THE EFFECT OF EXTERNAL FOCUS CUE INSTRUCTION ON RETENTION OF GOLF SWING PERFORMANCE

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THE EFFECT OF EXTERNAL FOCUS CUE INSTRUCTION ON RETENTION OF GOLF SWING PERFORMANCE

A Thesis

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Abstract

of

THE EFFECT OF EXTERNAL FOCUS CUE INSTRUCTION
ON RETENTION OF GOLF SWING PERFORMANCE

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Rhonda M. Mohr

Physical educators and coaches of all sports have long been breaking down motor skills while teaching in order to maximize learning. Part of that process involves the use of attentional cues, giving students and athletes cues on which to focus. Studies show that for the learning of complex skills internal focus cues, often used for teaching golf, may not be the most effective in terms of performance and retention. When learning complex skills, external focus of attention is the preferred method (Bell & Hardy, 2009; Wulf, 2008; Wulf, Lauterback, & Toole, 1999; Wulf, Shea, & Park, 2001; Zentgraf & Munzert, 2009). It appears that having an external focus would lead to better performance and acquisition (Bell & Hardy, 2009).

This study compared the retention from learning to hit a golf ball by internal focus cues, external focus cues, and no attentional focus cues. The purpose was to determine if giving external focus cues during the acquisition stage of learning a golf motor skill would produce a better performance and retention of that skill. Twenty high school physical education students (males = 9, females = 11) with no or little prior experience playing golf participated in three skill lessons and a retention test after 60 days. The skills
The test task was to hit a golf ball as close to a target as possible using a nine iron. Instruction was given using different attentional focus cues according to their assigned group. The average age of the participant was 15.81. Participants were randomly placed in one of three groups, external focus of attention, internal focus of attention or the control group. Participants were given a skills test prior to receiving three lessons. After each lesson a skills test was administered. After 30 and 60 days from the last lesson another skills test was performed to measure retention. There was no significant difference in the novice golfers’ performance or retention of the golf skills based on any focus of attention instructions. These findings were discussed in relation to motor learning and practical issues of golf instruction and physical education classes.

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Chapter 1

INTRODUCTION

Physical educators commonly demonstrate and give verbal instructions as a way of teaching motor skills. The instructional cues given during the beginning of the acquisition stage strongly impacts both performance and learning (Zentgraf & Munzert, 2009). Educators believe that for an individual to acquire and execute complex motor skills, a performer must know what they are doing; a knowledge base must be acquired about the skill during the initial stage of learning (Poolton, Maxell, Masters, & Raab, 2006).

The current model for learning and improving golf performance focuses on swing and short game techniques. The golf industry has relentlessly stated individuals must have a great swing and use the right equipment to play better. The use of video and fast cameras captures the swing allowing analysis in infinite detail, encouraging golfers to work endlessly to perfect swings and buy the latest technology.

Novice golfers spend time working on the mechanics of the chip, putt and full swing, trying to “groove in” the motion. When learning to play golf, some attention has to be toward the proper grip, stance, balance and swing of performing the skill (Madonna, 2001). Golf instructors and physical educators often rely on giving instruction and feedback to novice golfers through internal attentional focus cues, which directs a person’s attention inward to thoughts, feelings, body mechanics and movements (Weinberg & Gould, 2007). Internal focus cues for teaching golf skills sound like, “Your
spine is lightly tilted, your knees are slightly flexed, and your arms are suspended” (Madonna, 2001, p. 126).

Internal focus of attention (IFA) cues are useful throughout the acquisition stage, helping the student utilize her/his body movements to perform with proficiency. When a student’s performance shows a basic level of skill, the instructor often will start to teach how to assess the external environment and aim at a target, requiring an external attentional focus. Coaches give the following advice for external focus, “Putt up and down the ladder: hit one ball to the 3-foot mark, hit another to the 6-foot mark, on up to 12 feet” (Madonna, 2001, p.122).

As a student becomes more proficient in their golf swing, with practice and experience, their conscious thinking processes can move to automatic (unconscious) control of their physical actions. Consistent practice can change a skill that requires constant thinking to one that does not, which frees attention to other aspects of the situation (Weinberg & Gould, 2007). However, teaching the learner a large amount of knowledge on how to perform is not the most productive method of acquiring a motor skill (Liao & Masters, 2002; Maxell, Masters, & Eves, 2003; Poolton et al., 2006). According to recent studies, giving IFA cues does not promote the best performance as compared to giving EFA cues (Bell & Hardy, 2009; Wulf, Lauterbach, & Toole, 1999).

Studies show that external focus of attention (EFA) results in promotion of greater automaticity in movement control and is explained by the constrained action hypothesis (Lohse, Sherwood, & Healy, 2010; Vance, Wulf, Tollner, McNevin, & Mercer, 2004; Wulf, Shea, & Park, 2001). The constrained action hypothesis suggests that when
focusing on one’s movements (internal focus), a performer may actually constrain, or interfere with, automatic control processes that would normally regulate the movement. EFA allows the motor system to more naturally self-organize and therefore produce a better performance (Wulf, 2007; Wulf & Su, 2007).

In direct contrast to studies favoring EFA, Perkins-Ceccato, Passmore, and Lee (2003) demonstrated that low-skilled golfers performed better with the internal focus instructions in comparison to the external instructions. However, when testing skilled male golfers, Wulf and Dufek (2009) found that directing attention to the movements of a certain body part seems to constrain the motor systems, which eliminates the automaticity.

Task difficulty can change the effectiveness of external focus when performing a motor skill (Wulf, Tollner, & Shea, 2007). When a task is challenging, the performers’ attention will resort to using motor skills they have already learned in order to perform the task and control their movements. Age proves not to be a factor as young adults show EFA more effective while learning motor skills and for older adults it is effective in enhancing balance (Chiviacowsky, Wulf, & Wally, 2010).

Research has found an advantage for an EFA in motor control and learning. A study performing bicep curls using Electromyography (EMG) determined differences between external and internal focus conditions existed and could be manifested and measured at the neuromuscular level (Vance et al., 2004). EMG activity was reduced when performers adopted an external focus, focusing on the curl bar. Authorities suggest
external focus on motor skills will not only improve performance but can help to conserve energy during a sport competition or motor activity.

While giving EFA instructions and feedback is different from the way physical educators have traditionally taught sport skills, the effectiveness should be explored in a learning environment. Denny (2009) encourages instructors to allow students to explore and discover the best way to perform motor skills and to give external focus of attention instructions and feedback. Is the use of external focus of attention instructions during acquisition with a novice golfer the best way to learn golf skills when teachers have traditionally used internal focus of attention? Research tells us that external focus of attention promotes a better performance. What has not been fully explored is whether EFA promotes a better performance and retention after an extended period from the last instruction and skills test.

**Purpose of the Study**

This study will compare the retention from learning to hit a golf ball by internal focus cues, external focus cues, and no attentional focus cues. The purpose of this study is to determine if giving external focus cues during the acquisition stage of learning a golf motor skill will produce a better performance and retention of that skill.

