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Effects of Video Modeling on Skill Acquisition in Learning the Golf Swing

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EFFECTS OF VIDEO MODELING ON SKILL ACQUISITION IN LEARNING THE GOLF SWING

By

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GRADUATE COMMITTEE APPROVAL

of a thesis submitted by

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This thesis has been read by each member of the following graduate committee and by majority vote has been found satisfactory.

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As chair of the candidate's graduate committee, I have read the thesis of Joshua L. Smith in its final form and have found that (1) its format, citations, and bibliographical style are consistent and acceptable and fulfill university and department style requirements; (2) its illustrative materials including figures, tables, and charts, are in place; and (3) the final manuscript is satisfactory to the graduate committee and is ready for submission to the university library.

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ABSTRACT

EFFECTS OF VIDEO MODELING ON SKILL ACQUISITION IN

LEARNING THE GOLF SWING

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Master of Science

The purpose of this study was to determine the effects of video modeling on skill acquisition in learning the golf swing. One-hundred-eight college students participated in this study. All participants were pre-tested via videotaping to determine initial skill level. The pre-test videotaping was analyzed using DartTrainer software. Each participant was randomly assigned to one of three groups (1) control (2) single-view or (3) multi-view. Participants in the control group viewed a compact disc (CD) with a putting demonstration repeated 40 times. The participants in the single-view group viewed a CD with a front view only demonstration repeated 40 times of the golf swing with a driver. Participants in the multi-view group viewed a CD with a multi-view (front, back, left, and right) demonstration of the golf swing using a driver. The demonstration was performed by a golf professional and each view was repeated 10 times for a total of 40 repetitions.

After five weeks of CD viewing, practice, and class instruction, participants were video-taped to determine the level of improvement.

Factorial ANOVA (3 groups x 2 trials) indicated significant within group pretest to posttest differences ($F(1, 105) = 295.93$, $p<0.001$). Between group differences were also noted ($F, (2,105) = 18.33$, $p<0.001$). Post hoc analysis indicated significantly fewer posttest deviations in the MV group than in the control group ($p<0.001$). The single-view group also had fewer posttest deviations than did the control group ($p<0.001$). There were no significant differences between the multi-view and single-view groups. The current study suggests that video modeling provided on a CD, which a learner can access on their own, may significantly increase skill acquisition rate and performance in learning the golf swing.

Key Words: Modeling, Skill Acquisition, Golf Swing, Video

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Table of Contents

List of Tables

List of Figures

EFFECTS OF VIDEO MODELING ON SKILL ACQUISITION IN LEARNING THE GOLF SWING

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Abstract

The purpose of this study was to determine the effects of video modeling on skill acquisition in learning the golf swing. One-hundred-eight college students participated in this study. All participants were pre-tested via videotaping to determine initial skill level. The pre-test videotaping was analyzed using DartTrainer software. Each participant was randomly assigned to one of three groups (1) control (2) single-view or (3) multi-view. Participants in the control group viewed a compact disc (CD) with a putting demonstration repeated 40 times. The participants in the single-view group viewed a CD with a front view only demonstration repeated 40 times of the golf swing with a driver. Participants in the multi-view group viewed a CD with a multi-view (front, back, left, and right) demonstration of the golf swing using a driver. The demonstration was performed by a golf professional and each view was repeated 10 times for a total of 40 repetitions. After five weeks of CD viewing, practice, and class instruction, participants were video-taped to determine the level of improvement.

Factorial ANOVA (3 groups x 2 trials) indicated significant within group pretest to posttest differences ($F(1, 105) = 295.93$, $p<0.001$). Between group differences were also noted ($F, (2,105) = 18.33$, $p<0.001$). Post hoc analysis indicated significantly fewer posttest deviations in the MV group than in the control group ($p<0.001$). The single-view group also had fewer posttest deviations than did the control group ($p<0.001$). There were no significant differences between the multi-view and single-view groups. The current study suggests that video modeling provided on a CD, which a learner can access on their own, may significantly increase skill acquisition rate and performance in learning the golf swing.

