Effects of Immediate Videotape Visual Feedback in Learning Three Eclectic Martial Arts Kicks

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ABSTRACT

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This study was designed to determine the effectiveness of two methods of teaching three eclectic martial arts kicks to 60 female subjects with no prior experience in the martial arts. The subjects were selected from students who had registered to take beginning self-defense classes at Middle Tennessee State University. The subjects' ages ranged from 18 to 24 years. The 60 female subjects were randomly assigned to one of two groups. One group (N = 30), designated the experimental group, received the traditional method of instruction plus immediate videotape visual feedback. The other group (N = 30), designated the control group, received the traditional method of instruction with no videotape visual feedback.

Both groups met twice a week for five weeks practicing various aspects of self-defense. After five weeks, each subject received a pretest score on the front kick, the roundhouse kick, and the lunging side kick. Three Black Belts experienced in judging various techniques of the martial arts served as the judges. They used a 1-5 scale commonly used in karate tournaments to administer a score to each subject in both groups on each of the three kicks.

After the pretest, each subject in the experimental group was videotaped performing the three kicks.

Immediately following the taping session, the subjects watched the tape with comments from the instructor. The subjects in the control group performed the same number of kicks with no visual feedback. The subjects in the experimental group were videotaped one class session per week. Both groups practiced the same techniques on nontaping days. This procedure lasted for three weeks. After the three-week period, each subject received a posttest score on the three kicks by the same three judges.

An analysis of variance between groups was used to treat the pre- and post-data. The results indicated that both groups significantly improved at the .05 level for all three kicks. The experimental group improved significantly at the .05 level on the front kick and the roundhouse kick. The experimental group did not significantly improve at the .05 level compared to the control group on the lunging side kick.

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CHAPTER 1

Introduction

Physical educators, sport psychologists, coaches, and athletes are concerned with how various motor skills are best learned and how they can be improved. Two factors that might have influenced the acquisition and improvement of certain motor skills are the physical ability of the person and the amount of proper practice time. Visual feedback is a third factor that could improve the performance of certain motor skills.

Stallings (1982) defined feedback as "sensory input that makes possible an improvement in proficiency" (p 84). Bilodeau, Bilodeau, and Schumsky (1959) pronounced that feedback or knowledge of results is the most important variable controlling the skilled performance. De Bacy (1970) suggested that the importance of feedback in performance and in learning is universally agreed upon and that videotape replay has great potential in providing information. Robb (1966) stated that visual feedback was the most important factor in significantly improving a motor skill.

Filmstrips (Thompson, 1969); motion pictures (Nelson, 1958); and videotape feedback (Diggles, Grabiner, & Garhammer, 1987) have been used in various studies that provided visual feedback. Videotape feedback appeared to be the easiest and most efficient to use and had the advantage of giving visual feedback immediately without having to go

through the development process. This advantage allowed for valuable time to be saved.

Problem Statement

Physical educators, sport psychologists, coaches, and athletes have searched for methods to enhance and improve various motor skills. In view of this, the researcher has prepared a study to investigate if immediate videotape visual feedback affects the learning and improvement of selected motor skills when used with a traditional instruction method.

Purpose of the Study

The purpose of this study was to compare the relationships between the traditional method of teaching the front kick, roundhouse kick, and lunging side kick versus the traditional method plus immediate videotape visual feedback. Sixty female college students between the ages of 18 and 24 years at Middle Tennessee State University who registered to take self-defense classes were the subjects.

Definition of Terms

For the purpose of this study, the following terms are defined as follows:

Delayed feedback--occurs after a certain amount of time has passed following the motor movement or a series of movements.

Eclectic martial arts--is a combination of different styles of karate. It is not limited to only one style. The

instructor decides what movements and techniques are most applicable to the tasks he/she desires to execute.

Feedback--is an input from an external or internal source that makes possible a likely improvement in the proficiency of a movement or series of movements.

Front kick--is executed from a front stance. One's feet should be shoulder-length apart with weight distributed in a 50-50 ratio which means 50% of body weight is on the front foot and 50% is on the back foot. Both feet should be positioned so that the toes are pointing toward the opponent. The back foot moves directly forward with the toes back and the ankle locked forward so the "ball" of the foot absorbs the blow.

Immediate feedback--occurs immediately following the motor movement or series of movements.

Knowledge of performance/concurrent feedback--is a type of feedback that occurs "during" the actual movement or series of movements before the end result.

Knowledge of results/terminal feedback--is a type of feedback that occurs "after" a motor movement or a series of motor movements regarding the consequences in terms of goal attainment.

Lunging side kick--is executed from a side stance. The feet are turned to either side of the opponent (depending on which foot one desires to have in front) so only the side of the body is facing the opponent. The weight distribution is

distributed in a 50-50 ratio which means 50% of the body weight is on the front foot and 50% is on the back foot. The back foot moves slightly behind the front, and the person "lunges" toward the opponent or target, using the front foot to strike. The striking foot is positioned so the ankle is locked with the toes pointing down. The side or edge of the front foot absorbs the blow.

Martial arts kicks--are movements using the legs with as much quickness, power, and force as possible to strike an adversary or target.

Roundhouse kick--is executed from a front stance with the same characteristics as the aforementioned front kick. The back foot is raised, and as the movement begins, the front foot pivots as the back foot moves toward the opponent or target. The top of the foot, with toes turned back, absorbs the blow.

Stance--is the position of the feet and the weight of distribution of the feet before executing a technique.

Traditional teaching method--consists of teacher demonstration, verbal explanation, and question-and-answer sessions.

Videotape visual feedback--feedback provided through the videotaping of a motor movement or series of movements and reviewing it with the instructor for technique improvement.

Limitations of the Study

For the purpose of this study, the following limitations were recognized:

1. During this study, both classes were encouraged to practice during class at an equal intensity level.

2. During this study, both classes were instructed not to practice outside of class.

3. The three Black Belt judges used a subjective 1 through 5 common scale for the pretest and posttest scores for each subject. Similar subjective scales were used for platform diving, boxing, gymnastics, and karate tournaments.

Delimitations of the Study

For the purpose of this study, the following delimitations were recognized:

1. This study was delimited to 60 female students between the ages of 18-24 years who had no prior experience in self-defense. These 60 subjects were randomly selected from two beginning self-defense classes at Middle Tennessee State University.

