THE EFFECTS OF THE USE OF THE PORTABLE VIDEO TAPE RECORDER IN COACHING BATTING

by

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STATEMENT BY AUTHOR

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SIGNED: William Raymond Munroe

APPROVAL BY THESIS DIRECTOR

This thesis has been approved on the date shown below:

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5/8/72 Date
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ABSTRACT

This study was conducted to determine the effects of the use of the portable video tape recorder in conjunction with traditional coaching techniques in batting instruction of college junior varsity baseball players.

Seventeen members of the 1972 University of Arizona junior varsity baseball team were randomly divided into two groups. Both groups received traditional coaching methods; in addition, the experimental group received visual feedback through the use of the portable video tape recorder. During three days each week for five weeks the subjects in the experimental group were video taped during one time at bat. Each day they viewed their video tapes and received a critique of their performance based on an eleven point list of criteria. Video tapes were taken of both groups once per week and retained for analysis of overall improvement.

Both groups experienced significant improvement in batting performance, but the experimental group improved significantly over the control group for the five week period. In addition, the experimental group showed significant improvement between the first and third weeks and between the fourth and fifth weeks. The control group showed no significant weekly improvement.
CHAPTER 1

INTRODUCTION

One of the major electronic tools to evolve on the educational scene within recent years has been the video tape recorder. This instrument was first used for recording material to be used on television, but soon found a broad application in education as a teaching aid. The value of the video tape recorder (VTR) was particularly great in the fields of physical education and athletics where learning is expressed in physical performance. Through the capability of instant replay, the learner receives immediate knowledge of results in the form of direct, visual feedback.

As stated by MacPherson, Dees, and Grindle (1949) and Ammons (1956), feedback supplied immediately after practice is most useful to the learner. Plese (1967) in a study involving the use of the VTR in teaching selected gymnastic skills says about this medium:

It has the advantage of immediate reinforcement after every response, assurance of active participation, adaptability in individual capabilities and a means of focusing the attention of the student upon a small visual area (p. 4).

Research studies utilizing the video tape recorder in physical education and athletics over the past several years have been done in
activities such as bowling, badminton, gymnastics, trampoline, tumbling, basketball, fencing, tennis, and golf. The majority of these studies have been designed to determine the relative effectiveness of using the VTR contrasted to traditional methods of teaching including verbal instruction and demonstration. Most of these studies have indicated that use of the VTR is as effective as other instructional methods in skill learning.

The majority of learning studies involving the VTR have utilized subjects who were beginners in the particular skill involved or were relatively low skilled. Many studies have recommended that projects be undertaken with subjects at the middle or highly skilled levels to study the effectiveness of the VTR with advanced learners.

Some general use of the VTR has been made with skilled performers in the sport of baseball, particularly batting, but no scientific investigation has been reported in this area.

**Statement of the Problem**

The purpose of this study was to compare the learning effects of immediate viewing of performance through use of the portable VTR with traditional methods of coaching in correcting batting errors in college junior varsity baseball players.

Specifically, answers were sought to the following questions:

Is the viewing of performance on the VTR immediately following skill
execution beneficial to the learner? If so, at what point in the learning process are the greatest gains realized, or is the use of VTR generally beneficial throughout the learning period? If positive changes are achieved, will such changes be significantly greater than for learners exposed to traditional coaching methods without the immediate feedback supplied by the VTR?

**Limitations**

Every effort was made to control factors that may have had an influence on experimental results. However, some limiting factors were difficult to eliminate completely.

The length of the experimental period was five weeks, extending from the first practice session to the start of the official schedule of games. Extension of the study beyond this period was not feasible because of the heavy schedule of games.

The number of subjects was limited to ten in the experimental group and seven in the control group due to combinations of injury, illness, and ineligibility of some players.

Analysis of batting skill was made from one view of the subjects since only one camera was available for the study. Simultaneous, three view photography would likely provide a more detailed analysis of batting skill.
**Definitions**

Battery-operated, portable video tape recorder (PVTR): The equipment used in this study was carried easily by the operator. It included a self-contained power supply, and was capable of recording images and sound on magnetic tape to be replayed and viewed on a television monitor screen immediately after being taken.