Key Words: Modeling, Skill Acquisition, Golf Swing, Video

Introduction

Modeling and observational learning are a primary means of achieving behavioral changes and acquiring new motor skills. (Bandura, 1977; Bandura & Carroll, 1987). Modeling has been shown to be effective in learning and acquiring motor skills (Gould & Roberts, 1982). During observation, learners selectively take in information about spatial and temporal features of motor skills. From these observations a mental image is formed that serves as a cognitive reference to the learner. Once a cognitive model of reference has been formed, it becomes a standard of reference for future performances. Obtaining an accurate cognitive representation is necessary for proficient actions to be performed (Carroll & Bandura, 1990).

A strategy for organizing a mental model, proposed by Singer et al. 1989, includes readying, imaging, focusing, executing and evaluating. The aspect of imaging involves forming a mental picture of how the particular movement should be performed in the future. Studies have found that motor skill acquisition was enhanced by implementing this strategy and that imaging was a crucial aspect of the learning (Adams, 1971; Singer et al, 1989).

Verbal and visual demonstrations have been studied to determine their effects on learning motor skills (Anshel & Singer, 1980; Singer, Flora & Abourezk, 1989). Morrison and Reeve (1988) found that a video instruction group had higher mean scores in a skill analysis test compared to a traditional verbal instruction group. When comparing verbal and visual presentations Martens, Burwitz and Zuckerman (1976) found that visual demonstrations of motor skills were preferred over verbal ones. The golf swing is a complex activity involving subtle combinations of spatial and sequential features (Carroll & Bandura, 1982).

The golf swing could be considered a complex motor task because it requires proper balance, timing, and sequencing of gross and finite muscle groups. The complexity of the golf swing often scares potential golfers away from the sport (Mann, 1998). Schmidt (2000) has suggested that spatial orientation is important in many motor skills. Spatial orientation refers to being able to function while the body is inverted, rotating, in flight or at a certain height. During the golf swing the body is rotating and coiling in spatially and temporally specific ways in relation to the golf club. Spatial orientation adds to the complexity of the golf swing. Verbal instructions would likely be insufficient when teaching beginning golfers the golf swing. Studies have suggested that video modeling with an expert model can clarify specific movements that are difficult to convey through words (Martens et al., 1976; Pollock & Lee, 1992). Bertagna (2003) compared multi-view and single-view video modeling on the tennis serve and found that the multi-view group had significantly ($p<.001$) fewer deviations than did the single-view group. A deviation is a component of the movement that is not performed correctly. The golf swing occurs in 3-dimensional space. With regard to spatial orientation it seems reasonable to assume that a learner may benefit from observing single-view demonstrations and potentially gain even more from a multi-view modeling perspective. The multi-view observations may help the learner to form a more complete mental picture of the skill that is being learned.

Other studies have shown that video modeling improves the acquisition of motor skills and that the function of cognitive representations relating to the golf swing can be enhanced through video modeling. (Bouchard & Singer, 1989; Atienza et al. 1998; Williams 1989). The purpose of this study was to evaluate the effects of video modeling on the performance of the golf swing and to determine if multi-view modeling was more beneficial than single-view modeling.

Methods

Participants

One-hundred-eight college students (86 males and 22 females) enrolled in six beginning golf classes participated in this study. Participants who were enrolled in the six beginning golf classes had different instructors. In order to control for the effect of the teacher variability the participants in each class were randomly assigned to either the control, single-view modeling, or multi-view video modeling group.

Expert Model

A professional male and female golfer volunteered to demonstrate the golf swing for both the multi-view and single-view groups. The professional golf models participated on college golf teams and have professional teaching experience.

Experimental Procedures

The golf models were videotaped from four angles: (1) front view, (2) back view, (3) right view and (4) left view. The models were video taped using a digital camera; the video was then converted to MPEG files and burned onto compact discs to produce the multi- and single-view CDs. The front view was used for the single-view CD while all four angles were used for the multi-view CD. The multi-view CDs contained the above mentioned four views of the model and were repeated ten times from each perspective for a total of 40 repetitions. The single-view CDs contained the front view of the golf model repeated 40 times. Participants in the control group viewed a CD with a putting demonstration repeated 40 times. The male participants were given a CD of the male professional model while the female participants were given a CD containing demonstrations by the female professional.

After the initial skill level assessment each participant was given a CD containing images from one of the three groups. The participants in each group were asked to view their CD on a computer five days per week for five weeks. The CDs were approximately 3 minutes in duration. Participants kept a daily log to record the days they watched their CD and also to record how much time they spent outside of class practicing the golf swing. The participants received bi-weekly emails from the primary investigator to remind them to watch and record their CD viewing and practice time in the log book.