2. This study was delimited to include instruction from the same experienced instructor.

3. During this study, the instructor taught both classes with equal enthusiasm so as not to bias the results.

Hypotheses

1. There will be no significant difference between the experimental group who received the traditional method of

instruction plus immediate videotape feedback and the control group who received the traditional method with no visual feedback in the performance of the front kick.

2. There will be no significant difference between the experimental group who received the traditional method of instruction plus immediate videotape visual feedback and the control group who received the traditional method with no visual feedback in the performance of the roundhouse kick.

3. There will be no significant difference between the experimental group who received the traditional method of instruction plus immediate videotape visual feedback and the control group who received the traditional method with no visual feedback in the performance of the lunging side kick.

CHAPTER 2

Review of Literature

Several systematic studies supported the premise that visual feedback does improve the performance of various motor skills. Pyles (1993) conducted a study that investigated videotape feedback and its effect on "improving the safety of two-person transfers in a residential care facility" (Abstract). All nine of the subjects were classified with developmental disabilities. Two experiments were conducted using videotape feedback in regard to lifts and number of steps taken. "In Experiment 1, five subjects received videotape feedback following lifts for the day. In Experiment 2, four subjects received exactly the same kind of feedback prior to lifts" (Abstract). Lifts, in this study, denoted the ability of the subjects to move out of a sitting or lying position with the aid of the workers of the facility. A multiple baseline across subject design was used as the statistical procedure to determine results. The author reported:

> videotape feedback increased the percentage of steps completed correctly for six of the nine subjects across the two experiments. Two of the five subjects who received videotape feedback following lifts (Experiment 1) improved their performance, whereas all four subjects who received videotape feedback prior to lifts (Experiment 2) improved their performance. (Pyles, 1993, Abstract)

The author concluded that videotape feedback aided both groups in lifts and correct steps taken.

Messier and Cirillo (1989) conducted a study that investigated the effects of videotape feedback on running techniques. Twenty-two female novice runners were used as subjects. Each subject was randomly assigned to either the experimental group (N = 11) or the control group (N = 11). The experimental group received visual feedback plus verbal feedback concerning the subjects' running styles. The control group received the same training routine without visual or verbal feedback. The training session lasted for five weeks, with each session lasting 15 to 20 minutes. The visual feedback was provided by implementing high-speed photography using a Locam Model 51, a 16 mm DC camera positioned 91 m from and perpendicular to the experimental subject's right side.

The authors reported that the experimental group improved significantly more than the control group on the variables of greater relative stride lengths, shorter support time, greater ankle dorsiflexion during support, and increased knee flexion during support and nonsupport. There were no significant differences in submaximal VO_2 or RPE. The authors suggested that verbal and visual feedback could be of benefit to novice female runners for certain variables.

Sewall, Reeve, and Day (1988) examined the effect that visual feedback had on a weight-lifting skill using a mirror. The skill that was chosen for this study was the

power clean movement. The subjects (N = 18) had no prior experience with the power clean movement. They were assigned to either the visual feedback group (experimental) or the nonvisual feedback group (control). Each subject was briefed on the experimental protocol. All the subjects watched a videotaped demonstration of the power clean performed properly. Each subject was then videotaped performing one set of three repetitions of the power clean while being videotaped. This served as the pretest score. The pretest score was determined by a competitive weight lifter experienced in coaching and officiating this particular weight-lifting movement. The subjects then performed two sets of three repetitions with a two-minute rest between sets. This process was repeated three additional times with the experimental group performing in front of a mirror and the control group performing without the aid of a mirror. Each subject was then videotaped, and this served as the posttest score judged by the same weight lifter.

The results using a 2 X 2 (group X tests) analysis of variance with repeated measures on the second factor indicated that both groups improved significantly from the pretest to posttest scores. A second result of this study denoted that the experimental group who received visual feedback from the mirror significantly scored higher than the control group who did not have the aid of a mirror.

Diggles et al. (1987) investigated the effects of visual feedback on one-arm ball-catching of a tennis ball. Twenty male and female subjects were classified as skilled or unskilled in regard to the task of ball-catching. Subjects were designated skilled if they had experience in baseball, softball, racquetball, martial arts, or ice hockey. The subjects in the category of unskilled at the task of ball-catching had experience in golf, soccer, dance, or weight lifting. Subjects were seated in both the vision and no-vision conditions. The subjects were seated, and each attempted to catch 20 tennis balls from a ball-projection machine aimed close to the right shoulder. In "half of these trials, the subject's vision of the catching arm was prevented by a screen which still permitted viewing of the critical portion of the ball's trajectory" (Diggles et al., 1987, p. 987). Each trial was recorded on video to identify the catching errors. The errors were classified as errors of position or grasping.

The data "were analyzed in a 2 X 2 X 2 (skill X vision X error type) repeated-measures analysis of variance with repeated factors on the last two variables" (Diggles et al., 1987, p. 990). The main effect of vision was significant ($F\ 1.18 = 8.5$, $p < .01$). When visual feedback was prevented, the mean number of errors increased from 2.7 (SD = 2.7) with vision to 4.3 (SD = 2.8) without visual feedback. This included both the skilled and unskilled

subjects. The results suggested that visual feedback significantly improved both groups in the one-arm catching task.

Mittleman (1987) investigated videotape replay in regard to handcuffing techniques to new police recruits.

> The standard pretest-posttest with control group experimental design was used with the addition of a retention test administered one week after initial testing. . . . The police officer recruits (n = 63) were divided into three groups and tested during the three experimental occasions. (Abstract)

One group received immediate videotape replay; the second group received delayed videotape replay; and the third group received the traditional method of instruction. The Handcuffing Task Inventory (HTI) was used as the measuring device and

> utilized by a panel consisting of three senior police officers who served as judges. The panel members rated each subject in the experiment using a Likert scale on the HTI. . . . A pre-experimental correlation level of .85 was set for inter-judge reliability. This minimum condition was surpassed since the overall inter-judge reliability coefficient was actually 0.8721. (Mittleman, 1987, Abstract).

Statistical significance for improvement was found for all three groups with the experimental group that received immediate feedback significantly improving more.