**Significance of Study**

Physical educators, coaches and golf instructors have long been breaking down the motor skills of golf and other sport skills while teaching students. The internal focus cues for teaching golf may not be the most effective in terms of performance and retention. Studies show that for the learning of complex skills, external focus of attention
is the preferred method (Bell & Hardy, 2009; Wulf, 2008; Wulf, Shea, & Park, 2001; Wulf et al., 1999; Zentgraf & Munzert, 2009). It appears that having a distal external focus leads to better performance and acquisition (Bell & Hardy, 2009). Physical educators and golf instructors proclaim success if the student is able to show how to perform the swing instead of the outcome of their performance. If the golfer does not hit their target or hit the ball the distance needed for proper execution, they are told by the instructor that at least they swung the club properly and those objectives will come in the future after practicing. The retention of students who have been taught under internal and external focus cues will be studied to examine which method produces a better performance and retention after an extended period has passed from the last lesson and skills test. This study will help to understand the retention levels of internal and external focus of attention instruction when incorporated within the acquisition stage. Therefore, students and athletes will have an opportunity to have greater success with their performance and retention in order to enjoy golf as a life-long activity.

Definition of Terms

Acquisition: The direct observation of those practice experiences designed to influence the learning of a skill.

Distal external focus: Focus explicitly on the target, in particular the direction in which the participant intended to send the ball and the flight of the ball.

Electromyography (EMG): An electrical recording of muscle activity.

External focus of attention: Focus on the environmental cues, such as wind, distance, the golf ball or the clubhead.
Internal focus of attention: Participants focus on the arms of the swing.

Motor program: The plan of action developed by the cerebral cortex and initiated by the motor cortex.

Neuro-muscular system: The muscles of the body together with the nerves supplying them.

Performance: Qualitative or quantitative assessment of what can be observed during the execution of a skill.

Proximal external focus: Focus on the clubhead through the swing, specifically to keep the clubface square through impact.

Retention: The persistence of improvement in the performance of a skill over a period of no practice and interpreted as a measure of learning.

Somatosensory (cortex): Portion of the parietal lobe of the cerebral cortex involved in sensory perception.

Limitations

1. The skills test and retention measures are only representative of the sample group used in the investigation.

2. Individuals may have different perceptions about their own ability that classifies them as novice golfers.

3. Athletic and learning abilities vary among individuals.

4. Individuals may take an interest in the sport and practice more than allowed.

5. Weather conditions per day may vary between groups and affect learning.

6. Individual maturity levels may vary and affect motivation.
Delimitations

1. The researchers will make no mention to the participants about the other groups and the attentional focus each is required to act upon.

2. Each individual will have the same learning surface and equipment.

3. All individuals will have the same expert model.

4. Instruction will be the same for all groups on basic training in grip, stance, balance, and swing technique.

Assumptions

1. It is assumed the internal focus group will have more cues to rely on in order to perform.

2. It is assumed all golfers will be shown how to address the ball/stance, grip and balance and therefore have the same basic instructions.

3. It is assumed that during experimentation all students will participate to maximize potential golf benefits.

4. It is assumed that all participants will answer and return the surveys.

Hypotheses

It is predicted that learning a golf skill through external focus of attention will provide retention of that skill. Performance and retention by the external focus group will be greater than the significant value between all groups, (internal, external and control), after a delayed retention test two months after the last lesson.
Research shows that for learning complex skills, external focus of attention is the preferred method (Chiviacowsky et al., 2010; Poolton et al., 2006; Wulf et al., 1999; Wulf et al., 2001). That is, inducing an external focus results in performance advantages, while internal focus conditions and control conditions with no specific focus instructions produces similar and less effective performance or learning of motor skills. Studies found focusing on the movement effect (external focus) for sport skills such as tennis (Wulf, McNevin, Fuchs, Ritter, & Toole, 2002), golf (Wulf, McNevin & Shea, 2001), skiing (Wulf, HoB, & Prinz, 1998), basketball (Al-Abood, Bennett, Hernandez, Ashford, & Davids, 2002), running (Baden, Warwick-Evans, & Lakomy, 2004), volleyball and soccer (Wulf, McConnel, Gartner, & Schwarz, 2002) is beneficial in learning and performance of the skill.

Skilled Versus Novice Performers

While examining motor performance and learning, Wulf and Su (2007) randomly assigned 30 novice golfers to groups based on internal focus, external focus, or no instruction. Each group was instructed and given feedback based on their group assignment as they hit balls toward a target with a nine iron. Five points were awarded for balls hitting the target. Four, 3, 2, or 1 point was recorded for balls landing in one of the other specified zones. Zero points were given for balls landing outside the largest circle. Those who were given internal condition instructions were no more effective than
the control conditions in learning the skill and performing. The external focus group
outscored both the internal focus group and the group given no instruction. Their findings
concluded that adopting an external focus of attention enhances learning.

Wulf and Su (2007) also experimented with expert golfers with an average
handicap of 1.3. Each expert golfer performed the task under all conditions. The results
again concluded when performing a motor skill, instruction that focuses on the external
environment of the subject is more effective than instruction that focuses attention
internally.

Bell and Hardy (2009) examined the effects of internal focus, proximal external
focus and distal external focus on 33 skilled male golfers. Researchers assigned subjects
to one of the three experimental focus groups. The authors also found that using distal
proximal focus helped the skilled golfer perform the best. Subjects performed a chipping
skill with and without anxiety, which was induced by social evaluation and financial
incentives. Scores recorded by the proximal external focus group were significantly more
accurate than the internal focus group, supporting Bell and Hardy’s hypothesis that a
distal external focus would be the most effective focus and would hold under an anxiety-
provoking environment.

Bell and Hardy (2009) suggest that one critical factor underlying the learning
advantage of EFA is the distance between the action and its effect. Other findings suggest
that when instructed to focus on the body (arms) or proximal effects (golf club head), the
regulation of control processes involved in maintaining balance are constrained, resulting
in performance and learning decrements. Increasing the distance of the effect (focusing
on the target) from the movement producing it, allows performance to be brought about by automatic control processes that results in enhanced learning (McNevin, Shea, & Wulf (2003).