Video tape: The video tape used in this study was polyester tape one half inch wide designed for recording images and sound in a PVTR. The types used were Sony V30H and Memorex Chroma 80, each with a 30 minute recording capability.

Traditional coaching methods: This phrase referred to methods commonly used by coaches in batting instruction. Such methods include verbal explanation, demonstration, and the use of verbal feedback concerning error identification and correction.
CHAPTER 2

REVIEW OF THE LITERATURE

The review of literature is presented in two main sections. The first concerns the use of the VTR in physical education and athletics and the second is devoted to research and literature related to baseball batting.

The Video Tape Recorder in Physical Education and Athletics

The first use of the medium of video tape in education was for the purpose of pre-recording television programs (Miner, 1959, p. 531). Expansion of the use of this device resulted in greater educational applications including classroom uses for speech, social studies, drama, and other subjects. The VTR later was found to be extremely useful in the areas of self-evaluation in teaching (Bumpass, 1970, p. 562) and in micro-teaching (Cooper and Siedman, 1969; Mueller, 1970).

The most frequent use of the VTR in physical education and athletics has been through the use of the immediate playback capabilities of this equipment. Stowers and Tettemer (1970) indicated that the number one use of slant track VTR's as reported by users was.
instant playback. This was true on four out of five categories of VTR's ranging from the large, broadcast adaptable models to the smallest, battery-powered portable units.

Edward James (1969) reported that coaches used the PVTR for three purposes. The first was evaluation after practice which was designed primarily by the coach to provide feedback on his own coaching techniques. A second purpose was skill improvement, related primarily to individuals or groups reviewing their performance after practice or the day following. Thirdly, VTR was used for instant analysis by both the coach and the player involved. James indicated that the prime use of VTR in physical education classes was that of immediate playback.

Elliott and Markham (1970) classified the use of PVTR's into seven categories: 1) immediate feedback of performance, followed by a second performance; 2) performance evaluation; 3) data recording as a teaching aid; 4) historical documentation of class activities; 5) research; 6) a teaching tool for visual aesthetics; and, 7) improvement of instruction.

Hixson (1971, pp. 61-62) listed fifteen uses of television in physical education and athletics. He indicated that use of the VTR in providing immediate augmented feedback was the most frequent in the profession.
More work has been done in the physical education classroom than with athletic teams in the evaluation of the VTR as a learning aid. An early study by Caine (1967) involving college men and women beginning bowlers, found no significant difference between a group exposed to video tape replay of their bowling approach and those taught in the traditional manner. He stated however, that some variables would have to be overcome before final judgment of the results could be made since bowling by the experimental group was done in the false environment of the gymnasium, rather than the bowling alley, during the video taping.

Other studies involving the use of the VTR with bowling skills were conducted by Robb and Teeple (1969), Hoff (1970), Kinnaman (1969), Ochs (1971), and Polvino (1971). Four of these studies contrasted groups that used the VTR with groups utilizing traditional teaching methods. They all concluded there was no significant difference in learning between the two groups.

Robb and Teeple (1969) studied the use of the VTR in student self-evaluation as well as evaluation by the instructor. Beginning bowling students rated their techniques before and after viewing video tapes of themselves in the bowling approach. The instructor rated the performances during execution and from the video tape replay. The authors concluded that the students did not alter their self-evaluations significantly after viewing the video tapes, but the instructor altered
the rating of two errors in the approach after viewing the video tapes. They stated that by viewing performance on video tape, instructors are likely to determine movement errors not observed during actual performance.

Other studies have been conducted in physical education activities such as tennis, tumbling, trampoline, golf, fencing, basketball, football, volleyball, badminton, gymnastics, swimming, and wrestling. Most of these studies have concluded that use of the VTR and teaching with traditional methods both result in learning improvement.