Pretest and Posttest

The pretest and posttest was a video recording of the participant performing the golf swing three times. Video footage was recorded from the front view of the participant in order to compare each participant with the professional model. Every swing was analyzed using Dart Trainer software© (Dart Fish, Atlanta, GA). This software allowed the video of the participant to overlay the video of the professional model and simultaneously play the professional's and participant's golf swings. Each participant was rated on 7 competencies. The competencies were based on common characteristics and movement patterns that produce consistent superior performance (Mann, 1998). The following is a list of the 7 competencies with a description of each.

Competencies

Grip - The index finger and the thumb create a “V” which should point to the right side of the head and no further than the insertion of the right deltoid muscle.

Coil - The coil is measured during the backswing of the participant in which a minimal lateral movement is allowed. The coiling emphasis is on moving the weight from the left to the right side. The weight should be placed on the inside of the right knee and the inside of the right heel.

Head- The head of the participant is to remain still and have no lateral or vertical movement until impact and follow-through.

Top - This competency is determined by the balance of the participant being over the right leg and the club pointed at the target. The left arm is nearly straight, hands out away from head. The right hip is moved away from the target line while maintaining a flex in the right knee.

Transition - This competency is measured when the hips to initiate the downswing and shift the body slightly forward toward the intended target.

Impact - For the impact competency nearly all of the weight should be shifted to the left side. This powerful move into impact should allow the body to move well in front of the setup position. The shoulders and the head should also return to the same position they began at setup and the lower body moves out of the way of the upper body, enabling the upper body to produce an inside path.

Follow-through - During follow-through the weight should be on the front foot with the hips facing the target while the shoulders have rotated past the hips. The right and left arms and hands have gone to the left and behind the head.

Three swings from every participant were analyzed and the numbers of deviations from the competencies were averaged for both the pretest and the posttest respectively. A deviation was defined as an aspect of the golf swing which was not performed correctly compared to a specific competency.

The pretest was recorded on the fourth scheduled day of the golf classes. The posttest was administered five weeks after the pretest. Consistency in recording was maintained by having participants stand on a four foot by four foot practice mat with a plastic golf tee in the middle. The camera was positioned fifteen feet from the closest edge of the practice mat to ensure the entire range of motion of the golf swing would be captured by the camera.

Data Analysis

Group means and standard deviations were calculated for pretest and posttest deviations, practice time (min/wk) and video watching (days/wk) in each group (Table 1). Preliminary analyses of the participant's deviation measurements showed that all participants were beginners being defined as 4 or more deviations. A factorial ANOVA (3 groups X 2 trials) was used to determine any within and between group differences among the control, single-view and multi-view groups. A post hoc Tukey test was used to determine the within and between group differences in the pretest and posttest.

Results

There were no significant differences between the groups on pretest deviations (Table 1 and Figure 1). Factorial ANOVA (3 groups X 2 trials) indicated significant within group pretest to posttest differences ($F(1,105) = 295.93$, $p<.001$). Between group differences were also noted ($F(2,105) = 18.33$, $p<.001$) (Table 2). Post Hoc analysis indicated significantly fewer posttest deviations in the multi-view group than in the control group ($p<.001$). The single-view group also had fewer posttest deviations than did the control group ($p<.001$). There were no significant differences between the single-view and multi-view groups ($p = .253$). A significant interaction effect ($F(2,105) = 32.65$, $p<.001$) indicated a change in the rate of improvement between groups (Table 1) and the need for a post hoc follow up analysis. As can be seen in Table 4 and Figure 1, all groups improved significantly from pretest to posttest ($p<.001$).

The potential confounding effects of practice time and video watching was tested using analysis of covariance. Results indicated that neither of these variables contributed significantly to the treatment effect of group assignment.

Discussion

The main findings of this study suggest that participants in both treatment (SV and MV) groups improved significantly more and at a faster rate than did CG in their performance of the golf swing. The results of this study suggest that class instruction is sufficient to improve a beginning golf swing, but when that instruction is augmented by watching repetitions of an expert model there is significant improvement in the performance of the golf swing.