Wulf’s (2008) findings suggest that there may be a limit to the performance-enhancing effects of external focus instructions for top-level performers. The experiment tested performance of a balance task (standing on an inflated rubber disk) under each of the attentional focus conditions where participants were world-class balance performers of the Cirque du Soleil show “Mystère” in Las Vegas. All participants performed four trials under each condition; no attentional focus instructions (control), instruction to focus on reducing movements of their feet (internal focus), and instruction to focus on reducing movements of the disk (external focus). The acrobats movement automaticity and postural stability were greatest when they were free to use their “normal” focus of attention, when they were in the control group. For the balance experts in this study, standing still on a compliant surface was presumably represented at the highest level of control, and basically all movements required to achieve this goal were controlled automatically. Asking them to focus on moving the disk (external focus) or their feet (internal focus) as little as possible directed their attention to a lower level of control and apparently disrupted the fine-tuned, reflexive control mechanisms that normally control their balance. Thus, performance was degraded under both internal and external focus conditions, relative to control conditions. Thus, the balance of expert performers was most effective under control conditions.
Perkins-Ceccato et al. (2003) examined the influence of internal and external attention instructions on the performance of a pitch shot by golfers who were either highly skilled or low skilled. Ten golfers in each skill group used a 9-iron to pitch a ball as close as possible to an orange pylon. Focus of attention was manipulated for participants. Under internal focus of attention instructions, the participants were told to concentrate on the form of the golf swing and the force of their swing. For the external focus of attention conditions, the participants were told to concentrate on hitting the ball to the target. The highly skilled golfers performed better with external attention instructions than with internal focus instructions. In contrast to Wulf and Su’s (2007) study, the low-skill golfers performed better with the internal than with the external focus of attention instructions.

Influences Affecting Focus Performance

Marchant, Clough, Crawshaw, and Levy (2009) added another dimension to the discussion, researching whether the individual instructional preference of novices and the influences of that preference affected performance. Seventy-two novice dart throwers participated in two experimental sessions throwing at a target. The aim of the first session was to gain experience of the different attentional instructions so that preferences could be formed; the second session focused on accurate performance using one single attentional strategy.

The results of the first session revealed more participants preferred the external strategy than the internal strategy when throwing darts. Participants in the external group directed more attention toward the target than the internal group, which was revealed
through questionnaires. There was no overall advantage for accuracy using the external methods over the internal during the first session; although, those changing from external to internal instructions experienced a decrease in accuracy. During the second session, novices using external focus instructions were more accurate and scored more bull’s-eyes than those who used internal strategies. Interestingly, externally focused participants who preferred the internal strategy were significantly less accurate than those who preferred the external strategy.

Novice dart-throwing participants in the external strategy group reported finding the EFA instructions more difficult. This may reflect the participants’ level of expertise, with novices finding focusing externally more difficult (Marchant et al., 2009). Participants using external focus also reported being more distracted during the task, which was attributed to the increased difficulty of focusing externally. Marchant et al. (2009) stated that even though external focus of attention might be advantageous, this may limit the ability of novices to utilize it. Regardless of the differences in difficulty and reported distraction, externally focused instructions appear to promote better accuracy when compared to internal instructions (Marchant et al., 2009; Weiss, Reber, & Owen, 2008).

An earlier, similar study by Wulf et al. (2001) showed that despite individual differences and preferences, the benefits of an external focus are strong and independent of individual differences. The study examined individual differences in the preference for and effectiveness of the type of attentional focus used on a balance task. The experiment included a day of switching focus from trial to trial and then on day two using the
subjects preferred method. A retention test was performed on day three. Participants with an external focus showed superior learning relative to internal focus participants regardless of their preference.

Wulf, Wachter, and Wortmann (2003) found that females tend to be more concerned about performing a movement correctly than males, who might be more concerned with the outcome of a skill. When a female group was given internal-focus instructions during a kicking skill a greater performance decrement occurred. Females might also show greater learning advantage when provided with external-focus instructions (Wulf et al., 2003). Results also show that for learning by older adults external focus of attention outperforms internal focus of attention instructions (Chiviacowsky et al. 2010).

Task difficulty can affect the effectiveness of external focus when performing a motor skill (Wulf et al., 2007). Evidence showed that for a balancing task, the difficulty of the task was a critical factor for the occurrence of attentional focus effects. By utilizing control conditions, subjects performed two versions of a static balance task. Performing under simple task conditions, internal focus conditions were not significantly different from external conditions and the control conditions. When the subjects tried a more difficult task, external focus of attention was advantageous to learning the skill. Challenging tasks appear to require reflexive control mechanism and an external focus keeps from interceding with those processes in order to perform optimally. When performing simple tasks, internal focus had no significant disadvantage over external focus conditions. When a task is not challenging, internal focus instructions do not stop
the automatic control processes that help perform a motor skill. When a task is challenging, the performers’ attention will resort to using motor skills they have already learned in order to perform the task and control their movements. This confirmed that a task must have a certain degree of difficulty for the attentional focus effects to occur (Wulf et al., 2007).

Effects of Attentional Focus on Performance

The prevalent explanation for the attentional focus effects is based on the assumption that an external focus promotes greater automaticity in movement control, otherwise recognized as the constrained action hypothesis (Wulf et al., 2001). This hypothesis proposes that when performers utilize an internal focus of attention (focus on their movements), they may actually constrain, or interfere with, automatic control processes that would normally regulate the movement, whereas an external focus of attention (focus on the movement effect) allows the motor system to more naturally self-organize and, therefore, produce a better performance.

Variables with External Focus

An examination of external focus research literature by Wulf and Dufek (2009) led them to question why individuals jump higher when they adopt an external focus of attention in contrast to when they focus internally, or have no focus of attention. The participants in this experiment included 10 healthy, physically active, university students who were not aware of the specific purpose of the study. The subject’s task required them to produce maximum counter movement jumps. They were instructed to jump straight up
and touch the highest rung they could reach with the tips of their fingers. The participants performed 10 jumping trials under each of the internal and external focus conditions.

In the internal focus conditions, the experimenter instructed participants to concentrate on the tips of their fingers, reaching as high as possible during jumps. For external focus conditions, the participants were instructed to concentrate on the rungs of the vertical apparatus, Vertec, reaching as high as possible. Each performance was measured in terms of vertical acceleration, three-dimensional joint movements of force for the ankle, knee, and hip joints, and impulse values. The results depended on the instruction they received. While each subject tried to jump as high as possible in both conditions, the external-focus instructions resulted in significantly greater heights than did the internal-focus instructions (Wulf & Dufek, 2009). The findings suggest that directing attention to the movements of a certain body part seem to constrain the motor systems, which eliminates the automaticity of the movement. In other words, when one tries to control their body movements, they are generally less successful. Presumably, this is because they interfere with the body’s natural organizational capabilities. The results demonstrate that one’s focus can have an effect on their learning and performance.

Electromyography Measures under Attentional Focus Differences

Unlike previous studies which measured the outcome of performance, the electromyography (EMG) was used to determine whether differences between external and internal focus conditions could be manifested and measured at the neuromuscular level (Vance et al., 2004). The participants of this study performed bicep curls and were told to either focus on the arm performing the curl (internal focus) or the curl bar
(external focus). The results showed EMG activity reduced when performers adopted an external focus. A study on how attentional focus affects the neuro-muscular system while shooting free throws with a basketball also used EMG (Zachry, Wulf, Mercer, & Bezodis, 2005). The subjects were told to focus on either the motion of their wrist (internal focus) or the rear-center of a basketball hoop (external focus). The accuracy of the free throw was better in the external focus condition. Zachry et al. (2005) also found that EMG activity is reduced in the biceps and triceps during the external focus throws.