One of the few studies to involve subjects beyond the beginning level was conducted by Taylor (1972). He utilized three skill levels in an attempt to determine the effectiveness of using the VTR in the learning or improvement of the swimming whip kick. Each skill group was divided into sub-groups that were exposed to the following instructional aids: the VTR alone; the VTR and verbal feedback; verbal feedback only; and a control group that was given no aids.

Taylor found no significant differences between instructional aids among the highly skilled group. With subjects at the middle level, the group with the VTR and verbal feedback, and the group with verbal feedback only were statistically superior in their improvement compared to the control group. With subjects of low skill, the group with the VTR and verbal feedback was statistically superior to the group that received verbal feedback only and to the control group. The
group with low skill using VTR only showed no significant difference when compared with the group using the VTR and verbal feedback.

A study utilizing members of athletic teams as subjects was conducted by Wood (1970). He used two high school gymnastic teams of 20 members each. One team was the experimental group and one team the control group. Further, the low and high skill performers on each team were divided into groups. The experimental group used loop films of outstanding performers, student participation, and the VTR. The control group used loop films and student participation. Four routines involving the parallel bars, side horse, rings, and the horizontal bars were studied. Wood found that use of the VTR produced significantly superior performance on the horizontal bar for both skill levels, but only the low skill members using the VTR improved significantly on the parallel bar routine. None of the other comparisons produced significant differences.

Rockwell (1971) authored one of the few articles on the use of the VTR in the sport of baseball. Although he recommended playing back tapes immediately, he described an instructional program in which players were video taped but did not analyze their performance on the replay monitor until two to three days later. An instruction tape on various phases of baseball, including batting was prepared by Polk (1971), but again, little use was made of instant replay.
There have been many articles and books written on the skill of batting, but little research has been conducted in this area. The brief review that follows was selected to represent the current thought on what constitutes proper batting form and mechanics. Most of the articles in the past ten years have depended to a great degree upon motion picture film, photographs, and cinematographic analyses to show the components of the batting swing. Such analyses are similar to the VTR, but do not permit instant viewing.

Analysts and baseball experts agree there are essentially three phases of the batting swing. The preparatory phase includes the stance and grip, the force producing phase includes the stride and swing, and the final phase is the follow-through. Although both the preparatory phase and the follow-through are important to the batting swing, emphasis in this review will be placed on the force producing phase. This phase of batting is initiated with the backswing which occurs shortly before the stride.

Siedentop and Kaat (1971, pp. 35-36) indicated that the backswing accomplishes two objectives. First, it aids in relaxation and the avoidance of nervous tension. Second, it takes advantage of the stretch reflex to allow the muscle or muscle group to contract with more force. Williams (1971, p. 36) indicated that the backswing was
not detrimental unless the hands were dropped too low. In fact, he stated that cocking of the hips, which is part of the backswing, was one of the most important movements in developing batting power. Reiff (1971, p. 3) added that the backswing overcomes the bat inertia and increases the arc of the swing.

Another important aspect of the force producing phase of batting is head position and eye-movement. Research conducted by Slater-Hammel (1951) and Hubbard and Seng (1954) agreed that the ball was not followed by the eyes up to contact with the bat, and that pursuit eye movements rather than head movements track the ball. Head movements are accomplished before and after the swing of the bat, and the head is held steady during the swing.

Siedentop and Kaat (1971, p. 47), Reiff (1971, p. 3) and Williams (1971, p. 33) recommended a short stride since a stride that is too long would restrict hip rotation and reduce batting power. However, Race (1961) found no relationship between length of stride and batting or slugging average.

Most authors agree that the batting swing is started by rotation of the hips and this movement is one of the most important in the swing. Edwards (1966), Conard (1965) and Race (1961) stated that the weight was shifted to the front leg during the swing. Edwards (p. 143) characterized the movement as a weight shift into rather than onto the front leg. Conard concluded that highly skilled batters continue linear
movement toward the pitcher after contacting the ball while lower skilled batters move their body backward after contact.

The primary movements used in batting were summarized in the conclusions of Vana (1958). Modifications of these points were used as the criteria for this study and are presented in Chapter 3.