McLean (1986) investigated the effects of videotape feedback on the skill of hitting a baseball. Thirty-five subjects were divided into four groups: (1) no videotape replay and no batting, (2) videotape feedback only, (3)

batting only, and (4) videotape feedback and batting. The hitting variable was provided by a pitching machine. The videotape feedback was provided by allowing the subjects that received the treatment to watch a videotape titled "Baseball with Rod Carew." The videotape showed repetitive swings by a professional model and was contrasted by different speeds, computerized images, camera angles, and cues. All subjects performed the hitting task five days a week and received the treatment at night. The study lasted for a period of three weeks.

A 2 X 2 factor completely randomized design was used in the study. A two-factor multivariate analysis of covariance was used as the method of analysis, and a pre-ability test score was used as the covariate. Tukey's HSD revealed that the video feedback plus batting improved significantly more than the other three groups.

Trexler (1982) investigated the effects of visual feedback on improving the archery-shooting skill using two groups. The groups (N = 18) consisted of beginning archery students. Each group was subjected to three trials of shooting. Total error and new scores were recorded for the trials. Station 1 consisted of target archery-shooting; station 2 incorporated the viewing of an archery videocassette which displayed proper technique; and station 3 consisted of practicing target archery with concurrent visual feedback (experimental) and without concurrent visual

feedback (control). The results indicated that both groups improved on the two dependent measures over the days from trial 1 and trial 2. There was no significant difference between groups for the first seven days of practice, but on the eighth day the experimental group (visual feedback) produced a more proficient shooting performance. Based on these results, the author concluded that the positive influence of concurrent visual feedback produced significant gains later in the study.

Beitel and Ferguson (1981) investigated the effects of videotape feedback on the learning rate, performance time, and response accuracy to soccer. Forty-four women were used as subjects, and they were randomly divided into four groups: (1) no knowledge of results, (2) immediate viewing of videotape feedback, (3) completing a questionnaire emphasizing knowledge of results, and (4) immediate viewing of videotape replay plus completing a questionnaire emphasizing knowledge of results. The subjects were required to maneuver a soccer ball through a fixed environment, kick the ball at certain times, and move to the finish line.

The authors reported that the groups that received the videotape replay significantly improved for performance time. They also reported the following at the conclusion of the study: (1) the groups who received knowledge of results had significantly improved ($p \leq .05$) performance accuracy as

compared to the control group and (2) the groups who received knowledge of results had significantly improved ($p \leq .01$) as compared to the control group. The conclusion lends support that videotape feedback may enhance the performance of motor skills.

Sullivan (1981) used male subjects (N = 30), aged 19 to 25 years, concerning the accuracy of a long movement as a function of starting point and terminal location in the presence and absence of visual feedback. The subjects held a stylus in their right hands and performed aiming movements to a circular target (16 mm in diameter). The first condition consisted of a starting point located 336 m to the right of the midline of the body, with movements terminating at a target located 336 mm to the right of the midline. A 2 X 2 X 2 (sequence groups X target location X visual feedback condition) design was used. Analysis of variance was applied to analyze the percentage of error, preparation time, and movement time. The results indicated that in the absence of visual feedback the movements were initiated slower and completed faster than the movements with the presence of visual feedback. Percentage of error improved significantly for movements away from the midline compared to movements toward the midline, regardless of the visual feedback condition. Based on these results, the author concluded that visual feedback significantly improved the

subjects' performance in accuracy and they completed the task quicker.

Rikli and Smith (1980) investigated the effects of videotape replay on tennis serving form. The subjects were 48 advanced beginners (N = 24 males and N = 24 females) and 48 intermediate tennis players (N = 24 males and N = 24 females). The subjects were randomly assigned to four groups:

> (1) Control--no videotape feedback, (2) Early--subjects received videotape feedback during the early stages of the instructional cycle, (3) Middle--videotape feedback was administered midway through the cycle, and (4) Combination--videotape feedback was administered during both the early and middle stages of the instructional cycle. (Rikli & Smith, 1980, p. 895)

Each subject was pretested and posttested by professional instructors who used a seven-item rating scale. At the conclusion of the week, each subject in the videotape feedback groups was asked to respond to a five-point questionnaire on the effectiveness of the visual feedback. Footwork, body movement, ball toss, arm-pattern phase 1, and arm-pattern phase 2 were used as the variables that received a score by the judges. The authors reported that "performance scores for the three feedback groups were significantly better than for the control group" (Rikli & Smith, 1980, p. 895). The arm-pattern phase 1 was the only variable that improved with the use of videotape replay. "Responses to the questionnaire concerning the subjects'

evaluation of the use of video feedback on the serve indicated that 86% of them thought that it was effective in improving their serving form" (p. 899). The authors suggested the following:

> Videotape feedback (1) may be primarily effective in skill situations where the majority of the movement pattern takes place outside the performer's visual field; (2) may be more effective for subjects at higher levels of skill than for beginners; (3) is not affected by its temporal location within the instructional cycle, and (4) is often perceived by the learner as being more effective than it probably is. (p. 901)

Beverley (1974) conducted a study investigating the use of videotape replay to target archery. Ninety volunteer female students were used as the subjects, and they were randomly assigned to three groups. Group 1 received the standard lecture-demonstration. Group 2 received the lecture-demonstration method plus videotape replay every class period. Group 3 received the standard lecture-demonstration plus videotape replay every other class meeting. The modified Chicago Round was used as the pretest and posttest. This test revealed a score based on the accuracy of one's shooting. The results indicated the following:

1. All three methods of instruction increased the level of skill and form in target archery.

2. Instant videotape feedback was found to be superior to the lecture-demonstration group.

3. Instant videotape replay every class period did not yield a more significant difference in skill as compared to instant videotape replay every other class period.

4. Videotape replay every class period did produce a significant difference in skill as compared to videotape replay every other class period.

Jackson (1973) investigated the effect of videotape replay on the acquisition and retention of various sport-type motor skills. The motor skills were as follows: (1) volleying a volleyball against a wall; (2) lying on back, throwing a tennis ball six feet or higher in the air, and catching it with either hand; (3) bouncing a volleyball on the top end of a softball bat; and (4) shooting the basketball foul shot. Eighty-seven African-American male college freshmen were used as the subjects. Each was assigned to one of three groups which consisted of two experimental groups and one control group. The Adams Sport Type Motor Educability Test for College Men was used as the evaluation instrument. The study lasted for six weeks. The author concluded that videotape replay significantly improved the acquisition of the various motor skills used in the study.