Twelve subjects participated in a dart-throwing task, measuring changes in performance, preparation time between throws and EMG activity (Lohse et al., 2010). The subjects were exposed to both internal and external focus instructions. EMG activity was reduced and an improved performance resulted from an external focus of attention and was interpreted as improved neuro-muscular efficiency. In addition, the researchers showed an increase in preparation time during an internal focus of attention, although it is not clear what preparation time represents.

Using external focus on motor skills will not only improve performance but can help to conserve energy during a sport competition or motor activity. External focus promotes automatic control processes, which make performance more effective and efficient at the neuromuscular level.

Neural Correlates of Attentional Focusing

From a biomechanical viewpoint, internal focus instructions generate a greater load, conscious processing, than external focus instructions and therefore a poorer performance is present (Poolton et al., 2006). The external focus instructions during the
early stage of skill acquisition reduce the load on working memory. Performers seek out the most efficient sources of information and do not adhere to specific instructions despite repeated reminders. For instance, a golfer hitting balls on a driving range may start by focusing on a target. When a golfer hits a ball left or right of the target, the golfer will begin focusing internally, adjusting his stance, swing planes, or grip to change the unwanted effect. Once the problem is changed, the golfer will again focus externally. Poolton et al. (2006) believe that the learner will ultimately seek out the most efficient sources of information to accomplish a motor learning task.

Nonetheless, data favors a negative effect of internal instructions as suggested by the constrained-action hypothesis. It is unclear whether the benefits’ of external versus internal focus is due to an advantage of external focus or a disadvantage of internal focus (Zentgraf & Munzert, 2009).

A study was performed to test whether focusing attention on moving one’s fingers, internal focus, or the keys on a 16-key-press, external focus, in a sequential finger movement task reveals differential neural correlations in motor and motor-related areas of the brain (Zentgraf et al., 2009). The main finding is a higher activation in the primary somatosensory, motor, and the insular cortices of the brain for an external focus compared to an internal focus. An external focus during finger key pressing stimulates somatosensory and connected motor areas in a stronger manner than an internal focus. This may be the one mechanism underlying the performance benefits of an external focus reported in the motor control and learning literature.
Teaching Sports Skills

During instruction and when providing feedback, physical education teachers should explore the effectiveness of using external focus of attention (Denny, 2009). Teaching of motor skills have typically included breaking down the skill and demonstrating to the students. Feedback has usually been some component of the skill like, “keep your feet closer together” or “bend at the hips”. The emphasis of an external focus is not on technique but rather on directing the action to the end result. For teachers, Denny suggests emphasizing the effect of the movement rather than the movement itself will require using different types of feedback statements. She also encourages instructors to allow students to explore and discover the best way to perform motor skills and to give more external focus of attention instructions and feedback (Denny, 2009). Feedback generally enhances performance and learning, so one function of feedback might be to promote an external focus of attention (Shea & Wulf, 1999).

Summary

Adopting an external focus of attention enhances learning and performance (Bell & Hardy, 2009; Wulf, Shea, & Park, 2001; Wulf & Su, 2007; Wulf et al., 1999). The evidence shows that using an external focus can also lower the fatigue level of muscular activity (Lohse et al., 2010; Zachry et al., 2005). Additionally, external focus causes somatosensory and connected motor areas to be used at a greater level than an internal focus (Vance et al., 2004). This may lead to a better performance because more information is available to perform the skill. While giving more external focus of
attention instructions and feedback is different from the way physical educators have traditionally taught sport skills, it has value and deserves to be explored.
Chapter 3
METHODOLOGY

When learning and performing a motor skill, instruction that focuses on the external environment of the subject is more effective than instruction that focuses on attention internally (Bell & Hardy, 2009; Wulf & Prinz, 2001). This study focuses on whether external focus shows a positive and more effective performance in contrast to internal focus of attention through a retention test. This investigation explored if the results of previous studies continue to apply as evaluated through a retention test one and two months after the final lesson for novice golfers.

Participants

Twenty high school physical education students, eighteen right-handed and two left-handed with no or little prior experience playing golf were randomly selected and participated in this experiment. They were not aware of the purpose of the experiment. Each student and his or her parents/guardian provided informed consent prior to data collection. The average age of the participant was 15.81. Nine males (N=9) with the average age of 15.89 and eleven females (N=11) with the average age of 15.73 were randomly selected from first, second, and third period high school physical education classes. Each class had seven students commit to participating, although first period had one student decide not to participate on the first day. Period one remained with six students throughout the data collection and periods two and three continued with seven.
In order to keep each focus group separate from hearing the instructions of the other groups, each class period had a different type of focus. The focus of attention was randomly selected by drawing for each period. First period was Group I: External Focus of Attention, second period was Group II: Internal Focus of Attention and third period was Group III: Control group. All students every class period were given the opportunity to participate. After identifying novice to beginner golfers from the golf skill level questionnaire (Appendix D), seven from each class were randomly selected. On the first day meeting with students, Group I – EFA had only six students attend (N=6, 4 males and 2 females). Group II – IFA had seven students (N=7, 1 male and 6 females) and Group III – Control had seven students participate (N=7, 4 males and 3 females). A number was dedicated to each student based on the group their entered. For example, a female in the external control received EG11: E for external, G for girl, 1 for first period, 1 for first girl in the class. All data is void of any individuals’ identity information.

Procedures and Tasks

The apparatus, task and procedure were similar to Wulf and Su’s (2007) performance comparisons from each group using internal, external or no focus of attention. This experiment was conducted outdoors on a grass field. The participant’s task was to hit golf balls with a 9 iron to land at a flag target on the field from a distance of 110 yards. For each target test, students received ten (10) balls to hit toward the target. During practice, students received forty (40) balls to hit toward the target. The artificial turf hitting surface from which the students performed was seven commercial driving range mats that measured 3’ x 4’. These mats were placed in a semi-circle, equal distance
to the target. Students choose the mat they wished to use. Concentric circles with a radius of 10 yards each formed around the target ranging from 5 yards to 45 yards from the flagstick. The data collected used the following point system, measured from the distance the ball first landed to the flagstick: 0 to 5 yards = 5 points, >5 to 15 yards = 4 points, >15 to 25 yards = 3 points, >26 to 35 yards = 2 points, >35 to 45 yards 1 point, greater than 45 yards = 0 points. Three additional student volunteers for each class period recorded the point value of the ball’s landing area every hit on a scorecard (Appendix C). The participants’ assigned number was the only identifier on the form and the volunteer checked the appropriate point box for each ball that landed for that participant. A video recording of the participants’ number and the target area was filmed for review in case of any discrepancies on the scorecards, of which there were none. The pretest, all three posttests and the two retention tests used the following method to tabulate an average score for each test. On the scorecard, the total of the individuals scores were divided by ten and the average between the three scorers was used for the students’ final score for that particular test. The group average was computed for each test by totaling the student’s final scores and dividing by the number of students in the assigned group.