A study by Watkins (1963) was one of few that utilized cinematography in batting instruction. Twenty college varsity baseball players were paired according to their past performance, with the pairs randomly divided into experimental and control groups. Both groups were filmed during batting practice in the first, third, and fifth weeks of training. The experimental group viewed their most recent films uninterrupted once per week. The films were then shown again and critiqued with corrections given. Vana's conclusions were utilized as a 12 item list of batting criteria.

Watkins concluded that the reduction in the number of faults noted from the beginning to the end of the five week study period was statistically significant for the experimental group. In addition, the greatest error reduction occurred during the first three weeks of the study. Conversely, the control group's reduction in batting errors over the five week period of time was not statistically significant. When permitted to view their films at the conclusion of the study, this group stated they would have reduced their batting errors if they had been able to view their films after each practice session.
CHAPTER 3

RESEARCH PROCEDURES

The following procedures were adapted to investigate the use of the PVTR as an aid in the correction of batting errors among college junior varsity baseball players.

Subjects

The subjects for this study were nineteen freshmen and sophomore male students who were members of the University of Arizona junior varsity baseball team. The available subjects were randomly divided into two groups with ten in the experimental group and nine in the control group. Two subjects were dropped from the control group for reasons of illness and injury after the study began.

The control group received traditional coaching techniques and practice in batting while the experimental group received the same instruction and practice, but in addition had video tapes taken of their performance three times each week. The tapes were viewed and critiqued by the subjects immediately after they were taken.

Instructional Programs

All members of the junior varsity baseball team were given group instruction in batting fundamentals at the beginning of the study.
The instruction emphasized the criteria to be employed throughout the study. After initial instruction, the team members were assigned to their respective groups and were given the following instructional programs.

**Experimental Group Procedures**

The members of the experimental group were video taped during batting practice on the first day. They were then shown their video tapes on a television monitor located adjacent to the batting area, and a critique of their batting form was given by the investigator based on points emphasized in the criteria. In addition, while batting they were given normal coaching which included verbal instruction.

This procedure was followed for three days per week for five weeks. Experimental group subjects were encouraged to evaluate their own performances while viewing the tapes and receiving a critique of their performances. When appropriate, tapes were shown several times to the subjects and stop-action of the video tape was used in order to emphasize a particular error or the correction of a previous error.

Taping of the subjects averaged 1 to 1 1/2 minutes per subject and showing of the video tape ranged from 1 to 2 minutes per subject for an average total time of 20 to 30 minutes for the group per session. Each subject in the experimental group spent approximately
30 minutes watching his batting performance on tape during the duration of the study.

The video tapes taken of the experimental group during the first day of video taping in the first week and the last day of video taping in subsequent weeks were retained for future reference and application of the criteria for comparative purposes and analysis.

Control Group Procedures

During the course of the study the members of the control group received traditional coaching methods and instruction on batting. Verbal explanation, demonstration, correction, and encouragement were used to the fullest extent possible in endeavoring to correct batting errors.

On the first day of the first week and the last day of subsequent weeks, video tapes were taken of the control group subjects as was done with the experimental group subjects. The control group did not view their video tapes at this time, but tapes were retained for future reference and application of the criteria for comparative purposes and analysis.

Video Taping Procedures

On days that video taping was done, the batting order was drawn up according to test groups. In other words, all members of the experimental group took batting practice and then were followed by
members of the control group. The groups alternated batting first or second. Each group had 30 to 40 minutes of batting practice during which each subject had two batting trials. Experimental group subjects were taped during their first trial and viewed their video tapes prior to taking their second trial. The second trial of batting was not video taped.

Each subject was taped for a total of five swings. The investigator did all video taping and used the shoulder pack carrier for the PVTR. The camera was hand-held without use of a tripod. For a right-handed batter, video taping was done from a position 20 to 30 feet down the first base line and one to two feet in foul territory. A similar position was taken down the third base line for a left-handed batter. A position closer to the batter would have been distracting to the batter and dangerous to the PVTR operator. A more distant position would have exaggerated camera movements causing distortion of the picture, and the resultant product on the tape would have been unacceptable for proper viewing and analysis.