Kraft (1972) conducted a study to investigate the effects of videotape replay on bowling skills. The subjects were 45 male undergraduate students enrolled in an advanced bowling class at Syracuse University. Each subject was

randomly assigned to one of three treatments based upon a pretest score of bowling. The treatment groups consisted of the following: (1) teacher feedback only, (2) videotape feedback only, and (3) combination teacher and videotape replay. The experiment lasted for 12 weeks.

The author stated that all three groups made significant improvements from the pretest to the posttest. The combination teacher feedback and videotape feedback group significantly improved more than the other two groups.

Del Ray (1971) investigated the effects of videotape feedback on form and accuracy of a fencing lunge. The subjects were 40 college women who were enrolled in a fencing class. The subjects were randomly assigned to the experimental group (N = 20) or the control group (N = 20). The experimental group received videotape replay plus comments from the instructor, and the control group received only the instructor's comments. The dependent variables were latency, accuracy, and form. A 2 X 2 X 3 (task X feedback X practice session) yielded a significant improvement for the experimental group ($p \leq .05$). The author concluded that videotape feedback significantly improved the performance of the subjects. She also stressed the importance of instructor comments during the viewing.

Cooper (1970) conducted a study investigating the effects of videotape replay compared with other methods of feedback. The subjects were 54 beginning basketball

students from a seventh-grade group of boys. The subjects were randomly assigned to five groups: (1) auditory feedback only, (2) videotape feedback only, (3) a combination of auditory and videotape feedback, (4) no instructor feedback, and (5) a control group. The Johnson Basketball Test was used as the performance instrument. The skills included dribbling, lay-up shots, passing, catching, and the one-hand push shot. Pretests and posttests were administered at the beginning and ending of the 16-day study. The author concluded that videotape replay alone or combined with verbal feedback significantly improved learning the push shot and dribbling.

Thompson (1969) investigated the effect of immediate feedback on the learning of the golf drive and the five-iron approach shot. The subjects, 80 university females who were classified as beginners, were randomly assigned to the control or experimental group. The experimental group received visual feedback through filmstrips. The photos were available for the instructor and the students to observe and discuss immediately. The control group received just the basic class lecture and participation. The criterion was a battery of three golf skills as developed by the teacher. The students were asked not to practice golf between class meetings. The researcher concluded that immediate visual feedback through the use of filmstrips

significantly improved the performance of the golf drive and the five-iron approach shot.

Wood (1969) investigated the effects of a motion picture and a motion picture combined with videotape replay on self-learning of selected gymnastic routines. The parallel bars, side horse, rings, and horizontal bars were used as the selected gymnastic skills. Forty high school boys were used as subjects for the study. The boys were randomly assigned to either the experimental group or the control group. The experimental group received videotape visual feedback supplemented with the motion picture. The control group received only the reviewing of the motion picture. The researcher concluded that the experimental group improved significantly more than the control group.

Plese (1968) investigated the effects of videotape visual feedback on teaching specific gymnastic skills. The side horse, parallel bars, and the free mat exercise routine were the specific skills chosen for this study. Fifty-four junior high school students in the public school system of Fort Collins, Colorado, were chosen as subjects. The subjects were randomly assigned to two groups. The experimental group received the conventional method of instruction, including verbal explanation, demonstration, practice, and instructor input plus viewing themselves practicing the gymnastic skills. The control group received only the conventional method of instruction. Evaluation was

conducted by a gymnastic judge. Findings of the study showed the experimental group improved significantly more than the control group.

Watkins (1963) investigated the effects of visual feedback on 20 subjects from the varsity baseball team at the State University of Iowa, Ames. The 20 subjects were divided into an experimental group and a control group. All the players in the experimental group (N = 10) were filmed at the start of the experiment, at the end of the third week, and at the end of the fifth week. The experimental subjects watched themselves each week for five weeks, with the coach pointing out batting faults. The control group subjects (N = 10) received only the coach informing them of their batting faults. The author reported a significant decrease in batting faults for the experimental group that received visual feedback.

There have been several studies reported in which visual feedback did not produce a significant effect when compared with various other methods of instruction.

Schweiger (1994) investigated the effects of visual feedback and verbal cueing in testing quadriceps torque on an isokinetic device. Thirty subjects were randomly assigned to groups that consisted of visual feedback, verbal cueing, and a combination of visual feedback and verbal cueing. The author hypothesized "that subjects who received both conditions would show a statistically significant

difference in quadriceps muscle torque compared to subjects who received verbal cueing alone or visual feedback alone" (Schweiger, 1994, Abstract). The author reported no significant differences between the groups.

McMahon (1989) investigated the effects of videotape replay on hitting a softball. Eighteen volunteer softball players were randomly assigned to three groups. Experimental group 1 received the videotape replay, the Syber Vision visualization program, and Wade Boggs' biomechanical swing photographs. The subjects in experimental group 2 received videotape visual feedback of themselves hitting a softball. The control group received only the traditional coaching methods and regulated batting practice. A 3 X 2 multivariate analysis of variance was used to statistically treat the data. The author reported no significant difference between the three groups.

Walford (1989) conducted a study investigating the effects of "visual feedback on learning the golf skills of pitching and putting. . . . Sixty-four male and thirty-one female subjects (N = 95) were randomly assigned to a visual feedback group and a proprioceptive feedback group" (Walford, 1989, Abstract). The visual feedback group received videotape replay of themselves practicing the golf pitching and putting techniques, and the proprioceptive group visualized the proper technique, but received no visual feedback of themselves practicing these techniques.

A pretest and posttest were administered to each group. Based on the results of these comparisons, the author concluded no significant difference existed between the groups.

Wieringen, Emmen, Bootsmor, Hoogesteger, and Whiting (1989) investigated the effects of videotape replay on tennis. The subjects had at least two years of experience. The subjects were divided into three groups. The videotape feedback group (N = 22) had two training sessions a week for five consecutive weeks. The sessions lasted for 40 minutes, with 30 minutes utilized for practicing the tennis serve. The additional 10 minutes were used by the subjects viewing themselves performing the tennis serve, with discussion from the instructor. The second group (N = 22) received the traditional training which consisted of 30 minutes of practicing the tennis serve. The additional 10 minutes were spent by the subjects watching ground strokes and volleys performed by top-level competitors. The tennis serve was not watched by this group. The third group (control) (N = 22) received no training or viewing. They completed the pretest and posttest. The authors reported no significant difference between the video-feedback group and the group that received the traditional training. Both of these groups did improve significantly as compared to the control group.

