye-hand coordination have shown that the rest period between performances does have an effect as to the outcome of the results. A short, but not too short, rest period is the best approach to learning.[19]

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[18] Ibid.

[19] Ibid.

CHAPTER II

METHODOLOGY

Method of Determining Groups

The teams were divided into three groups. Intrinsically motivated players were placed in group I. There were two groups motivated extrinsically. One was called Group II and the other Group III.

The placement of the player in one of these three groups was determined by the percentage of free throws made in practice sessions for a period of two weeks. The individual percentages were ranked from highest to lowest. The highest individual percentage was placed in Group I, second highest placed in Group II and the third highest placed in Group III, fourth in Group III, fifth in Group II and sixth in Group I. This alternating procedure was followed until all subjects were placed. Adjustments were made to equate all groups to approximately the same mean percentage. If groups were uneven, the odd players were placed in Group I.

Practice Procedure for Group I

The members attempted twenty-five free-throws, five at a time, on all practice nights. They were not in competition for an award.

Practice Procedure for Group II

The players in this group were in competition with members of Group III for an award one night a week on a percentage basis of free throws made out of 25 attempts. They followed the same procedure in free-throw practice as did Group I.

Practice Procedure for Group III

The players of this group were in competition with Group II for an award three nights a week on a percentage basis of free throws made out of 75 attempts. They followed the same procedure in shooting free-throws as did Group I.

Practice Procedure Pertaining to All Three Groups

All players attempted twenty-five free-throws five at a time during the practice. All three groups held their free-throw shooting drill during the last half of practice. Only one player was allowed to shoot at a basket at a time. The number of free-throws made out of twenty-five attempts was recorded daily on a chart.

Procedure Pertaining to Instructions Given Coaches

All coaches were given instructions containing the information listed in the practice procedures of this chapter.

Procedure for Pooling the Data

All individual charts were compiled and placed on a master sheet containing information for each group and each team.

Procedure for Handling the Data

1. Within groups comparisons were made on the basis of pre-test and post-test scores.
2. Between group comparisons were made on the basis of post-test scores.
3. A between group comparison of intrinsic motivation (Group I results) to extrinsic motivation (results of Groups II and III) applied to game conditions was shown by a bar graph.
4. The null hypothesis[20] was used to make comparisons.

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[20]Allen L. Edwards, Statistical Methods for the Behavioral Sciences, (New York: Rinehard & Company, Inc., 1954), p. 255.

CHAPTER III

ANALYSIS OF THE DATA

The purpose of this study was to compare the effect of intrinsic and extrinsic motivation on improving the accuracy of free throw shooting during an experimental period of 15 weeks. The bases for comparisons were the results from:

1. Pre-test to post-test scores with-in groups.
2. Post-test scores between groups.
3. The actual game free throw percentages between groups.

RESULTS OF COMPARISONS

With-in Group Comparison of Intrinsic Group I

The Intrinsic Group had a mean free throw (shooting) percentage of 61.90 on the pre-test and a mean score of 68.49 on the post-test which measured the amount of improvement made during the experimental period. This represented a mean difference of 6.59 percentage points between the pre-test and the post-test. The estimate of the sampling error of this mean difference was 2.38. With eleven degrees of freedom, the "t" value of 2.67 was an indication of significance at the .05 level of confidence, and the null hypothesis was therefore rejected.

With-in Group Comparison of Extrinsic Group II

Extrinsic Group II had a mean shooting percentage of 61.70 on the pre-test and a mean of 68.75 on the post-test, which measured the amount of improvement made during the experimental period. This represented a mean difference of 7.05 percentage points between the pre-test and the post-test. The estimate of the sampling error of this mean difference was 2.70. With eleven degrees of freedom, the "t" value of 2.37 was an indication of significance at the .05 level of confidence, and the null hypothesis was therefore rejected.