**Equipment**

The battery-operated PVTR used in this study was the Sony Videocorder Model AV-3400. The unit measured 11 inches wide, 6 and 3/16 inches high, 11 and 5/8 inches deep, and weighed 18 pounds, 12 ounces including the battery pack, tape, and reel. The
battery had a capability of providing continuous power for operation of the camera and PVTR for 45 minutes without recharging. The recording tape used was 1/2 inch video tape with a 30 minute recording capability. Special features of the system included stop-action and audio dubbing after recording of video. No audio dubbing was done in this study.

The camera was a Sony AVC-3400 with a zoom lens and an electronic viewfinder that showed the operator the picture as it would appear on the tape. The viewfinder could also be used as a monitor for playback, but was used for this purpose only by the operator to check tape quality. A built-in condenser microphone recorded sound automatically during taping, but this feature was not used in this study.

The monitor used for immediate replay was a Sony CVM 1920 with a 19 inch viewing screen. During playback of the tape through the monitor, the Sony AC Power Adapter, Model AC-3400, was used to provide power to the PVTR and to concurrently recharge the battery. One 50 foot extension cord with a four-outlet plug and one 25 foot extension cord were used for connecting the monitor and the AC Power Adapter to an external power source when the monitor was in use. All equipment was the property of the Department of Physical Education for Women, University of Arizona, Tucson, Arizona.
Analysis of Batting Performance

The batting performance of each subject was analyzed by application of specific criteria suggested originally by Vana (1958). These criteria identified the correct body movements and mechanics of batting as outlined in the literature and as accepted by most coaches and experts in baseball. Watkins (1963) developed a list of instructional points based on Vana's criteria, and these points with slight modifications were utilized in the present investigation. Descriptions of the criteria used are given below. All actions described are for a right-handed batter.

1. The bat starts its forward swing with the handle about five to six inches in front of the right armpit, the bat so extending above and across the right shoulder that the large end of the bat is behind the head.

2. During the backswing of the bat, the hips cock by medial rotation of the left hip and lateral rotation of the right hip.

3. After the forward stride, the left foot is firmly grounded, with the leg partially flexed at the knee joint.

4. During the forward swing, the hips uncock by lateral rotation of the left hip and medial rotation of the right hip.

5. During the forward swing, the batter pivots on his right foot.
6. During the forward swing of the bat the hands and arms are away from the body.

7. Before the forward swing of the bat, the shoulders are level.

8. The head is held steady during the forward swing of the bat.

9. During the forward swing of the bat, the head is aligned vertically with the right hip.

10. The head rotates forward after contact so that the batted ball is within the range of vision.

11. The bat follows through to a position behind the back of the batter.

**Scoring Method**

To avoid bias in the analysis, all individual analyses were made at the completion of the five week instructional program. The investigator viewed the weekly video tapes for each individual in both groups in sequence so that a subject's performance in the first week was viewed and analyzed before his second and successive performances were analyzed.

When a violation of the same criterion was detected on three or more of the five recorded swings, an error was recorded. This procedure was repeated for each criterion. The score recorded for
each week was the total number of criteria, 11, minus the number of criteria violated.

**Investigator Competence**

Instruction in the use, care, and operation of the battery operated PVTR was provided by the equipment factory authorized representative. The investigator underwent approximately 15 hours of operational practice in using the camera and the PVTR prior to commencing the study, and was the sole operator of all the equipment throughout the study.

The test-retest method was used to establish reliability in the application of the instructional criteria for the analysis of batting performance. Video tapes were taken of 20 varsity baseball candidates and analyzed individually to determine the number of criteria that were executed incorrectly. The tapes were examined one day later and the criteria were reapplied without reference to the original analysis. The scores given each hitter on the two analyses were correlated using the Pearson product-moment method. The resultant coefficient of .925 indicated the criteria could be applied with a high degree of accuracy.