Olson (1984) investigated the effects of motion picture feedback as a tool to improve baseball batting skills. The subjects (N = 40) were randomly selected males, ages 17 to 21 years, from Western Illinois University. The subjects were randomly assigned to four groups: (1) the film-training group, (2) the hitting-training group, (3) the combined hitting- and film-training group, and (4) the control group. Each subject was pretested to determine his hitting skill. Only fastballs were thrown to the subjects, and a solid-hit method was used to assess the hit. Each pitch was recorded as one of the following: (1) no swing, (2) missed swing, (3) foul tip, or (4) solid hit. The solid hits were totaled, and each subject was given a score based on the solid-hit method. A six-week practice period was then conducted. Group 1 watched 25 pitches shown by a movie projector, indicating whether each pitch was a ball or strike. Group 2 actually hit 25 pitches. Group 3 viewed the 25 pitches, indicating whether it was a ball or strike and hit 25 pitches. Group 4 took part in the pretest and the posttest sessions with no practice in between. After six weeks of practice, the subjects were posttested. After the groups had been statistically treated, the author concluded that there was no significant difference between the groups.

Armstrong (1973) investigated the possible effects of videotape feedback on the learning of gross motor skills, rate of learning, and form in tennis when compared to a

standard method of teaching consisting of lecture and demonstration. The subjects consisted of 54 female students enrolled in beginning tennis. The subjects were divided into three groups: (1) standard lecture-demonstration program, (2) standard lecture-demonstration plus videotape replay with analysis, and (3) standard lecture-demonstration program plus once a week the videotape replay was used by each subject. The classes met two days a week and lasted 10 weeks.

The scores were measured by the Broer Miller Tennis Test, which measures the skill level on various aspects of tennis. All students improved significantly on forehand, backhand, and combined skills. The author concluded that there were no significant differences in teaching methods.

Carre (1973) investigated the effects of videotape replay on the discus throw. The subjects were randomly assigned to one of four groups: (1) control, (2) videotape feedback, (3) instructor assistance and verbal feedback, or (4) subjects received both videotape feedback and verbal feedback from the instructor. The statistical analysis revealed no significant difference among the four groups. The author concluded that there was sufficient feedback in the performance of the tuck through practice alone. The author also suggested that videotape replay may play no role in learning a skill in the initial stages.

Eason (1973) conducted a study to investigate the effects of videotape instruction as it relates to the running jump and reach with a single-foot takeoff. Eason also examined the effects of videotaped instruction on advanced learners and beginners. Subjects for the study were fifth- and sixth-grade males whose birthdays fell between June 1, 1958, and December 31, 1960. The experimental group received videotape feedback, while the control group did not. The three factors that were investigated were the following: (1) methods of instruction, (2) ability levels of the advanced and beginning students, and (3) six treatment sessions. The results of the study suggest that while all of the groups improved over days of practice, there were no significant differences between the methods of instruction.

Selected badminton skills were used to investigate the effect of immediate visual feedback by Rollins (1973). Forty-eight subjects (24 males and 24 females) were used as subjects and were randomly assigned to either the control group or the experimental group. "The Experimental Group had knowledge of performance via videotape instant replay, the Control Group did not" (Rollins, 1973, Abstract). The control group received the standard lecture-demonstration form of instruction. No significant difference was found between the two methods of instruction when the data were analyzed with statistics.

Polvino (1971) conducted a study investigating videotape replay in bowling. The subjects were 79 college women, and the duration of the study lasted for six weeks. The subjects were randomly divided into three groups: (1) experimental with videotape alone, (2) experimental with videotape and illustration, and (3) the control group. The author reported that all groups significantly improved, with no significant differences among the three groups.

Cox (1969) investigated the effects of teaching a complex motor skill of wrestling. The subjects were 123 male college freshmen enrolled in a physical education class. The subjects were randomly assigned to an experimental group (videotape replay) or a control group. The various experiments investigated the effectiveness of performance with and without videotape replay. The author reported no significant difference of videotape replay to increasing the experimental subjects' wrestling skills.

Penam, Bartz, and Davis (1968) conducted a study investigating the effect of videotape feedback as it applied to teaching trampoline skills. One hundred and thirty freshman students enrolled in a physical education class were randomly assigned to either the experimental group or to the control group. Both groups were taught the same curriculum, with the experimental group given videotape feedback of themselves performing. The experiment lasted for 12 weeks. Based on the findings of the study, the

authors concluded that there was no significant difference between the two groups in the performance of certain trampoline skills.

Gray and Brumbach (1967) investigated the effects of visual feedback on the performance of badminton skills. The subjects were 60 male undergraduates, and none of them were physical education majors. The subjects were randomly assigned to two groups. The experimental group received visual feedback by viewing films of experienced players performing various skills of badminton. The control group did not view the film. The authors reported that all of the subjects in the experimental group indicated that the film had been useful to them. Although the experimental group was performing better than the control group at the midpoint of the study, it was not maintained. There was no significant difference between the two groups at the conclusion of the study.

Huselton (1962) investigated the effects of visual feedback on learning archery. The device he used to provide the visual feedback was a Polaroid. Twenty subjects were randomly divided in an experimental group (visual feedback, N = 10) and a control group (N = 10). Both groups received the traditional lecture-demonstration method of teaching, but the control group received no visual feedback. Each of the two groups was pretested and posttested in regard to their archery scores. The study lasted for 10 weeks. The

researcher reported no significant differences between the two groups.

Brown and Messersmith (1948) conducted a study to investigate the use of visual feedback on a program of tumbling. The subjects were enrolled in a beginning tumbling class. They were randomly assigned to either an experimental group or a control group. The experimental group viewed motion pictures of themselves performing the various tumbling skills. They also watched motion pictures of four experts performing these tumbling techniques. The control group received the basic lecture-demonstration form of teaching. Each group was pretested and posttested. They received scores on their performance by two qualified judges. The authors reported no statistically significant differences between the two groups.