With-in Group Comparison of Extrinsic Group III

Extrinsic Group III had a mean shooting percentage of 62.43 on the pre-test and a mean of 70.63 on the post-test, which measured the amount of improvement made during the experimental period. This represented a mean difference of 8.20 percentage points between the pre-test and the post-test. The estimate of the sampling error of this mean difference was 1.39. With eleven degrees of freedom, the "t" value of 6.498 was an indication of significance at the .05 level of confidence, and the null hypothesis was therefore rejected.

TABLE I

PRE-POST TEST RESULTS

Groups	Pre-test Per Cent	Post-test Per Cent	Mean Diff. Increase	"t" Ratio
Intrinsic I	61.90	68.49	6.59	2.67
Extrinsic II	61.70	68.75	7.05	2.37
Extrinsic III	62.43	70.63	8.20	6.49

Between Group Comparison of Intrinsic Group I and Extrinsic Group II on Post-Test

The mean difference between the post-test results of Intrinsic Group I and Extrinsic Group II was -.26. The estimate of the sampling error for the distribution of the difference between the mean differences was 3.59. With twenty-two degrees of freedom, the "t" value of -.016 indicated no significant difference between the groups and therefore, the null hypothesis was retained.

Between Group Comparison of Intrinsic Group I and Extrinsic Group III on Post-Test

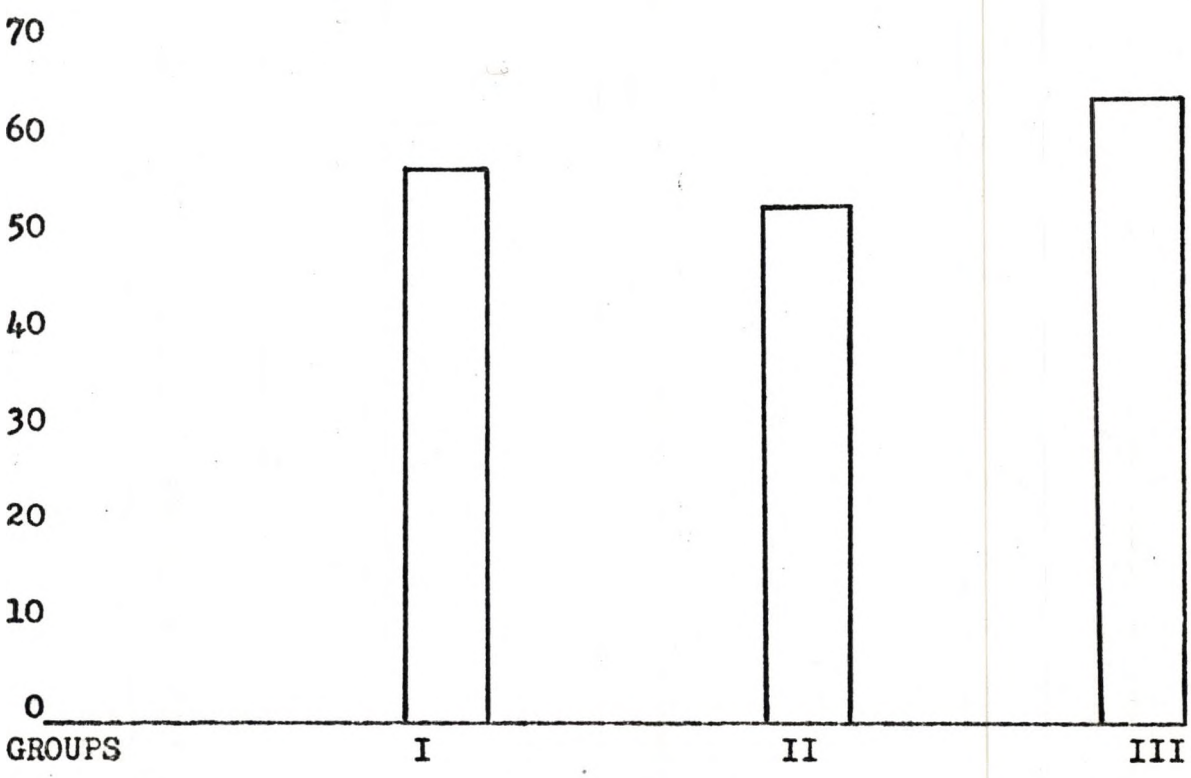
The mean difference between the post-test results of Intrinsic Group I and Extrinsic Group III was 1.88. The estimate of the sampling error for the distribution of the difference between the mean differences was 2.56. With twenty-two degrees of freedom, the "t" value of -1.05 indicated no significant difference between the groups and therefore, the null hypothesis was retained.