Unlike the study by Bertagna (2003) there was no difference in improvement between the single-view and multi-view groups. Possible explanations for non-significant differences between the treatment groups may be related to the complexity of the golf swing combined with the lack of problem solving capacity of novice learners. In other words the additional information provided to the learner by the multi-view demonstration was not beneficial when compared to the single-view demonstration. This could have been because novice learners, unlike more advanced learners, do not have enough experience to recognize the relevant cues provided by multiple views in an observed demonstration of a complex motor task. The single-view demonstration alone provided enough information for the learner to make improvement in the golf swing (Schmidt & Wrisberg, 2004, p. 225).

To overcome the problem of information overload by observation of a complex motor skill, Schmidt and Wrisberg (2004) suggest the use of cueing techniques. One such technique is attentional cueing. Attentional cueing refers to a verbal cue associated with a visual demonstration. For example, while demonstrating the golf swing, the demonstrator would point out verbally what the hands do during the motion of the swing or how the weight transfers from back to front during the backswing and follow-through. Using video modeling and attentional cueing may be more effective at conveying information about motor skills, particularly for beginners in a multi-view demonstration situation. Future research should consider cueing techniques in an effort to enhance the effect of viewing a multi-view demonstration.

Modeling has become one of the most effective and common methods for providing instruction in physical education classes. Video modeling provides the student with a representation of the action to be performed (Sheffield, 1961). This representation then serves as a perceptual reference that the student can retrieve to compare their own concurrent actions against. There is potential benefit to the learner of having a CD of an expert model to use as a learning tool for skill acquisition. Learning motor skills is a problem solving process that can be facilitated through viewing repetitions of a model (Adams, 1971; Schmidt, 1975).

One of the main responsibilities of physical education instructors and coaches is to assist beginning learners in acquiring motor skills. In order to do this a teacher/coach must have a basic understanding of the skill that is being taught and be able to provide effective demonstrations (Gould & Roberts, 1982). Video modeling provided on a CD, which a learner can access on their own, may significantly increase skill acquisition rate and performance in learning the golf swing. Furthermore, the effect of multiple views was not evident.

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Table 1 Descriptive Statistics

	A Control Group (N=34)		B Single-View (N=37)		C Multi-View (N=37)	
Variable	M	(± SD)	M	(± SD)	M	(± SD)
Pretest Deviations	6.18*	(.79)	6.32*	(.83)	6.39*	(.84)
Posttest Deviations	5.50[BC]	(1.05)	3.89	(.84)	3.51	(.96)
Practice (min/week)	199.56	(82.70)	226.76	(73.86)	221.35	(48.56)
Video (days/week)	1.31 [BC]	(2.87)	4.02	(4.88)	4.40	(4.73)

Superscripts indicate significant between group differences ($p<.001$)

*Indicates significant pre- to posttest difference ($p<.001$)

Table 2 Factorial ANOVA Analysis

Source	SS	df	MS	F	P	R^2
Group	31.41	2	15.71	18.33	<0.001	0.259
Error	89.95	105	0.857			
Trials	214.42	1	214.42	295.93	<0.001	0.738
Interaction	47.31	2	23.65	32.65	<0.001	0.383
Error	76.07	105	0.725			

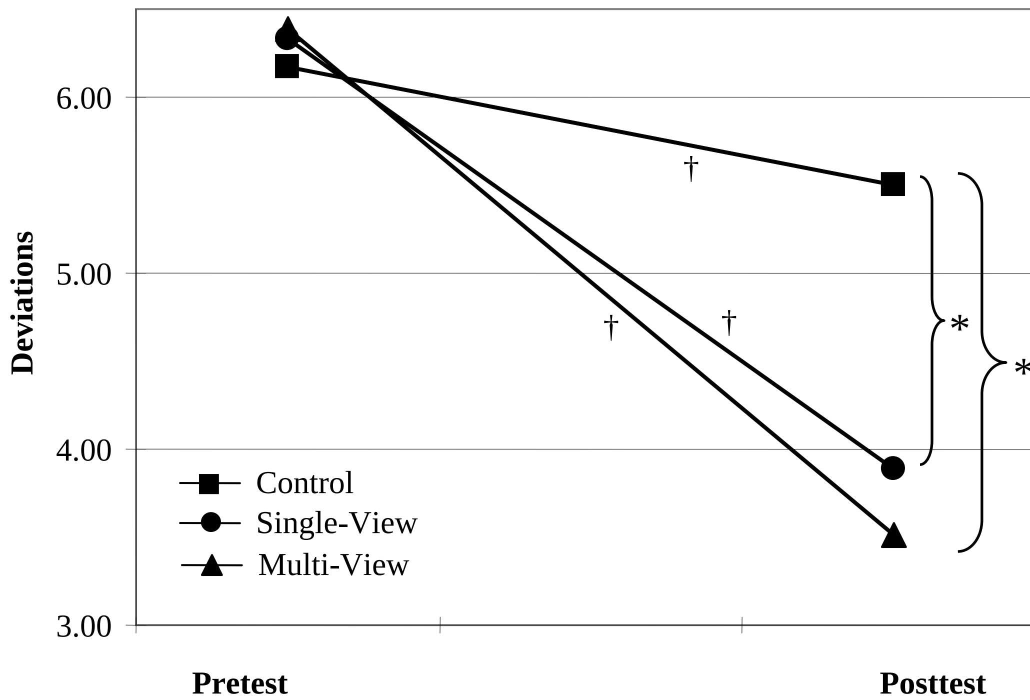
Table 3 Post Hoc Comparisons of Posttest Between Groups (Tukey)