Protocol

Expert Model: A professional female golfer demonstrated the golf swing for groups. The professional golf model has professional teaching experience. Those subjects that qualified were randomly selected to be in one of the following groups:

Control Group: little to no instruction and all verbal cues such as: “That looks good”, “Nice”, “Very Good” “Try again”.
Internal Group: instruction regarding how to move the body, such as, “Keep your shoulders level, rotate around your spine, shift your hips a little to the left”

External Group: instruction regarding equipment or target: “Throw the ball with your club towards the target”.

A golf skill-level questionnaire (Grandolfo, 2009) was taken by every student in each class to assess the golf experience level of each potential participant. Appendix B contains the golf skills assessment questionnaire. This golf questionnaire along with an interview, further defining any amount of golf instruction or play they have had, determined if they qualified to participate in the study. Each student assessed their activity level for golf by checking the boxes that apply to their individual situation. Subjects were selected and placed in a random drawing only if checked boxes were within the novice and beginner level. If they checked any boxes in the intermediate or advanced sections, they were disqualified.

Once the participant was chosen, a nine iron skill test was used as the instrument to assess the skill of the golfer. This skill test was given before the first lesson and after each day of instruction. The participant performed a retention test using the same skills test after one month and two months from the last skills test. This skills test was a performance test. The task was a golf shot similar to that used by Bell and Hardy (2009). Each golfer was directed toward the same target marked on the field. Participants were instructed to hit a ball from a designated position towards a target (i.e., the flagstick) at a distance of 110 yards. To determine performance, chalk lines were spaced and circled around a flagstick, starting with the flagstick in the middle of a five yard radius distance
and continuing with circles at intervals of 15 yards circling the target from the distance of five yards to 45 yards from the designated flagstick. A digital Sony DCR-SX63 Handycam camera was positioned on a tripod from the location of the hitting area and facing the target area so that a motion picture recorded the position in which the ball landed. The focus remained on the target area to allow for post hoc scoring. The terrain between the ball and the target was uneven, short cut grass. The participants used a Callaway nine iron and standard golf balls provided by the instructor.

The skills test objective was to hit each ball within a five yard distance from the target. They hit within the five yard distance from the target they were awarded five points, within six to 15 yards from the target received four points, within 16 to 25 from the target received three points, within 26 to 35 yards received two points, within 36 to 45 yards received one point and beyond 46 yards received zero points. Each subject performed the test one time with 10 balls. An average score was determined for each individual per each session.

*Experimental Procedures*

Lesson one started with an expert model showing the students the basic golf swing. The expert model gave them basic instructions on safety, stance, grip and balance. After the basic instruction, each individual took the golf skills test before receiving any more instruction. Each group was given time to practice for one half hour with verbal feedback, cues and instruction based on the assigned mode of their group. The instructor had a list of verbal cues for each group, which served as a guideline.
Group I – EFA cues:

- Focus on the target
- Throw the club toward the target
- Focus on direction, mat, target, or grass
- Turn your club over

Group II – IFA cues:

- Move the body with shoulders level
- Rotate around your spine
- Shift your hips
- Focus on hands, arms, hips, knees

Group III – Control cues:

- That looks good
- Nice
- Try again
- Try to do that same thing again

The students were given a nine iron club only during the sessions. After the first lesson, the students took the skills test again. At the end of the test, each individual completed a feedback form (Appendix E).

During lesson two and lesson three, participants were given a golf lesson for the nine iron using the cues for their respective groups. After the lesson, each individual had a one-half hour to practice then perform the skills test and complete the feedback form.
(Appendix E). One month and two months after the last lesson, all individuals took a retention test using the same skills test.

The last measurement consisted of the participants completing a feedback form after each lesson to assess whether they used the cues provided within their group. The Likert scale was used to evaluate the information from the form. The form asked three questions to evaluate if they heard the cues they were given during their lesson and if those cues were used during their performance. They answered questions with strongly agree, agree, neutral, disagree, and strongly disagree with a score attached equaling a one, two, three, four or five value (Appendix F). Score totals from all three questions that equal between 21 and 33 indicated that the group stayed focused on the cues given during the lesson and performance.

Statistical Analysis

An analysis of variance (ANOVA) was used on the data comparing the starting point of each individual and the improvement in performance from the first lesson to the last lesson and the significance between groups. This allowed for the results to show a percentage of improvement or no improvement and to compare the results between each group. Data results also were collected regarding any improvement or decrement from first and last performance to retention test and last retention test. Comparisons were made between all groups and conclusions were based on those results. The data collected shows if there is a better performance and retention from one of the groups of control, internal focus, or external focus group when the retention test is given after one and two months from their last lesson. Alpha was set at .05.
Before any instruction or any practice on the first session, each participant performed a base test. Students used a Calloway nine iron and hit off their mat platform ten golf balls with the goal of hitting the flagstick as the target. At this time, no other instruction had occurred. Results of the pretest are in Table 1. Included in this table are the total number of male and females in each group and the average score for the group within each gender.

Table 1.
Pretest Results by Focus and Gender Classification

<table>
<thead>
<tr>
<th></th>
<th>Group I (EFA) n= 6</th>
<th>Group II (IFA) n= 7</th>
<th>Group III (Control) n= 7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group Average</strong></td>
<td>0.72</td>
<td>1.85</td>
<td>1.21</td>
</tr>
<tr>
<td><strong>Male Average/number</strong></td>
<td>0.62/4</td>
<td>2.5/1</td>
<td>1.84/4</td>
</tr>
<tr>
<td><strong>Female Average/number</strong></td>
<td>0.97/2</td>
<td>1.74/6</td>
<td>0.37/3</td>
</tr>
</tbody>
</table>

The group average indicates that each group was at a beginner and novice skill level for this experiment, which is consistent with the students’ feedback on the golf skill level questionnaire. It would be expected that beginners would not be able to receive an average of between three to five points. After the pretest during session one, the expert model gave each student basic instruction on safety, stance, grip and balance. This
instruction was the same for each group. Every individual practiced hitting forty (40) golf balls with individual verbal feedback from the instructor based on the focus assigned to the particular group.

Practice sessions one through three for the groups occurred within four consecutive days. After the practice sessions, all students took a posttest. The results for the pretest and the three posttests after each lesson are shown in Figure 1. These tests were utilized as confirmation that the students were engaged in the activity and were trying to hit the target. The Control group and the EFI group both showed an increase in scores through the second pretest and the IFA showed an increase on the first posttest and the third posttest.

Figure 1. Golf Skills Performance Test
To make sure the instructor was staying focused on the correct cues for each group, each student filled out a feedback form, (Appendix E), at the end of each session. Feedback forms were not given to the students on the retention test days as no instruction or feedback occurred during those sessions. Feedback forms used a Likert Scale and scores between 21 and 33 reflect that the student was aware of the cues they should be using. Group I – EFA turned in 18 total forms with a mean of 28.44 ($SD = 5.11$). Group II – IFA turned in 17 total forms with a mean of 26.95 ($SD = 3.51$). Group III – Control turned in 21 total forms with a mean of 28.66 ($SD = 5.22$). All scores indicate that verbal cues and instruction were correctly received by each focus group.