**Statistical Treatment**

Means for each group were calculated for each week of the study. The differences between group means were analyzed by the
small sample technique for testing differences between means when data are uncorrelated, using a \( t \)-test if variances are not significantly different by an \( F \)-test. Differences in the number of batting errors occurring between the weekly tests within a group were analyzed by the difference method with application of the \( t \)-test to determine significance (Downie and Heath, 1970, pp. 179-184).
CHAPTER 4

RESULTS

The purpose of this study was to investigate the effects of the use of the portable video tape recorder in correcting batting errors of college junior varsity baseball players. One group of batters was given typical verbal instruction including demonstration, and a second group was given immediate visual feedback by means of video tape replay in addition to the normal coaching techniques. All findings were analyzed in terms of group mean scores of the number of correct batting responses made, based on eleven criteria of proper batting technique.

The results are presented in two major phases; comparisons within groups and comparisons between groups. In each case, weekly comparisons are presented also to indicate the point in learning where the greatest improvement occurred.

Comparisons Within Groups

The initial and final batting correction mean scores for both groups and the significance of the differences between these scores are presented in Table I. Only the scores of individuals present for both the initial and final video taping sessions were included.
TABLE I

SIGNIFICANCE OF THE DIFFERENCES BETWEEN INITIAL AND FINAL BATTLING CORRECTION MEANS

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Initial Mean</th>
<th>Final Mean</th>
<th>$M_D$</th>
<th>$SE_{MD}$</th>
<th>$t$</th>
<th>$P$</th>
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<tr>
<td>Con.</td>
<td>6</td>
<td>5.66</td>
<td>6.83</td>
<td>1.17</td>
<td>.31</td>
<td>3.74</td>
<td>.05</td>
</tr>
<tr>
<td>Exp.</td>
<td>8</td>
<td>6.25</td>
<td>9.25</td>
<td>3.00</td>
<td>.26</td>
<td>11.28</td>
<td>.01</td>
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</table>

The batting correction mean scores of the control group improved from 5.66 to 6.83 during the five week period of the study. This indicated that the average control group batter violated approximately one less of the eleven batting criteria at the end of the study than he had at the beginning. The difference of 1.17 between the initial and final means was significant at the .05 level, producing a $t$-value of 3.74. With five degrees of freedom, a $t$-value of 2.57 was required for significance at the .05 level of confidence.

The experimental group experienced a greater increase in batting correction mean scores, improving from 6.25 to 9.25 in five weeks. This increase of 3.00 in the batting criteria represented nearly a 50 per cent improvement in performance for the group using instant replay. The obtained $t$-value of 11.28 indicated this was a highly significant improvement. With seven degrees of freedom, a
A t-value of 3.50 was required for significance at the .01 level of confidence.

These findings indicated that both coaching methods produced significant learning as measured by the increase in the number of correct batting criteria met. However, the improvement demonstrated by the experimental group was nearly three times as great as the improvement shown by the control group.

**Weekly Comparisons Within Groups**

In an effort to determine if the improvement in batting was distributed over the entire period of the study or if it occurred mainly at certain points in the learning period, comparisons were made between the means for successive weeks. Because of the time involved between the initial mean, obtained from video tapes taken on the first day of the first week, and the second mean, obtained on the last day of the second week, this period was designated from zero to two in the tables and represented a longer period of time than subsequent comparisons.

Comparisons within the control group are presented in Table II and comparisons within the experimental group are presented in Table III. Data for these tables was taken from only those subjects who were present for every video taping session to insure consistency in the progressive analysis. Some subjects in both groups missed
### TABLE II

**SIGNIFICANCE OF THE DIFFERENCES BETWEEN SUCCESSIVE WEEK BATTING CORRECTION MEANS FOR THE CONTROL GROUP**

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Mean Diff.</th>
<th>SE MD</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>1.00</td>
<td>.41</td>
<td>2.45</td>
<td>NS</td>
</tr>
<tr>
<td>2-3</td>
<td>- .25</td>
<td>.25</td>
<td>-1.00</td>
<td>NS</td>
</tr>
<tr>
<td>3-4</td>
<td>.25</td>
<td>.75</td>
<td>.33</td>
<td>NS</td>
</tr>
<tr>
<td>4-5</td>
<td>.50</td>
<td>.90</td>
<td>.55</td>
<td>NS</td>
</tr>
</tbody>
</table>