Group	Mean Difference	Standard Error	P
Control vs. Single-View	0.73	0.155	<0.001
Control vs. Multi-View	0.888	0.155	<0.001
Single vs. Multi-View	0.158	0.152	0.556

Table 4 Post Hoc Comparisons of Pretest to Posttest Within Groups (Tukey)

Trials	Mean Difference	Standard Error	P
Control pre to post	0.676	0.532	<.001
Single-view pre to post	2.43	0.388	<.001
Multi-view pre to post	2.87	0.388	<.001

Figure 1 Main and Interaction Effects for Factorial ANOVA



† Indicates significant within group difference from pretest to posttest, p<.001

* Indicates significant differences between control/single-view and control/multi-view in posttest results, p<.001.

Appendix A

Prospectus

Chapter 1

Introduction

Modeling is a primary means of achieving behavioral changes (Bandura & Carroll, 1987). Through observing others, new rules and patterns of behavior can be learned (Bandura, 1977). Observational learning has been shown to be an effective tool in acquiring skilled actions. Not only does learning become more effective, but also the time required to learn a new skill is attenuated (Gould & Roberts, 1982). Social cognitive learning theories (Adams, 1971 & 1984; Bandura, 1977, 1986; Carroll & Bandura, 1985) cite four main processes by which learning takes place. The areas that mediate observational learning are attention to modeled events, retention of what is observed, ability to replicate modeled behavior, and motivation to reproduce those behaviors (Bandura, 1986). During observation, learners selectively take in information about spatial and temporal features. From these features a model is formed in their minds that serves as a cognitive reference. Once a cognitive model of reference has been formed, it becomes a standard of reference for future performances. Obtaining an accurate cognitive representation is necessary for proficient actions to be performed (Carroll, Wayne & Bandura, 1990).

All of the changes an individual makes in their motor skill performance derive from a cognitive mechanism. This cognitive mechanism of self-efficacy is best utilized and implemented through effective practice. Practice does not make perfect, instead practice makes permanent and perfect practice would thus make perfect. In order to progress and achieve higher levels of skill, a better cognitive model needs to be created in the minds of beginners. The learner observes the differences between the model's actions or movements and their own to determine which responses are appropriate in which settings (Bandura, 1977). The most effective models for beginners to observe in golf do not have to be golf professionals who have a near perfect swing, rather a simple model with few errors (Pollock & Lee, 1992).

The golf swing is perhaps one of the most difficult motor skills to perform because it requires proper balance, timing and sequencing of gross and finite muscle groups. Beginning golfers have the task of organizing a cognitive reference for all parts of the golf swing. A five-step strategy, which includes readying, imaging, focusing, executing and evaluating, has been used to help novice learners perform motor skills better (Singer, Flora, Abourezk, 1989). Imaging involves forming a mental picture of how the particular movement should be performed in the future. Singer et al. (1989) found that by implementing the five-step strategy motor skill acquisition is enhanced. One of the main problems in teaching a new motor skill to novices, in beginning college physical education courses, is that beginners do not know how to effectively use their mental capacities, meaning that beginning level learners do not form or use problem-solving strategies in learning a new motor skill. (Adams, 1971; Singer et al, 1989). It would be ideal to teach learners one on one how to learn and effectively problem-solve, but time restraints and class size prevent such personal interventions.