CHAPTER 3

Methods

The purpose of this study was to determine if the effects of videotape visual feedback will significantly improve the performance of three eclectic martial arts kicks. It was conducted during the fall semester of 1994 at Middle Tennessee State University.

Subjects

The subjects were 60 randomly selected female students enrolled to take beginning self-defense classes at Middle Tennessee State University. The female subjects' ages ranged from 18 to 24 years. None of the subjects had any prior experience in self-defense. The subjects were required to sign an informed consent form before their participation in the study (see Appendix A). Both the experimental group and the control group met for 50 minutes twice a week.

Instrumentation

Three expert Black Belts with experience in judging karate tournaments and belt promotions served as the judges (see Appendix B). Subjects were judged and received a pretest and posttest score by the aforementioned three judges. The judges used the following scale frequently used in karate tournaments: 1 = poor, 2 = fair, 3 = average, 4 = good, and 5 = excellent.

Procedures

Both the experimental group and the control group met for 50 minutes per class two times a week. The subjects in both classes received the same instructions and practiced the same movements prior to the administration of the pretest. The experimental and control groups each practiced additional self-defense techniques other than the three dependent variables (front kick, roundhouse kick, and lunging side kick).

Schroeder and Wallace (1976) stated that before a beginning student understands the various kicks and stances associated with the kicks, a certain amount of time should be given to them before they are judged. Both the experimental and control groups received five weeks of actual class participation and practice prior to the pretest. At the conclusion of the five-week period, each subject in the experimental group and the control group received a pretest score on the front kick, roundhouse kick, and lunging side kick.

After each subject received a pretest score, each subject in the experimental group was videotaped performing the front kick, roundhouse kick, and lunging side kick one class session per week. Each subject performed 10 kicks of each of the three aforementioned kicks. Immediately following the taping session, the subjects in the experimental group viewed the tape with the instructor. The

instructor made comments concerning correct movements of the kicks and pointed out mistakes. The subjects in the control group performed the same number of kicks, but they did not receive the immediate videotape visual feedback. To equalize instruction time of the experimental group viewing the tape, the control group received a lecture from the instructor that addressed preventative self-defense suggestions. The subjects in the experimental group were videotaped one class session each week. During the other class period, both groups practiced the same techniques. This procedure lasted for three weeks. At the conclusion of this period, each subject received a posttest score on the front kick, roundhouse kick, and lunging side kick by the same three judges. The judges had no knowledge of which group they were judging.

Statistical Treatment

Mean scores and standard deviations were calculated for the three dependent variables (front kick, roundhouse kick, lunging side kick). An analysis of variance (ANOVA) with repeated measures was computed to determine differences between pre- and post-data between groups. The .05 level of significance was used to determine any significant differences.

CHAPTER 4

Results and Discussion

This chapter presents the results of data analysis comparing two groups who learned three eclectic martial arts kicks under two different teaching methods. The subjects were 60 female students who had registered to take beginning self-defense classes at Middle Tennessee State University. One group, designated the experimental group, learned the kicks using the traditional method of instruction plus immediate videotape visual feedback. The other group, designated the control group, learned the kicks using the traditional method of instruction with no visual feedback. Both of the groups were taught by the same instructor.

The 60 female subjects were randomly assigned to either the experimental group (N = 30) or the control group (N = 30). Both groups met for 50 minutes twice a week. Both groups received the same instruction for the first five weeks. This consisted of the groups practicing kicks, blocks, and punches. After this five-week period, the experiment began.

Each subject in both groups received a pretest score by three expert Black Belt judges (see Appendix B). The subjects received a score for each dependent variable: front kick, roundhouse kick, and lunging side kick. The judges had no knowledge of which group they were judging. The judges used the following scale frequently used in karate

tournaments: 1 = poor, 2 = fair, 3 = average, 4 = good, and 5 = excellent. After each subject received a pretest score, the independent variable of immediate videotape visual feedback was introduced to the subjects in the experimental group.

Each subject in the experimental group was videotaped performing the front kick, roundhouse kick, and lunging side kick. Each subject performed 10 kicks of each of the three aforementioned kicks. Immediately following the taping session, the subjects in the experimental group viewed the tape with the instructor. The instructor made suggestions for improvement concerning correct movements of the kicks and pointed out mistakes. The subjects were allowed to ask questions or make comments.

The subjects in the control group performed the same number of kicks, but they did not receive immediate videotape visual feedback. They were allowed to ask questions or make comments. The experimental group was videotaped once a week for three weeks. Both groups received the same instruction the next class period. At the conclusion of the three-week period, each subject in both groups received a posttest score on each of the three dependent variables. The same judges were used, as well as the same 1-5 common scale.

Means and standard deviations for all three dependent variables are shown in Table 1. The pretest scores indicate

Table 1

Mean Scores and Standard Deviations for the Experimental Group and the Control Group

	Experimental				Control			
Variable	Pre	SD	Post	SD	Pre	SD	Post	SD
Front kick	1.978	.454	3.255	.501	1.890	.640	2.844	.810
Roundhouse kick	1.501	.624	2.633	.756	1.689	.561	2.434	.774
Lunging side kick	1.488	.552	2.710	.699	1.610	.480	2.534	.741
Average	1.656	.443	2.866	.582	1.730	.461	2.605	.702

the judges' ratings of each group at the beginning of the study for each dependent variable. The posttest scores indicate the judges' ratings of each group at the conclusion of the study for each dependent variable: front kick, roundhouse kick, and lunging side kick.

Data Analysis

Thomas and Nelson (1990) state "Statistics cannot accept the research hypothesis. Statistics can determine only if the groups are different, not why they are different" (p. 129). For this study, an analysis of variance (ANOVA) with repeated measures was chosen as the instrument for data treatment. Each dependent variable was treated, and the area of treatment X interval F score at the .05 level of significance was used for possible interpretation. The ANOVA is an extension of the independent *t* test.