### TABLE III

**SIGNIFICANCE OF THE DIFFERENCES BETWEEN SUCCESSIVE WEEK BATTING CORRECTION MEANS FOR THE EXPERIMENTAL GROUP**

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Mean Diff.</th>
<th>SE MD</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>1.25</td>
<td>.25</td>
<td>5.00</td>
<td>.01</td>
</tr>
<tr>
<td>2-3</td>
<td>.25</td>
<td>.36</td>
<td>.70</td>
<td>NS</td>
</tr>
<tr>
<td>3-4</td>
<td>.50</td>
<td>.26</td>
<td>1.90</td>
<td>NS</td>
</tr>
<tr>
<td>4-5</td>
<td>1.00</td>
<td>.33</td>
<td>3.04</td>
<td>.05</td>
</tr>
</tbody>
</table>
different video taping sessions, thus complete data was obtained on four subjects in the control group and eight subjects in the experimental group.

The greatest improvement in batting for the control group occurred during the first period of the study. However, this period was longer than the successive periods, containing five practice days rather than three practices for each following week. Batting scores regressed slightly during the third week, but then improved for the remaining two weeks. There was no significant improvement in batting correction mean scores for the control group during any single week period.

The experimental group experienced the largest increase in batting correction mean scores from the initial mean to the second week mean. The improvement of 1.25 produced a $t$-value of 5.00. With seven degrees of freedom, a $t$-value of 3.50 was required for significance at the .01 level of confidence. As was true with the control group, this increase was realized over a longer period of time than subsequent comparisons, but indicated that the use of instant replay may be valuable at the beginning of the learning period.

Further increases in the differences between means, although not significant, were evident between the second and third weeks and between the third and fourth weeks. There was a significant increase between the fourth and fifth weeks, with a mean difference of 1.00
resulting in a $t$-value of 3.04. With seven degrees of freedom, a $t$-value of 2.36 was required for significance at the .05 level of confidence. The successive increases over the last three weeks were each 100 per cent greater than the previous week, indicating improvement occurred at an accelerating rate during this period of learning.

These findings indicated that the use of the portable video tape recorder may be particularly valuable in reducing batting errors during the initial period of learning, and then increasingly valuable in later stages following another acceleration in improvement.

**Comparisons Between Groups**

The difference between final batting correction mean scores for both groups were analyzed for significance to determine the relative effectiveness of the two coaching methods in improving the correction of baseball batting faults. This comparison is presented in Table IV, and is based on the total number of subjects in each group during the last week.

The batting correction mean score of the experimental group was significantly different from that of the control group. The difference between the mean scores was 2.42, resulting in a $t$-value of 3.44. With twelve degrees of freedom, a $t$-value of 3.05 was required for significance at the .01 level of confidence.
TABLE IV

SIGNIFICANCE OF THE DIFFERENCES BETWEEN
FINAL BATTING CORRECTION MEANS

<table>
<thead>
<tr>
<th>Group Means</th>
<th>Control</th>
<th>Diff.</th>
<th>SE MD</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>9.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>6.83</td>
<td>2.42</td>
<td>.70</td>
<td>3.44</td>
<td>.01</td>
</tr>
</tbody>
</table>

Weekly comparisons were difficult because all subjects were not present for video taping at each session. However, a gross comparison of weekly means indicated the experimental group improved at a faster and steadier rate than did the control group. As early as the fourth week, the average batter in the experimental group was making nearly two less errors in the batting criteria than the average control group batter.
CHAPTER 5

SUMMARY AND CONCLUSIONS

Educators have always searched for new and effective aids to learning. Audio-visual aids have been responsible for many changes in teaching methods, and in recent years, the development of the video tape recorder has made a tremendous impact as a teaching tool. The main characteristic that differentiates this device from other audio-visual equipment is its capability for instant replay of both picture and sound.