The primary objective in executing the golf swing is to produce maximum distance, accuracy, control and consistency in each shot. This requires a specific sequencing of the body from three major phases: (1) the preparation phase, (which includes grip, posture, stance, and ball position), (2) the back swing and downswing, (which make up the execution phase) and (3) the recovery or follow-through phase. (Maddalozzo, 1982)

Two main problems inhibit learning among beginning golfers. First, beginning golfers are easily confused by the complexity of the golf swing. Schimdt (2000) discussed the idea of spatial orientation and the importance of being able to function while the body is inverted, rotating, in flight or at a certain height. Spatial orientation adds to the complexity of the golf swing. Verbal instructions alone are insufficient to teach beginning golfers the full golf swing. Modeling is an effective way to teach motor skills in golf because actions are often difficult to convey through words (Pollock & Lee, 1992). The second problem facing college classes with beginning golf students is the amount of personal feedback/teaching time they receive from the instructor.

A solution to both of these problems is video modeling. Bouchard and Singer (1998) tested the performance and retention of the tennis serve among 63 university students who classified themselves as recreational tennis players. Each participant was given a videotaped recording of a tennis professional performing the tennis serve. This particular study found that performance and retention increased among all groups. In another 24-week study, physical practice, mental imagery and video modeling when combined, were shown to improve performance in the tennis serve (Atienza, Balaguer, Garcia-Merita 1998). Modeling can also effectively convey the particular demands of the motor skill to be learned (Martens, Burwitz, Zuckerman, 1976). Video recordings, of a golf professional, from one or multiple angles may effectively help students learn proper sequencing and spatial orientation of the golf swing. The main focus of this study will be to determine if singleview or multiview video modeling supplements enhance the ability of beginning golfers to learn the golf swing correctly.

Statement of the Problem

This study will examine the effect of multiview video modeling versus singleview modeling on the acquisition and performance of the full golf swing in beginning golf students.

Hypothesis and Null Hypothesis

Hypothesis: There will be significant differences between the multiview video and the singleview modeling approach in skill acquisition, retention and performance of the full golf swing.

Null: There will be no significant differences between the multiview video and the singleview modeling approach in skill acquisition, retention, and performance of the full golf swing.

Operational Definitions

Multiview video modeling - A method of teaching motor skills where the learners, through use of videos, view a modeled demonstration of the skill to be learned from the (a) front, (b) back, (c) right, and (d) left sides or perspectives.

Singleview video modeling - A method of teaching motor skills where the learners, through use of videos, view a modeled demonstration of the skill to be learned from one angle or perspective.

Skill acquisition - Comparison between pre-posttest performances using statistics to determine the amount of learning that occurred.

Retention - Statistical comparison between post test and follow up scores to determine performance and recall of the skill after the learning process is completed.

Deviations - Any aspect of the full golf swing form that is not performed correctly. Deviations are determined by comparing beginners' golf swings against an expert model.

New Skill - In learning motor skills a new skill is one that has not been formally practiced or rehearsed with feedback from an instructor, teacher or coach.

Cognitive procedures - Any process or method of forming a visual and mental model or mental image of a motor skill.

Assumptions

1. The golf swing is a new skill for all participants.
2. Participants have had little or no formal instruction in golf.

Delimitations

1. All participants are enrolled in spring and summer 2004 beginning golf classes at Brigham Young University.
2. The majority of subjects are Caucasian.
3. The majority of subjects are male.
4. All subjects are between the ages of 18 and 26.

Limitations

1. Lack of control for past experiences and exposure to the game of golf.
2. Athletic and learning abilities vary among individuals.

Significance of the Study

The results from this study may encourage teachers and students to implement video modeling in teaching and learning of new motor skills. Teachers can use video recordings to supplement one-on-one teaching time with students. Students can view recorded images of the golf swing to enhance their learning experience in beginning golf classes.

Chapter 2

Review of Literature

The learning of movement sequences and motor skills have their theoretical roots in behavioral theories. Behavioral changes, particularly motor skills, are derived from a common cognitive mechanism. Motor skills are overt physical responses to observations. Much of human behavior is developed through modeling (Bandura, 1977). Through observation individuals use trial and error experiences to determine the correct response or behavior for different situations (Dulany, 1958). Albert Bandura, one of the leading experts on human modeling, introduced a theory called the self-efficacy theory in 1977. Efficacy simply means the power or capacity to produce a desired effect. The theory of self-efficacy is based on the principle assumption that cognitive procedures, independent of their form, serve as means of creating and strengthening expectations of personal efficacy (Bandura, 1977). Observational learning is a means by which individuals can strengthen or create personal efficacy. This personal power or capacity to produce a desired effect is most readily altered through effective performances.