Comparison of Intrinsic Group I and Extrinsic Groups II and III on Percentage Basis Under Game Conditions

On the basis of percentages established under game conditions, Intrinsic Group I had a shooting percentage of 57.6 which was 3.3 per cent higher than Extrinsic Group II. In comparing Intrinsic Group I's 57.6 percentage with Extrinsic Group III's percentage, the graph below shows Intrinsic Group I had a lower percentage by 6.9 points than did Extrinsic Group III. The bar graph illustrated in Graph I points out the preceding information.

GRAPH I

PERCENTAGE COMPARISONS OF FREE THROWS MADE BY GROUPS UNDER GAME CONDITIONS



Intrinsic Group	I percentage	57.6
Extrinsic Group	II percentage	54.3
Extrinsic Group	III percentage	64.5

CHAPTER IV

DISCUSSION

One of the major concerns in today's basketball game is the improvement of free-throw shooting accuracy under game conditions. Most coaches realize that their boys do shoot a good percentage in practice, but the players seldom approach this percentage when shooting free-throws under game conditions.

Coaches have employed many different methods to try to improve this situation. Described in Chapter I of this study were some of the methods used to improve free-throw shooting.

In developing a way to improve free-throw accuracy, certain factors should be considered: first, whether or not an incentive will be used; second, can the learner improve by himself; third, a combination of one and two; fourth, is repetition an important part of practice. These four points were used to try to develop better free-throw shooting under game conditions.

The results of with-in group comparisons showed that all groups improved, but a slightly higher percentage of improvement was made by Extrinsic Group III than by either of the other two groups. All "t" values indicated significant differences at the .05 level.

The comparisons between groups showed that there were no significant differences in the amount of improvement made by any of the groups.

Under game conditions, Group III demonstrated a higher shooting percentage than did the other two groups. The percentage of shots made by Group III under game conditions was from 7 to 10 per cent greater than those of Groups I and II.

When awards were handed out to the four teams, Extrinsic Group II won three of the four awards given to the individuals in the groups. It seemed that Extrinsic Group II did better in practice on those particular days when they were in competition.

The pre-test to post-test comparisons of the Groups revealed that there were marked differences in what the players accomplished throughout the experimental period. (1) Intrinsic Group I post-test shows that two players lowered their percentage scores considerably. Four individuals made substantial gains, ranging from 10.5 per cent to 21.4 per cent. (2) Extrinsic Group II's post-test showed that five members decreased in percentage of attempts made. The decreases ranged from .06 per cent to 6.4 per cent. To compensate for the decrease of five players, five individuals made tremendous improvements of 12.7 per cent to 23.3 per cent. (3) In Extrinsic Group III only one individual decreased his percentage from pre-test to post-test. Here again, five individuals made impressive gains from 11.9 per cent to 14.9 per cent. (4) The individual

exhibiting the best accuracy in each group lowered his percentage from the pre-test to post-test.

All teams played similar schedules but when teams played games twice a week the Extrinsic Group III was under constant pressure to shoot well during the three practice sessions. This type of conditioning could have been the deciding factor contributing to the better performance of Group III under game conditions.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The participating high schools in this study were those at Killdeer and Halliday in North Dakota. The Killdeer and Halliday "A" and "B" squad basketball teams were used for the study. The experimental groups for this study were selected on a matched pair basis, using results of a pre-test to within approximately one percentage point of each other.

The experimental period extended from the first part of November, 1966, to the end of the State Basketball tournament in the middle of March, 1967.