The majority of research done in physical education and athletics with the video tape recorder has been to study the effects of using this device in the instruction of beginners or relatively unskilled individuals. Little experimentation has been conducted in physical education and athletics, particularly in the sport of baseball, utilizing skilled individuals as subjects.

The present study was undertaken to obtain evidence regarding the effect of using the portable video tape recorder in the correction of batting errors among college junior varsity baseball players. The investigation centered on the comparison of a traditional approach to
coaching batting with the same approach supplemented by the addition of instant replay through use of the portable video tape recorder.

**Subjects**

The subjects were seventeen male freshmen and sophomore students who were members of the 1972 University of Arizona junior varsity baseball team. The subjects were placed randomly into two groups, the experimental group which received the supplemental aid of the portable video tape recorder and the control group which received only normal coaching.

**Coaching Techniques**

The experimental and control groups received initial instruction in batting which included verbal instruction and demonstration emphasizing the points outlined in the criteria.

**Experimental Group**

On three days each week for five weeks, the members of the experimental group were video taped while batting. Each individual performed five swings during his first time at bat each day. He then viewed his performance on a television monitor and was given a verbal critique emphasizing the errors made in the eleven criteria. Following the video replay, he took a second series of five swings. Traditional coaching techniques, including verbal instruction and
demonstration were given also during the batting performance of each subject. One video tape from each week was retained for analysis of each subject.

**Control Group**

Traditional coaching techniques including verbal instruction and demonstration were the only coaching methods administered to this group during the five week study period. Practice time was the same in both groups, with all subjects taking two sets of five swings each day. As with the experimental group, video tapes were taken of the subjects in the control group once each week. These tapes were retained for analysis, but were not seen by the subjects.

**Analysis of Batting Errors**

Batting errors were analyzed using eleven specific criteria which included the essential points of correct batting techniques. At the completion of the instructional period, the video tapes of all subjects were analyzed by application of the batting criteria. The number of batting errors identified for each subject was subtracted from the total of eleven criteria, and was referred to as the batting correction scores.
Statistical Treatment

Mean scores were calculated for both the experimental and control groups. The differences between the final means of the two groups were analyzed for significance using the small sample technique for testing differences between means when data are uncorrelated. The differences between the weekly means within each group were tested for significance using the difference method for correlated groups. For procedures on both see Downie and Heath (1970, pp. 179-184).

Results

The experimental group experienced an increase of three points in correcting batting errors over the five week study period. The improvement in mean score from 6.25 to 9.25 was significant at the .01 level of confidence. Weekly analysis of data indicated that the greatest number of batting errors were corrected between the initial and second weeks for the experimental group, but that significant differences also occurred between the fourth and fifth weeks indicating that the use of the portable video tape recorder may be valuable throughout a learning period. Improvement curves of weekly mean batting scores are summarized in Fig. 1.

Comparison of the final means indicated the experimental group had a higher batting score, 9.25, than did the control group, 6.83.
Fig. 1. Weekly Batting Correction Mean Scores for the Experimental and Control Groups.
The difference of 2.42 was significant at the .01 level of confidence. Weekly analysis of control group data indicated no significant differences within this group.

**Conclusions**

As applied to this study, the following conclusions were made:

1. The portable video tape recorder was an effective learning-aid in the correction of batting errors.

2. Traditional coaching techniques did improve batting significantly, but not at the level nor with the speed that batting was improved when coaching was augmented with the portable video tape recorder.

3. The effects of the portable video tape recorder were greatest in the early stages of learning. Following the initial improvement, gains were slower, but became increasingly greater during the later stages of the program.

**Recommendations for Further Study**

Relating to the conclusions of this study, recommendations for further study are as follows:

1. A longer period of time should be used to study the effects of the portable video tape recorder in correcting batting errors.

2. The portable video tape recorder should be used in studies of other skills of baseball, particularly pitching.
3. Studies involving the use of the portable video tape recorder should be conducted in other physical education and athletic activities involving skilled performers.
SELECTED BIBLIOGRAPHY