Thirty days from the third posttest, students, with no warm up or practice, hit 10 golf balls toward the target for a one-month retention test. This test was scheduled to keep the students engaged with the experiment and to make sure all students would attend the last session. Sixty days from the third posttest, students performed the last retention test. The average skills test, last post lesson test, and the sixty-day retention test were used for comparison. Included in Table 2 are both retention tests and the last posttest average score for each group.

Table 2. Last Posttest and Retention Test Average Scores

<table>
<thead>
<tr>
<th>Group</th>
<th>Last Test Score</th>
<th>Retention Score 30 days from Last Test</th>
<th>Retention Score from 60 days from Last Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFA</td>
<td>1.57</td>
<td>1.30</td>
<td>1.58</td>
</tr>
<tr>
<td>IFA</td>
<td>2.21</td>
<td>1.95</td>
<td>2.25</td>
</tr>
<tr>
<td>Control</td>
<td>2.12</td>
<td>1.96</td>
<td>2.17</td>
</tr>
</tbody>
</table>
The first hypothesis predicted that learning a golf skill through external focus of attention will provide retention of that skill. Table 3 shows Group I, external focus of attention, has after sixty (60) days retained an average of 43% \((SD = 154.26\%)\) from the last lesson and test session. Group II, internal focus of attention and the control group III, had an average of 30.61% \((SD = 64.51\%)\) and 3.45% \((SD = 37.10\%)\) respectively. Therefore, the null hypothesis is accepted.

Table 3.
Group and Individuals 60 Day Retention Percentages

<table>
<thead>
<tr>
<th>Group I - EFA</th>
<th>Dependent Variable</th>
<th>Group II - IFA</th>
<th>Dependent Variable</th>
<th>Group III - Control</th>
<th>Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>EB13</td>
<td>30.91%</td>
<td>IB23</td>
<td>1.74%</td>
<td>CB31</td>
<td>39.44%</td>
</tr>
<tr>
<td>EB14</td>
<td>-16.00%</td>
<td>IG21</td>
<td>32.35%</td>
<td>CB32</td>
<td>13.04%</td>
</tr>
<tr>
<td>EB15</td>
<td>350.00%</td>
<td>IG22</td>
<td>-36.46%</td>
<td>CB33</td>
<td>-24.09%</td>
</tr>
<tr>
<td>EB16</td>
<td>-13.10%</td>
<td>IG24</td>
<td>78.13%</td>
<td>CB35</td>
<td>60.87%</td>
</tr>
<tr>
<td>EG11</td>
<td>-77.36%</td>
<td>IG25</td>
<td>125.00%</td>
<td>CG34</td>
<td>-22.22%</td>
</tr>
<tr>
<td>EG17</td>
<td>-15.38%</td>
<td>IG26</td>
<td>-53.76%</td>
<td>CG36</td>
<td>-42.86%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IG27</td>
<td>67.31%</td>
<td>CG37</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group Average 60 day retention</th>
<th>43.00%</th>
<th>30.61%</th>
<th>3.45%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Standard Deviation</td>
<td>154.26%</td>
<td>64.51%</td>
<td>37.10%</td>
</tr>
</tbody>
</table>

Hypothesis number two stated performance and retention by the external focus group will be significantly better than both internal focus and the control group after a delayed retention test two months after the last lesson. A 60 day retention test was taken by all participants. Part one of hypothesis two concerning performance shows the average
accuracy scores under internal focus of attention and the control group are M=2.25 (SD=1.10) and M= 2.17 (SD = 1.64) in that order. The external focus of attention average accuracy score is less with M = 1.58 (SD = .87). The null hypothesis of the external focus group will be significantly better in performance than both the internal focus and the control group is rejected. The second part of the hypothesis states performance and retention by the external focus group will be greater than the significant value between all groups after a retention test. The dependent variables in Table 3 were analyzed with a single factor ANOVA and are shown in Table 4. The F value of 0.30462426 is smaller than the table value of 3.59, therefore, F with a 2 and 17 degrees of freedom equaling 0.3462426 is not significant and less than the 0.5 level (F (2, 17) = .03462426, p<0.05). The null hypothesis stating performance and retention by the external focus group will be greater than the significant value between all groups, after a delayed retention test two months after the last lesson is rejected.

Table 4.
ANOVA Retention Percentage Between and Within Groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>Count</th>
<th>Sum</th>
<th>Average</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFA</td>
<td>6</td>
<td>2.590707469</td>
<td>0.431784578</td>
<td>2.378352086</td>
</tr>
<tr>
<td>IFA</td>
<td>7</td>
<td>2.143029897</td>
<td>0.306147128</td>
<td>0.416124527</td>
</tr>
<tr>
<td>Control</td>
<td>7</td>
<td>0.241827069</td>
<td>0.034546724</td>
<td>0.137628564</td>
</tr>
</tbody>
</table>

ANOVA

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>0.5452522</td>
<td>2</td>
<td>0.27262612</td>
<td>0.304624626</td>
<td>0.05</td>
</tr>
<tr>
<td>Within Groups</td>
<td>15.214279</td>
<td>17</td>
<td>0.894957587</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15.759531</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Teaching a golf skill through external focus of attention cues to a novice shows, through performance testing, a 43% retention of that skill 60 days after a lesson. This finding follows with previous studies, which promote external focus of attention cues as an enhancement to learning (Wulf et al., 1999). The results from the high school student participants showed internal focus of attention cues group had 30.61% retention and the control group only retaining 3.45% ability to perform the same skill after the extended period. The average score for the internal focus and control groups showed that the golfers were more accurate than the external focus of attention group. This is in contrast to studies that show the EFA group to be more accurate at hitting the target than the IFA and Control Group (Wulf & Su, 2007). Even though the scores of each group did not show any significant difference between the groups in performance and retention, students individually did present performance and retention differences within the groups.

Performance Factors

Within this study, many factors may have influenced the students as they practiced and performed the skills tests. In each group, competition among several of the males and females arose. They would cheer each other on and clap when they did well providing motivation. Cheering can also have the opposite effect on a learner as it may
cause anxiety. The internal focus group would repeat different cues aloud to help
themselves mechanically complete the task of hitting balls toward the target. The
participants would ask questions on how to improve their swing. The instructor stayed on
task by giving them replies and cues that matched their group variable. The external
focus and control group were less mechanical in their movements and swung at the ball
more naturally. They also asked fewer questions while trying to figure out the proper
movement on their own. The advantage of not having any instruction allows for the
automaticity of past-learned behaviors that help with the performance (Zentgraf &
Munzert, 2009). The control group and the external focus group appeared to be using past
experience from other sports or tasks to accomplish the goal. With no instruction, the
control group was completely reliant on themselves.