Thorndike (1911) suggested through his law of effect that performances can be rewarded and punished. To reward a correct response a teacher or coach would say “right” and after an incorrect response say “wrong.” In this manner rewarding or focusing on the positive and allowing the incorrect responses or actions to drop out could elicit a desired response. Food, water, and electric shock are some of the events that helped produce a desired response among animals. In humans anything that reinforces an appropriate response, in particular an appropriate action or movement, is often called knowledge of results (Adams, 1971). In the early stages of learning humans guided their motor skills with verbal responses, which in essence reflect Thorndike's law of effect.

In order to guide and direct motor learning open and closed-loop systems of feedback are used. In learning motor skills a closed-loop system uses feedback, error detection and error correction. The main idea behind a closed-loop system is that it is self-regulating. In other words the person performing the motor skill uses error detection to improve performance of the motor skill. A closed-loop motor skill must be error centered with a reference mechanism against which feedback can be given (Adams, 1968). The golf swing is an example of a motor skill that uses closed-loop feedback. Beginning golf students are given a demonstration of the golf swing and then they are allowed to practice. The demonstration given by the instructor serves as a cognitive reference point for the golfers to duplicate through their own movements. During class instruction and practice the teacher gives qualitative feedback. After several weeks of instruction, the feedback begins to be more quantitative in nature, meaning that the feedback given is more descriptive in error detection. Both types of feedback, qualitative and quantitative, in the closed-loop system of golf serve as knowledge of results for the student to perform error correction or problem solving (Adams, 1971).

Verbal and visual demonstrations have been studied to determine the effects on learning motor skills (Anshel & Singer, 1980; Singer, Flora & Abourezk, 1989). One particular study conducted by Morrison and Reeve (1988) found that a video instruction group had higher mean scores in a skill analysis test in comparison with a traditional verbal instruction group. When comparing verbal and visual presentations Martens

(1975) found that visual demonstrations of motor skills were preferred over verbal ones. The reason for this is language or verbal instructions on how to perform a motor skill are unable to specify critical aspects of human movement with precision (Martens, Burwitz, & Zuckerman, 1976). An important aspect of visual demonstrations is the skill level of the model. One influential study (Pollock & Lee, 1992) found that progress in motor learning is not dependant upon the skill level of the model. Instead learners continue to build their level of movement knowledge using guided feedback until an understanding of what to do was reached (Singer & Pease, 1979). This applies specifically to the golf swing, which is a complex activity involving subtle combinations of spatial and temporal features (Carroll & Bandura, 1982).

A persistent problem in the learning of the golf swing is that golfers cannot observe their own actions. The movement pattern is outside of their field of vision (Bandura, 1977). To test the impact of video modeling and field of vision Carroll and Bandura (1982) randomly assigned participants to groups in which each participant was instructed to wear a pair of safety goggles with the lenses cut out and the sides darkened. The purpose of this was to block each participant’s view and ensure the movements were outside their field of view. Participants watched an abstract movement pattern six times. After each visual demonstration there were verbal instructions given on how to complete the movement. One of the treatment conditions included visual feedback or knowledge of results and visual demonstrations of the motor skill. This group was able to view a recording of their own movements, and they were asked to rate the similarities of their movements with the modeled demonstration. This particular group had significantly more accurate results, $p < 0.01$ than did the non demonstration group. (Carroll & Bandura, 1982; Carroll & Bandura 1985). Individuals who receive concurrent visual and verbal demonstrations are able to more easily and precisely reproduce the movement pattern to be learned. (McGuire, 1961; Sheffield & Maccoby, 1961).