Intrinsic Group I practiced for self-improvement. Extrinsic Group II shot free-throws in competition for awards one night a week on a percentage basis. Extrinsic Group III shot free-throws in competition for awards three nights a week on a percentage basis. Comparisons were made between the mean differences with-in each group on a pre-test to post-test basis. The null hypothesis was retained at the .05 level of significance.

Between group comparisons were made based on the post-test results for each group. The "t" test for correlated groups was used to determine if there were significant

differences.

A bar graph was used to illustrate the game percentages of all three groups.

Findings

1. The scores of all three groups produced "t" values that indicated significant gains at the .05 level during the experimental period.
2. The improvement made by all three groups was similar. A comparison between groups revealed no significant differences at the .05 level. Extrinsic Group III did have a slightly larger increase in mean free-throw percentage than did the other groups.
3. Extrinsic Group III demonstrated a higher shooting percentage over the other groups under game conditions. The free-throw percentage of Group III was 10.1 percentage points higher than Group II and 6.9 percentage points higher than Group I.

Conclusions

From the interpretation of the data collected for this study, the following conclusions seem warranted:

1. Competition for awards on a once a week basis did not appear sufficient to increase free-throw percentages significantly under game conditions.
2. Intrinsic motivation appeared somewhat better than having Extrinsic motivation once a week for improving

free-throw shooting under game motivation conditions.

3. Motivation of Intrinsic or Extrinsic nature did not show significant difference in the amount of gain made under practice conditions, but Extrinsic Group III demonstrated a higher free throw percentage under game conditions. Placing teams in constant competition for awards did appear to improve free-throw shooting under game conditions.

Recommendations

Since the study was limited to only two schools, Killdeer and Halliday, it is felt that a similar study should be tried on a much larger scale. There should be at least eight participating schools to make the study more conclusive.

It is recommended that coaches experiment with their teams in trying the use of awards for improvement of free-throw accuracy. The use of awards should be on a one or two week basis.

The investigator felt that continued work should be done on the subject of improving free-throw shooting.

APPENDIX A

FREE THROWS

TEAM
KILLDEER "A"

Month and Day													
Names													

TEAM SCORING SHEET

SPECIFIC TEST ITEM SCORES

INTRINSIC GROUP I PERCENTAGE
BASED ON PRE-TEST AND POST-TEST

Individuals	Pre-Test Percentage			Post-Test Percentage		
	Made	Attempts	Per Cent	Made	Attempts	Per Cent
1	196	275	71.2	109	150	72.6
2	177	225	78.6	88	125	70.4
3	182	275	66.3	111	150	74.0
4	150	275	54.5	101	150	67.4
5	151	275	54.9	104	150	69.4
6	170	275	61.8	100	150	66.7
7	149	225	66.2	88	125	70.4
8	68	100	68.0	64	100	64.0
9	150	275	54.5	65	100	65.0
10	284	525	54.0	89	150	59.4
11	293	450	65.1	128	175	73.2
12	228	475	48.0	104	150	69.4
Total	2198	3650	60.2	1151	1675	68.7

Mean Percentage of Intrinsic Group I Pre-test = 60.2

Mean Percentage of Intrinsic Group I Post-test = 68.7

SPECIFIC TEST ITEM SCORES

EXTRINSIC GROUP II PERCENTAGE
BASED ON PRE-TEST AND POST-TEST

Individuals	Pre-Test Percentage			Post-Test Percentage		
	Made	Attempts	Per Cent	Made	Attempts	Per Cent
1	211	275	76.7	113	150	75.4
2	177	250	70.8	112	150	74.7
3	123	175	70.2	51	75	68.0
4	145	275	52.7	50	75	66.7
5	174	250	69.6	69	100	69.0
6	147	275	53.4	68	100	68.0
7	186	275	67.6	62	100	62.0
8	151	250	60.4	86	125	68.8
9	163	275	59.2	66	125	52.8
10	280	450	62.2	131	175	74.9
11	175	375	46.7	102	175	58.3
12	255	500	51.0	130	175	74.3
Total	2187	3625	60.3	1040	1525	68.3