Those students scoring low on the skills tests did not show any signs of
discouragement and continued to try to get within the circles toward the target. Included
in the study was one adaptive student. He was able to understand the directions of hitting
toward the target. This student was very good at hitting the ball but was not always able
to refrain from hitting the ball far, affecting the average with the small sample size. Many
of the females’ performances were on the same level and sometimes better than the
males. It was observed that some females did not take full swings and therefore never
reached a circle to score a point. Those scores would also have a big impact on the
overall average since the total number of participants in the group was small.

Students had opportunities to watch the others in their group perform each test.
This gave them an opportunity to model after each other with their swing or techniques.
All students had this similar opportunity. Despite the limits of the groups’ foci, students would have been able to use techniques other students may have previously known. Regardless of the fact that the participants were all novice golfers, they may have had other sport or physical talents that would affect their performance or transfer to the golf swing skill (Maxwell et al., 2003).

The average scores for the focus groups as they progressed through each test are presented in the chart in Figure 2. The difference between the pretest and 60 day retention test for each group does show improvement in performance. (EFA = +.86, IFA = +0.4, Control = +.96) Even though there is improvement in each focus group, there is no evidence that clearly can support that improvement was due to the focus cues.

Figure 2. Average Performance Per Test and Group
The control group, as observed, was consistently trying to figure out how to get the ball to the target and motivated by competition that they created. The chart in figure 2 also shows how the IFA group has a decrease in score during test 2 before an increase in performance occurs. Possibly the results would be different if each test was taken during an upward swing of performance and not during a downward swing.

Retention

ANOVA identified that there was no significant difference between the retention of the groups and therefore using external focus of attention cues only may not be the best way to teach a beginner golfer the game. A physical education class could be similar to all the sample subjects and the sample size. Physical education classes could benefit from using all three methods in order to enhance performance and retention (Denny, 2009; Marchant et al., 2009; Poolton et al., 2006). Each participant made the most out the basic instructions, the focus of attention cues, and watching their peers in order to perform. Golf is a sport that takes time to learn. There are different clubs, different lies for every hit, and different distances for every hit. In this controlled situation the hitting surface, ball, club, and distance remained consistent with every hit. Despite all those factors remaining the same, each hit is different. The physical body can not hit each shot the same. For this particular reason, ten shots is not a large sample number per test. If time had permitted, more shots per test would be helpful in determining the ability of the participant. In addition, as each shot is hit, more experience is obtained and it becomes harder to determine if the cues are responsible for the results and not experience.
Recommendations for Future Studies

The primary purpose of this study was to identify if novice golfers performed and retained a golf hitting skill at a higher percentage from external focus of attention cues over internal focus of attention or no instruction cues from an instructor. The results revealed that there is no significant difference between methods of instruction. The scope of the study should increase the sample size and length of time data is collected. Utilizing the methods in a classroom setting with 30 or more students per group for a six week unit would prove to be more usual for the data collection. In addition, if students had more time to learn the basic grip, balance, stance, and swing movement, participants could focus on the attentional cues.

Testing accuracy may not be the best way to study which focus of attention is a good method for retention of a golf swing for a novice golfer. Often the direction students would hit the ball was inaccurate even if the distance was correct. Some students could hit the ball towards the target but could not control the distance with the specified iron.

The equipment may need to adjusted based on the golfer’s ability to hit clubs different distances. One person can hit a sand wedge 110 yards and another may need a 7-iron. Golf is a game of feel and touch. Some novice golfers start to develop these attributes quickly during their practice time therefore defeating the purpose of the study. Results start to change and those who are in the IFA and Control group start toward focusing on the target and being an advanced golfer, eliminating the novice aspect.

The golf skill might be a critical factor in this study as it may be too complex of a skill to learn from one focus of attention. There is no assurance that participants with no
prior experience with golf will perform better under either focus of attention conditions. Performers seek out the most efficient sources of information and do not adhere to specific instructions despite repeated reminders and encouragement (Poolton et al., 2006). The findings appear to support using various focuses of attention as they may all be beneficial to learning and performing a golf skill. Research on instructing golfers with no experience warrants further investigation.
APPENDICES
APPENDIX A

Consent to Participate in Research

You are being asked to participate in research that will be conducted by Rhonda Mohr, a student at California State University, Sacramento.

**Purpose and Procedures of Study:**

The study topic is the effect of focus cue instruction on retention of golf swing performance. You will be given a questionnaire and possibly be interviewed regarding those answers about your playing ability and current activity related to playing golf. At any given time you do not have to answer a question if you do not wish to do so. You may choose to participate as much or little as you wish. You will be asked to participate in 3 golf sessions consisting of instruction, practice time, target test (hitting golf balls toward a target) and answering questions regarding each lesson. After the first 3 initial sessions, one month and two months from the last session you will be asked to participate in a target test. Each session will take approximately 1 hour of your time. You may participate as much or little as you wish. You can withdraw from the research project at any time.

**Confidentiality:**

With your permission, your target test will be videotaped for use with the project and these may be used with the publication of this study. During the target test, only the target and where the golf ball lands within the target will be videotaped. You will not appear in any video. Video will be utilized as backup information to manually recorded scores in the privacy of the researchers office. Your name will not be used but rather a number will be assigned to you and will be utilized in the research project. Your name will not appear on any testing scores or feedback forms. Video will be downloaded after each lesson to a computer file and password protected. After download is complete, the video will be deleted from the camera memory. At the end of the research project, video will be deleted permanently from the computer. All scores and feedback forms will stored under lock and key in a file cabinet and will be shredded at the conclusion of the research project.

**Benefits of Participating in the Study:**

You may or may not personally benefit from participating in this research. It is a goal that the results of the study will be beneficial to the student researcher, and/or for others who are doing research on the topic. The data collected will be used as part of a scholarly paper and/or academic presentation. You will not receive any compensation for participating in this study. This research will be conducted during physical education class at Davis Senior High School. You will receive full credit for physical education during the time participating in the research project.

**Risks and Injury:**

At each session, you will hit 40 golf balls with a 9 iron off of a professional driving range golf mat toward a target. You will only be allowed to swing the club on the golf mat, avoiding injury to other students. Even though this is a low risk activity, during normal golf motion there is a risk of sore muscles, hand cramping and overextension. You will be encouraged to swing the club at a medium tempo which will be modeled for you. In case of any injury, Rhonda Mohr is certified by the Red Cross as an Advance Rescuer and she will assess the situation and take you to the Athletic Trainer or School Nurse which are both available at the school. In a life threatening emergency, 911 will be called.

**Inquiry Information:**

If you have any questions about this research, you may contact Rhonda Mohr by phone: xxx-xxx-xxxx or by E-mail: xxxxxxx@gmail.com. The advisor for this study is Maureen Smith, PhD, California State University, Sacramento. Dr. Smith can be contacted by phone: xxx-xxx-xxxx or by E-mail: xxxxxxx@csus.edu.

Your participation in this research is voluntary. Your signature below indicates that you have read this page and agree to participate in this research.