Atienza et al. (1998) analyzed video modeling and its effects on the tennis serve using groups of 9- to 12-yr-old tennis players. A physical practice group was compared against video modeling and plus physical practice group. The difference among a pretest and posttest comparison between groups indicated that there were significant differences in the degree of deviations, such as serving. Those who used video modeling and plus physical practice improved in their technique of serving. Video modeling has also been shown to be an effective primary means in the acquisition of throwing actions in baseball (Williams, 1989). Video modeling of an arm-movement pattern was presented to 12 men and 12 women. Each of the subjects was asked to reproduce the movements they saw on the video demonstration and each was tested twice to measure the accuracy of reproduction of the arm throwing movement. Results showed significant improvements in accuracy of movement sequencing. Videotape modeling has also been shown to be an effective means of improving retention of previously learned motor skills. Bouchard and Singer et al. (1998) used videotape modeling among 63 recreational level tennis players and measured acquisition and retention of the tennis serve. Results showed significant improvements in posttest measurements among all subjects.

Modeling is an effective method for teaching motor skills. The details of complex movements that are difficult to verbalize can be learned more efficiently through demonstration (Pollock & Lee, 1992). Cognitive references about the golf swing that the learner needs to develop can be enhanced through video modeling. Bertagna (2003) compared multiview and singleview video modeling with the tennis serve and found that the multiview group had significantly ($p<.01$) fewer deviations than did the singleview group. The purpose of this study is to evaluate and record the effects of singleview and multiview video modeling on the acquisition of the golf swing.

Chapter 3

Methods

Participants

One hundred college students (50 males and 50 females) who are enrolled in six beginning golf classes at Brigham Young University will participate in the study. Students will be randomly assigned to one of the three groups (multiview group, singleview group or control group).

Informed consent from the participants will not be necessary since the study will be conducted in an established educational setting as part of the class curriculum. Confidentiality will be maintained by assigning students a random number to identify individuals during data collection and randomization of groups. Approval to use human subjects in this study will be sought from Brigham Young University's Institutional Review Board.

Expert Model

A gender specific model will be used to demonstrate the full golf swing for the singleview and multiview groups. Two expert models, one male and one female, will be used in the singleview and multiview groups. The male participants will view another male performing the golf swing, while the female participants will view a professional female model.

Testing

The pretest and posttest test will consist of videotaping each subject performing three full golf swings. Each of these swings will be performed to the best of their ability without any concurrent coaching or feedback. The participants' swings will be analyzed using Dart Trainer computer software program. Dart Trainer software allows pretest and posttest images to be layered over one another and compared against the expert model to determine the number of deviations or swing competencies. A deviation is defined as an aspect of the golf swing which was not performed correctly. Deviations will be measured using a scale of specific sequences of the body from three major phases: (1) the preparation phase (which includes grip, posture, stance, and ball position), (2) the back swing and downswing (which make up the execution phase) and (3) the recovery or follow-through phase. The measured deviations will be as follows: (a) head location (b) left wrist and hand angle (c) left knee to ankle distance (d) contact point of club head (e) hip rotation. (George, 2004; Mann, Griffin, 1998) For each deviation performed incorrectly one point will be given to each participant. A total of five deviation points will be possible.

The pretest observation will be recorded during the second week of class. The posttest observation will be taken on the fifth week of class.

Procedures

The male and female expert model will be used to create two separate videotapes. The singleview procedure will include a videotape of the expert model from one angle. The multiview video recording will contain four different angles: front view, back view, left and right side views. Students will be randomly assigned to one of the three groups. The three groups will be the control group, singleview group and the multiview group.

Each participant will be asked to view the video recording, the control group, singleview or multiview for five weeks. Participants will be asked to view the CD every day of the week for five weeks. The participants in the singleview group will view the front view forty times. Participants in the multi view group will view each of the four positions ten times. The control group will receive a putting CD and regular class instruction. The control group will be asked to view the putting CD every day of the week for four weeks. The purpose of the putting CD is to control for the amount of time spent outside of class working or studying the golf swing that the singleview and multiview groups. The total time involvement in the viewing process is three minutes per day. The three minutes per day is in addition to class instruction.

Design and Statistical Analysis

Independent variables in this study will be the three separate teaching approaches. The three teaching approaches to be used will be a control group, singleview group and multiview group. The dependent variable in this study will be the ability to perform the full golf swing. A one-way ANOVA will be used to determine the differences between groups in pretest and posttest. A two-way ANOVA will be used to statistically analyze the difference between skill acquisition and skill retention. Significance will be measured at the $p < 0.05$ level.

Findings

After completing the statistical analysis all findings and results will be recorded and listed. Conclusions and recommendations will be made based upon the findings and results.

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