Front Kick

For the dependent variable of front kick, the experimental group started with a pretest score of 1.97 and finished after the three-week interval with a posttest score of 3.25. The control group started with a pretest score of 1.89 and finished after the three-week interval with a posttest score of 2.84. Although the experimental group started with a slightly higher score than the control group, it was not a significant difference at the .05 level, $F(1, 58) = .38$, $p = .54$. The value of .38 did not exceed

4.006 at the .05 level of significance. As shown in Table 2, the results of an analysis of variance show that there was a significant improvement for both groups, $F(1, 58) = 235.01$, $p \leq .001$. The experimental group improved significantly more than the control group at the .05 level of significance, as indicated by a significant interaction between groups and the pre-post measure, $F(1, 58) = 4.89$, $p \geq .05$. This translation is based on the fact that the value of 4.89 is greater than 4.006 at the .05 level of significance.

Roundhouse Kick

For the second dependent variable of roundhouse kick, the experimental group started with a pretest score of 1.50 and finished after the three-week interval with a posttest score of 2.63. The control group started with a pretest score of 1.68 and finished with a posttest score of 2.43. Although the control group started with a slightly higher score than the experimental group, it was not a significant difference at the .05 level, $F(1, 58) = 1.51$, $p = .22$. The value of 1.51 did not exceed 4.006 at the .05 level of significance. As shown in Table 3, for the second dependent variable of roundhouse kick, the results of an analysis of variance show that there was a significant improvement for both groups, $F(1, 58) = 154.42$, $p \leq .001$. The experimental group improved significantly more than the control group at the .05 level of significance as indicated by a significant

Table 2

Repeated Measures ANOVA for Front Kick

Source of variation	df	ms	F	Prob.
Groups (treatment)	1	1.865	3.09	.08
Between error	58	.603		
Pre-Post (interval)	1	37.341	235.01	.001
Treatment X interval	1	.778	4.89	.03
Within	58	.159		

Note: F needed for significance: .05 level 4.006.

Table 3

Repeated Measures ANOVA for Roundhouse Kick

Source of variation	df	ms	F	Prob.
Groups (treatment)	1	.001	.00	.972
Between error	58	.766		
Pre-Post (interval)	1	26.433	154.42	.0001
Treatment X interval	1	1.129	6.60	.013
Within	58	.171		

Note: F needed for significance: .05 level 4.006.

interaction between groups and the pre-post measure, $F(1, 58) = 6.60$, $p \geq .05$. This translation is based on the fact that the value of 6.60 is greater than 4.006 at the .05 level of significance.

Lunging Side Kick

For the third dependent variable of lunging side kick, the experimental group started with a pretest score of 1.48 and finished after the three-week interval with a posttest score of 2.71. The control group started with a pretest score of 1.61 and finished with a posttest score of 2.71. Although the control group started with a slightly higher pretest score, it was not significant at the .05 level, $F(1, 58) = 0.83$, $p = .36$. The value of .83 did not exceed 4.006 at the .05 level of significance. As shown in Table 4, for the third dependent variable of lunging side kick, the results of an analysis of variance show that there was a significant improvement for both groups, $F(1, 58) = 195.50$, $p < .001$. There was no significant improvement between the control group and the experimental group, as indicated by the interaction between groups and the pre-post measure, $F(1, 58) = 3.79$, $p \leq .05$. This translation is based on the fact that at the .05 level of significance the score of 3.79 is less than the required 4.006 needed for significance.

Discussion

A review of the literature on visual feedback in regard to its effect on numerous motor movements was inconsistent.

Table 4

Repeated Measures ANOVA for Lunging Side Kick

Source of variation	df	ms	F	Prob.
Groups (treatment)	1	.002	.04	.849
Between error	58	.611		
Pre-Post (interval)	1	34.518	195.50	.0001
Treatment X interval	1	.664	3.79	.056
Within	58	.177		

Note: F needed for significance: .05 level 4.006.

Although many different motor movements were investigated, some researchers reported significant gains using visual feedback, and others reported no significant differences. Based upon the findings and within the limitations of this study, it can be suggested that this study supported the aforementioned premise. No significant differences were found for any of the three dependent variables after the pretest was administered. These findings suggested that both groups started at essentially the same level of proficiency performing the three kicks at the pretest. For the dependent variables of front kick and roundhouse kick, the experimental group did improve significantly more than the control group at the .05 level of significance. For the dependent variable of lunging side kick, the experimental group did not improve significantly more than the control group at the .05 level of significance. In addition, both groups improved significantly at the .05 level from pretest to posttest for all three dependent variables. This suggested that both methods of instruction improved the performance of the three kicks.

Observations

The experimental group improved significantly more than the control group at the .05 level of significance for the two dependent variables of front kick and roundhouse kick. The experimental group did not improve significantly more than the control group at the .05 level of significance for

the dependent variable of lunging side kick. Thomas and Nelson (1990) stated that "The intensive firsthand presence of the researcher is the strongest support for validity in the data gathering process in qualitative research" (p. 349). This researcher noted the following:

1. For the dependent variables of front kick and roundhouse kick, the kicks were executed from a front stance. This could have been a more natural fighting position for the subjects before executing the front kick and the roundhouse kick.

2. For the dependent variable of lunging side kick, the kick was executed from a side stance. This could have been a more difficult stance for the subjects before executing the lunging side kick because the front portion of the body must be completely turned to either side. Although the body is turned to either side, the eyes and hands are positioned toward the front.

3. For the dependent variables of front kick and roundhouse kick, the kicks were executed with the back foot.

4. For the dependent variable of lunging side kick, the kick was executed with the front foot. Before the kick was actually executed, a lunging step had to be made, and immediately following the kick, the subjects had to quickly return to the original position.

5. Although the judges were very qualified and experienced (see Appendix B), all subjective scales have limitations.

6. Oxendine (1970) stated that motivation is one of the most widely accepted variables of human behavior and that people perform best when they are motivated. It is possible that the experimental group was more motivated at the posttest than the control group due to the fact that they viewed themselves on videotape. Watkins (1963) reported that the visual feedback group was more motivated than the control group based on self-reports. This researcher observed that the subjects in the videotape visual feedback group asked more questions concerning the kicks than the control group.

7. Practice could have affected the results. Although the subjects were instructed not to practice outside of class until the study was completed, it is possible some of them did. Thorndike (cited in Hilgard & Gordon, 1975) addressed the issue of proper practice and repetition in his law of exercise. It is logical to assume that if beginning subjects use proper practice with repetitive movements, increased proficiency of the movements could be improved. Both groups improved significantly for all three dependent variables from pretest to posttest.