Signature of Participant: ____________________________ Date: ____________________
APPENDIX B

Parent Permission for Child/Student to Participate

Your child/student is being asked to participate in research that will be conducted by Rhonda Mohr, a student at California State University, Sacramento.

**Purpose and Procedures of Study:**

The study topic is the effect of focus cue instruction on retention of golf swing performance. The student will be given a questionnaire and possibly be interviewed regarding those answers about his/her playing ability and current activity related to playing golf. At any given time she/he does not have to answer a question if they do not wish to do so. She/he may choose to participate as much or little as they wish. She/he will be asked to participate in 3 golf sessions consisting of instruction, practice time, target test (hitting golf balls toward a target) and answering questions regarding each lesson. After the first 3 initial sessions, one month and two months from the last session she/he will be asked to participate in a target test. Each session will take approximately 1 hour of time, which will be during the physical education class and will not impact other classes. She/he may participate as much or little as they wish. She/he can withdraw from the research project at any time.

**Confidentiality:**

With your permission, the target test will be videotaped for use with the project and these may be used with the publication of this study. During the target test, only the target and where the golf ball lands within the target will be videotaped. Your child/student will not appear in any video. Video will be utilized as backup information to manually recorded scores in the privacy of the researcher’s office. Your child/student’s name will not be used but rather a number will be assigned to them and will be utilized in the research project. Your child/student’s name will not appear on any testing scores or feedback forms. Video will be downloaded after each lesson to a computer file and password protected. After download is complete, the video will be deleted from the camera memory. At the end of the research project, video will be deleted permanently from the computer. All scores and feedback forms will stored under lock and key in a file cabinet and will be shredded at the conclusion of the research project.

**Benefits of Participating in the Study:**

You student/child may or may not personally benefit from participating in this research. It is a goal that the results of the study will be beneficial to the student researcher, and/or for others who are doing research on the topic. The data collected will be used as part of a scholarly paper and/or academic presentation. Your child/student will not receive any compensation for participating in this study. This research will be conducted during your child’s physical education class at Davis Senior High School. Your student will receive full credit for physical education during the time participating in the research project.

**Risks and Injury:**

At each session, you will hit 40 golf balls with a 9 iron off of a professional driving range golf mat toward a target. You will only be allowed to swing the club on the golf mat, avoiding injury to other students. Even though this is a low risk activity, during normal golf motion there is a risk of sore muscles, hand cramping and overextension. You will be encouraged to swing the club at a medium tempo which will be modeled for you. In case of any injury, Rhonda Mohr is certified by the Red Cross as an Advance Rescuer and she will assess the situation and take you to the Athletic Trainer or School Nurse which are both available at the school. In a life threatening emergency, 911 will be called.

**Inquiry Information:**

If you have any questions about this research, you may contact Rhonda Mohr by phone: xxx-xxx-xxx or by E-mail: xxxxxxxx@gmail.com. The advisor for this study is Maureen Smith, PhD, California State University, Sacramento. Dr. Smith can be contacted by phone: xxx-xxx-xxxx or by E-mail: xxxxxxxx@csus.edu.

Your child/student’s participation in this research is voluntary. Your signature below indicates that you have read this page and agree to give consent to your child/student to participate in this research. Your signature also acknowledges that your child have freely consented to participate in the study.

**Signature of Participant:**  
**Date:**
APPENDIX C

Scoring Sheet for Skills Test

<table>
<thead>
<tr>
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APPENDIX D

Golf Skill Level Questionnaire

The following list is designed to assess your playing ability. Please CHECK all that indicate your current activity related to playing golf.

New Golfer (Rookie)
- Does not play regularly
- Has had group lessons only
- Scores over 120 regularly (18 holes)
- May not keep score; picks up often
- Is uneasy with experienced golfers
- Has not established a handicap

Beginner
- Plays regularly, but weekly at most
- Practices rarely
- Sometimes picks up
- Scores 111-120 regularly (18 holes)
- Has an official USGA handicap
- Handicap is 39 or higher (18 holes)

Intermediate
- Plays regularly, 1-2 times a week
- Practices occasionally
- Still uncomfortable in competition
- Scores 101-110 regularly (18 holes)
- Has an official USGA handicap
- Handicap is 29-38 (18 holes)

Advanced
- Plays regularly, 1-2 times a week
- Practices often
- Plays comfortably in competition
- Scores 85-100 regularly (18 holes)
- Has an official USGA handicap
- Handicap is 13-28 (18 holes)

Subject ID # ______________

APPENDIX E

Feedback Form

From today’s lesson what, if any, cues/instructions/feedback do you remember the teacher gave? Please circle if you strongly agree, agree, neutral, disagree, or strongly disagree that you heard the following instructions.

“That looks good”, “Nice”, “Very Good”, “Try again”.

strongly agree  agree  neutral  disagree  strongly disagree

“Keep your shoulders level, rotate around your spine, shift your hips to the left” strongly agree

agree  neutral  disagree  strongly disagree

“Throw the ball with your club towards the target”.

strongly agree  agree  neutral  disagree  strongly disagree

From today’s lesson what, if any, cues/instruction/feedback did you try to use? Please circle if you strongly agree, agree, neutral, disagree, or strongly disagree that you heard the following instructions.

“Try to do that again”

strongly agree  agree  neutral  disagree  strongly disagree

“Focus on the target”

strongly agree  agree  neutral  disagree  strongly disagree

“Keep your shoulder’s level”

strongly agree  agree  neutral  disagree  strongly disagree

During today’s lesson what were you telling yourself mostly to do?

Focus on hand, wrists, hips, shoulders.

strongly agree  agree  neutral  disagree  strongly disagree

Focused on direction, mat, target, grass.

strongly agree  agree  neutral  disagree  strongly disagree

Focused on something else.

strongly agree  agree  neutral  disagree  strongly disagree
APPENDIX F

Feedback Form Key

EFA = 1, IFA = 2, Control = 3
Score according to group. Add scores with the above lines for the appropriate class.

From today’s lesson what, if any, cues/instructions/feedback do you remember the teacher gave? Please circle if you strongly agree, agree, neutral, disagree, or strongly disagree that you heard the following instructions.

**“That looks good”, “Nice”, “Very Good”, “Try again”.**

<table>
<thead>
<tr>
<th></th>
<th>strongly agree</th>
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**“Keep your shoulders level, rotate around your spine, shift your hips to the left”**

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**“Throw the ball with your club towards the target”.**

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From today’s lesson what, if any, cues/instruction/feedback did you try to use? Please circle if you strongly agree, agree, neutral, disagree, or strongly disagree that you heard the following instructions.

**“Try to do that again”**

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**“Focus on the target”**

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Feedback Form Key (continued)

“Keep your shoulder’s level”

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During today’s lesson what were you telling yourself mostly to do?

**Focus on hand, wrists, hips, shoulders.**

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**Focused on direction, mat, target, grass.**

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**Focused on something else.**

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REFERENCES