Mean Percentage of Extrinsic Group II Pre-test = 60.3

Mean Percentage of Extrinsic Group II Post-test = 68.3

SPECIFIC TEST ITEM SCORES

EXTRINSIC GROUP III PERCENTAGE BASED ON PRE-TEST AND POST-TEST

Individuals	Pre-Test Percentage			Post-Test Percentage		
	Made	Attempts	Per Cent	Made	Attempts	Per Cent
1	201	275	73.0	121	150	80.7
2	197	250	78.8	97	125	77.6
3	180	275	65.4	108	150	72.0
4	185	250	74.0	79	100	79.0
5	116	250	46.4	61	100	61.0
6	128	275	46.5	92	150	61.4
7	238	325	73.2	83	100	83.0
8	174	275	63.2	69	100	69.0
9	87	175	49.7	77	125	61.6
10	169	225	75.1	143	175	81.7
11	237	500	47.4	105	175	60.0
12	221	475	46.5	106	175	60.6
Total	2133	3550	60.2	1151	1625	70.9

Mean Percentage of Extrinsic Group III Pre-test = 60.2

Mean Percentage of Extrinsic Group III Post-test = 70.9

SPECIFIC PRACTICE AND COMPETITION SCORES

PRACTICE AND COMPETITION PERCENTAGES OF ALL GROUPS

Individuals	Intrinsic I Practice			Extrinsic II Competition			Extrinsic III Competition		
	Made	Attp	Per Cent	Made	Attp	Per Cent	Made	Attp	Per Cent
1	817	1100	74.2	231	300	77.0	645	825	78.1
2	748	1000	74.8	230	300	76.6	625	825	75.6
3	781	1075	72.6	196	275	71.2	571	850	67.7
4	408	625	65.3	118	200	59.0	366	550	66.5
5	516	750	68.8	185	250	74.0	71	125	63.8
6	446	650	68.5	154	225	68.4	303	550	55.0
7	686	1000	68.6	187	300	62.3	651	825	78.9
8	589	950	62.0	203	300	67.6	535	725	73.7
9	547	925	59.1	179	300	59.6	230	350	65.7
10	326	550	59.2	120	175	68.5	376	475	79.1
11	429	575	74.6	85	150	56.6	272	475	57.2
12	347	525	66.8	123	175	70.2	280	475	58.9
Total	6640	9735	68.2	2001	2950	67.8	4925	7050	69.8

Mean Percentage of Intrinsic Group I in Practice = 68.2

Mean Percentage of Extrinsic Group II in Competition = 67.8

Mean Percentage of Extrinsic Group III in Competition = 69.8

SPECIFIC GAME SCORES

GAME PERCENTAGE'S OF ALL GROUPS

Individuals	Intrinsic I			Extrinsic II			Extrinsic III		
	Made	Attp.	Per Cent	Made	Attp.	Per Cent	Made	Attp.	Per Cent
1	55	87	63.2	79	110	71.8	139	173	80.3
2	92	144	63.8	30	54	55.5	24	38	63.1
3	23	34	67.6	19	39	48.5	6	13	46.1
4	45	83	54.3	57	103	55.3	29	58	50.0
5	27	46	58.7	9	14	64.3	1	7	14.2
6	2	5	40.0	1	4	25.0	0	0	00.0
7	24	59	40.6	0	0	00.0	44	57	77.3
8	17	34	50.0	71	132	53.7	24	43	55.8
9	7	20	35.0	27	74	36.6	24	48	50.0
10	3	4	75.0	27	52	52.0	12	26	46.2
11	25	39	64.0	0	4	00.0	12	28	42.0
12	0	0	00.0	6	14	42.8	5	5	100.0
Total	320	555	57.6	326	600	54.3	320	496	64.5