8. The anxiety levels of the subjects could have played a role in their performance during the pretest and

posttest. Each subject had to execute the three kicks individually in front of the three judges. This researcher was also present, and it appeared that some of the subjects exhibited observable behavior associated with anxiety more than others. No instrument was used to determine the exact anxiety levels of the subjects.

CHAPTER 5

Summary, Conclusions, and Recommendations

The purpose of this study was to make a comparison between two groups of beginning female self-defense students using two methods of instruction. The 60 female subjects' ages ranged from 18 to 24 years, and none had any prior experience in self-defense. The students were randomly divided into either the experimental group (N = 30) or the control group (N = 30). Both groups met twice a week for 50 minutes for the duration of five weeks. During this five-week period, the subjects were taught the front kick, roundhouse kick, and lunging side kick by the same instructor. Other areas of self-defense were also taught, such as blocking, punching, and points of attack.

After this five-week period, each subject received a pretest score for the three dependent variables: front kick, roundhouse kick, and lunging side kick. Three Black Belt judges with experience in judging karate tournaments and belt promotions (see Appendix B) used a 1-5 common scale to give each subject in both groups a pretest score on each of the dependent variables. The judges did not know to which group the subjects were randomly assigned. The subjects in the experimental group (N = 30) received the traditional method of instruction plus immediate videotape visual feedback one day per week. The subjects in the control

group (N = 30) received the traditional method of instruction with no visual feedback.

The following null hypotheses were developed prior to the study:

1. There will be no significant difference between the experimental group who received the traditional method of instruction plus immediate videotape visual feedback and the control group who received the traditional method with no visual feedback in the performance of the front kick.

2. There will be no significant difference between the experimental group who received the traditional method of instruction plus immediate videotape visual feedback and the control group who received the traditional method with no visual feedback in the performance of the roundhouse kick.

3. There will be no significant difference between the experimental group who received the traditional method of instruction plus immediate videotape visual feedback and the control group who received the traditional method with no visual feedback in the performance of the lunging side kick.

Each female subject in both the control and experimental groups was pretested by three experienced Black Belt judges (see Appendix B) on each of the three dependent variables. No significant differences were found between the two groups at the conclusion of the pretest. This suggested that both groups started at essentially the same place in proficiency of each of the three dependent

variables. One day per week the subjects in the experimental group were videotaped performing the three dependent variables: front kick, roundhouse kick, and lunging side kick. Immediately following the taping session, the subjects viewed the videotape with the instructor. The control group executed the same number of kicks, but received no visual feedback. Both groups received the traditional method of instruction the following class period. This procedure lasted for three weeks.

After three weeks, each subject in both the experimental and control groups received a posttest score on each of the three dependent variables by the same three Black Belt judges. The pretest scores and the posttest scores were treated with an analysis of variance. An extension of the t test, it addressed the three null hypotheses that this researcher developed at the beginning of the study. The results yielded that both the experimental group and the control group improved significantly at the .05 level from the pretest to the posttest on all dependent variables. The experimental group improved significantly more than the control group on the dependent variables of front kick and roundhouse kick. There was no significant difference between the two groups on the dependent variable of lunging side kick.

Conclusions

Based upon the findings and limitations of this study, the following conclusions were drawn relative to the previously stated hypotheses:

1. Hypothesis 1 was rejected. Immediate videotape visual feedback added to the traditional method did increase the proficiency of performance of the front kick at the .05 level of significance.

2. Hypothesis 2 was rejected. Immediate videotape visual feedback added to the traditional method did increase the proficiency of performance of the roundhouse kick at the .05 level of significance.

3. Hypothesis 3 was accepted. Immediate videotape visual feedback added to the traditional method did not increase the proficiency of performance of the lunging side kick at the .05 level of significance.

In addition, both methods of instruction did increase the proficiency of performance of the front kick, roundhouse kick, and the lunging side kick from pretest to posttest. The results of this study were consistent with the research which indicated that videotape visual feedback appears to improve some motor movements, but not all of them. The conclusion is based on the fact that in this study the experimental group that received videotape visual feedback did improve significantly more for the front kick and roundhouse kick, but not for the lunging side kick.

Recommendations

The following recommendations were developed as a result of this study:

1. It is recommended that this study be duplicated using only males.

2. It is recommended that this study be duplicated using a mixture of males and females as subjects.

3. It is recommended that this study be duplicated using advanced students as opposed to beginners.

4. It is recommended that different age groups, such as children, be used as subjects using videotape visual feedback.

5. It is recommended that different camera angles be used for producing the visual feedback. This would provide the subjects with additional visual information.

APPENDIXES

APPENDIX A

INFORMED CONSENT FORM

APPENDIX A

INFORMED CONSENT FORM

Waiver Form

HEALTH, PHYSICAL EDUCATION, RECREATION AND SAFETY DEPARTMENT

MIDDLE TENNESSEE STATE UNIVERSITY

I, _____ have voluntarily selected to participate in this activity _____ offered by the Health, Physical Education, Recreation and Safety Department at Middle Tennessee State University.

I hereby release and discharge the instructor, _____, the Department, Middle Tennessee State University, the Board of Regents, State of Tennessee, and each and all their agents and employees from any liability whatever to the undersigned resulting from, or in any manner arising out of injury or damage which may be sustained by me, _____ on account of participation in this activity _____ or in the transportation in connection therewith.

Signed this _____ day of _____, 19___.

_____*
(Student)

_____
(Address)

*Student must be 18 or older; otherwise, release should be signed by parent or guardian.

APPENDIX B

JUDGES

APPENDIX B

JUDGES

1. Sue Abernathy

   -- 2nd degree Black Belt

   -- Experienced in judging karate tournaments and has participated in belt promotions

   -- Member of World Tae Kwon Do Association

   -- Experienced in teaching Tae Kwon Do karate

2. Jason Wilkerson

   -- 2nd degree Black Belt

   -- Experienced in judging karate tournaments and has participated in belt promotions

   -- Experienced in boxing, full contact fighting, and point fighting

   -- Experienced in teaching eclectic karate

3. Craig Smith

   -- 1st degree Black Belt

   -- Experienced in judging karate tournaments and has participated in belt promotions

   -- Experienced in boxing, full contact fighting, and point fighting

   -- Experienced in teaching eclectic karate

APPENDIX C

PHOTOGRAPHS

APPENDIX C

PHOTOGRAPHS