Mean Percentage of Intrinsic Group I = 57.6

Mean Percentage of Extrinsic Group II = 54.3

Mean Percentage of Extrinsic Group III = 64.5

APPENDIX B

PRE-TEST AND POST-TEST PERCENTAGES OF INTRINSIC GROUP I

Individuals	Pre-Test	Post-Test	Sum of Diff.	Difference Squared
1	71.2	72.6	1.4	1.96
2	78.6	70.4	- 8.2	67.24
3	66.1	74.1	8.0	64.00
4	54.5	67.4	13.0	169.00
5	54.9	69.4	14.5	210.25
6	61.8	66.7	4.9	24.01
7	66.2	70.4	4.2	17.64
8	68.0	64.0	- 4.0	16.00
9	54.5	65.0	10.5	110.25
10	54.0	59.4	5.4	29.16
11	65.1	73.2	8.1	65.61
12	48.0	69.4	21.4	457.96
Total	742.9	821.9	+ 88.4 - 12.2 + 76.2	1233.08

Mean Score of Intrinsic Group I on Pre-Test = 61.90

Mean Score of Intrinsic Group I on Post-Test = 68.49

Mean Difference = 6.59

THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN MEANS DERIVED FROM CORRELATED SCORES FROM SMALL SAMPLES

Between = Pre-test and Post-test

Group = Intrinsic I

$N = 12$

$\varepsilon D = 76.2$

$\varepsilon D^2 = 1233.08$

$S_{\bar{D}}$ (estimate of Sampling of $\bar{D}$ =

$$\sqrt{\frac{\varepsilon D^2 - \frac{(\varepsilon D)^2}{N}}{N-1}} = \sqrt{\frac{1233.08 - \frac{5806.44}{12}}{11}} =$$

$$\frac{}{\sqrt{N}} \qquad \frac{}{\sqrt{12}}$$

$S_{\bar{D}} = 2.382$

$\bar{D} = \frac{D}{N} = 6.36$

"t" $= \frac{\bar{D}}{S_{\bar{D}}} = \frac{6.36}{2.382} = 2.67$

df = N-1 = 11

"t" at .05 = 2.20

Significant increase at .05 level.

PRE-TEST AND POST-TEST PERCENTAGES OF EXTRINSIC II

Individuals	Pre-Test	Post-Test	Sum of Diff.	Difference Squared
1	76.7	75.4	- 1.3	1.69
2	70.8	74.7	3.9	15.21
3	70.2	68.0	- 2.2	4.84
4	52.7	66.7	14.0	196.00
5	69.6	69.0	- .6	.36
6	53.4	68.0	14.6	213.16
7	67.6	62.0	- 5.6	31.36
8	60.4	68.8	8.4	70.56
9	59.2	52.8	- 6.4	40.96
10	62.2	74.9	12.7	161.29
11	46.7	58.3	13.6	184.96
12	51.0	74.3	23.3	542.89
Total	740.5	812.9	+91.8 -14.7 +77.1	1463.28

Mean Score of Extrinsic Group II on Pre-test = 61.70

Mean Score of Extrinsic Group II on Post-test = 68.75

Mean Difference = 7.05

THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN MEANS DERIVED FROM CORRELATED SCORES FROM SMALL SAMPLES

Between = Pre-test and Post-test

Group = Extrinsic Group II

$N = 12$

$\varepsilon^{D} = 77.1$

$\varepsilon^{D^2} = 1463.28$

$S_{\bar{D}}$ (estimate of Sampling of $\bar{D}$) =

$$\frac{\sqrt{\dfrac{\varepsilon^{D^2} - \dfrac{(\varepsilon^{D})^2}{N}}{N-1}}}{\sqrt{N}} = \frac{\sqrt{\dfrac{1463.28 - \dfrac{5944.41}{12}}{11}}}{\sqrt{12}} =$$

$S_{\bar{D}} = 2.70$

$\bar{D} = \dfrac{D}{N} = 6.425$

$$\text{"t"} = \frac{\bar{D}}{S_{\bar{D}}} = \frac{6.425}{2.70} = 2.379$$

$df = N-1 = 11$

"t" at .05 = 2.20

Significant increase at .05 level.

PRE-TEST AND POST-TEST PERCENTAGES OF EXTRINSIC III

Individuals	Pre-Test	Post-Test	Sum of Diff.	Difference Squared
1	73.0	80.7	7.7	59.29
2	78.8	77.6	- 1.2	1.44
3	65.4	72.0	6.6	43.56
4	74.0	79.0	5.0	25.00
5	46.4	61.0	14.6	213.16
6	46.5	61.4	14.9	222.01
7	73.2	83.0	9.8	96.04
8	63.2	69.0	5.8	33.64
9	49.7	61.6	11.9	141.61
10	75.1	81.7	6.6	43.56
11	47.4	60.0	12.6	158.76
12	46.5	60.6	14.1	198.81
Total	749.2	847.6	+109.6 - 1.2 +108.4	1236.88

Mean Score of Extrinsic Group III on Pre-test = 62.43

Mean Score of Extrinsic Group III on Post-test = 70.63

THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN MEANS DERIVED FROM CORRELATED SCORES FROM SMALL SAMPLES

Between = Pre-test and Post-test

Groups = Extrinsic Group III

$N = 12$

$\varepsilon D = 108.4$

$\varepsilon D^2 = 1236.88$

$S_{\bar{D}}$ (estimate of Sampling of $\bar{D}$) =

$$\frac{\sqrt{\frac{\varepsilon D^2 - \frac{(\varepsilon D)^2}{N}}{N-1}}}{\sqrt{N}} = \frac{\sqrt{\frac{1236.88 - \frac{11750.56}{11}}{11}}}{\sqrt{12}} =$$

$S_{\bar{D}} = 1.39$

$\bar{D} = \frac{D}{N} = 9.033$

"t" $= \frac{\bar{D}}{S_{\bar{D}}} = \frac{9.033}{1.39} = 6.498$

df = N-1 = 11

"t" at .05 = 2.20

Significant increase at .05 level.

APPENDIX C

THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN MEANS DERIVED FROM UNCORRELATED SCORES FROM SMALL SAMPLES

Intrinsic Group I $\overline{D}$ = 6.36 = Extrinsic Group II $\overline{D}$ = 6.42

Intrinsic Group I $S_{\overline{D}}$ = 2.38 = Extrinsic Group II $S_{\overline{D}}$ = 2.70

S_{D_M} (The estimate of the sampling error for the distribution of difference between the mean diff.) =

$$\sqrt{(S_{\overline{D}_1})^2 + (S_{\overline{D}_2})^2} = \sqrt{(2.38)^2 + (2.70)^2} =$$

$$S_{D_M} = 3.59$$

$$D_{\overline{D}} = \overline{D}_1 - \overline{D}_2 = 6.36 - 6.42 = -0.06$$

$$\text{"t"} = \frac{D_{\overline{D}}}{S_{D_M}} = \frac{-0.06}{3.59} = 0.016$$

$$df = (N_1 - 1) + (N_2 - 1) = 22$$

"t" = at .05 level = 2.07

Not significant at .05 level.

THE SIGNIFICANCE OF THE DIFFERENCE BETWEEN MEANS
DERIVED FROM UNCORRELATED SCORES FROM SMALL SAMPLES

Intrinsic Group I $\overline{D}$ = 6.36 = Extrinsic Group III $\overline{D}$ = 9.033

Intrinsic Group I $S_{\overline{D}}$ = 2.38 = Extrinsic Group III $S_{\overline{D}}$ = 1.39

$S_{D_M D}$ (The estimate of the sampling error for the distribution of difference between the mean differences) =

$$\sqrt{(S_{\overline{D}_1})^2 + (S_{\overline{D}_2})^2} = \sqrt{(2.38)^2 + (1.39)^2} =$$

$$S_{D_M D} = 2.56$$

$$\overline{D}_D = \overline{D}_1 - \overline{D}_2 = 6.36 - 9.033 = -2.67$$

$$\text{"t"} = \frac{\overline{D}_D}{S_{D_M D}} = \frac{-2.67}{2.56} = -1.05$$

$df = (N_1 - 1) + (N_2 - 1) = 22$

"t" = at .05 level = 2.07

Not significant at .05 level.

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