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Effects of a Skilled Videotape Model with or without Attention-Focusing Cues on the Performance of a Basketball Foul Shot

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EFFECTS OF A SKILLED VIDEOTAPE MODEL WITH OR WITHOUT ATTENTION-FOCUSING CUES ON THE PERFORMANCE OF A BASKETBALL FOUL SHOT

An Abstract of a Thesis

Submitted

in Partial Fulfillment

of the Requirements for the Degree

Master of Arts

Steven Edward Beard

University of Northern Iowa

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ABSTRACT

The purpose of this study was to examine the effectiveness of a skilled videotape model with or without attention-focusing cues on the performance of a non-dominant hand basketball foul shot. It was hypothesized that attention-focusing cues of a skilled videotape model would have no significant effect on the non-dominant hand basketball foul shot performance of adolescents. Thirty participants (22 male, 8 female) were randomly assigned and stratified by gender into one of two groups: skilled videotape model with cues and skilled videotape model without cues. Each participant completed 22 blocks of 50 trials each, with the first and last block being the pre and posttest with no manipulation (i.e., observing skilled videotape model either with or without attention-focusing cues) administered. For the acquisition blocks 2 to 21, manipulation was given after every tenth trial. Performance was assessed with respect to made or missed non-dominant hand foul shots. The results indicated that participants who observed the skilled videotape model with attention-focusing cues made more foul shots during the acquisition trial blocks and retention trial block. The findings suggest that a skilled videotape model with attention-focusing cues enhanced adolescent's performance of a non-dominant hand, basketball foul shot, providing support for the observational learning paradigm.

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TABLE OF CONTENTS

PAGE

CHAPTER 1

INTRODUCTION

Social learning theorist suggested that learning through observation of a model is powerful (Carroll & Bandura, 1982, 1985, 1990). The use of modeling or visual demonstrations is a technique used for observational learning of new motor skills, particularly to beginners (McCullagh & Weiss, 2001; Weinberg & Jackson, 1990). Language is often limiting when describing complex movements (Bandura, 1997; Doody, Bird, & Ross, 1985), therefore, observing a model can facilitate the acquisition of motor skills. Modeling as an instructional technique, such as demonstrating the use of machinery or the execution of sport skills, is commonly employed in industry and education. This technique is beneficial for the novice participant, as a model can quickly and efficiently convey an image of the act and help the learner "get the idea" of the movement (Gentile, 1972).

Modeling conveys information to the participant by demonstrating the skill live or archived so that the participant can observe the elements of the action. Richardson and Lee (1999) defined modeling as a procedure that provides information about the nature of a skill or a task to be performed, usually as conceptual information about "what to do," and is provided prior to attempting performance. When participants observe a model, the pattern of the motor skill is learned by focused attention on the spatial and temporal characteristics of the skill. This cognitive representation is used in producing a response and provides a pattern for comparing with performance feedback for corrective adjustments (Bandura, 1997).

Instructors, educators, and individuals who teach motor skills spend much of their time planning, carrying out, and evaluating instruction. To complete these tasks, there are many decisions that must be made. These decisions relate to concerns, such as how to organize a unit for a particular activity, how to organize a daily lesson plan, how to provide the most effective instructions for factory machine operation, and obtain performance proficiency. Instructors and educators rely heavily on demonstration for a cognitive framework that ulitmately guides the participants resulting actions. Interest in modeling research acknowledges both its practical and theoretical significance (Carroll & Bandura, 1982, 1985, 1990; Doody et al., 1985; Ferrari, 1996; McCullagh & Little, 1989; McCullagh & Weiss, 2001; Ross, Bird, Doody, & Zoeller, 1985). Increased performance and acquisition occurs when an instructor knows how to establish the most appropriate educational setting while deciding the most effective and efficient means of providing participants with instructions or other means of instruction so as to change motor skill behavior (Janelle, Champenoy, Coombes, & Mousseau, 2003).

This study was concerned with the performance of a closed motor skill, basketball foul shot, using participants' non-dominant hand after observing a skilled videotape model with or without attention-focusing cues. Wallace & Hagler (1979) studied the effects of non-dominant hand foul shooting and knowledge of performance. Participants used their non-dominant hand to allow for the knowledge of performance effects to materialize. The task in the present study is not easily influenced by prior learning and also involves movements whose correct biomechanical properties are well established, which, may allow for the attention-focusing cues effects to materialize.

Zetou, Tzetzis, Vernadakis, & Kioumourtzoglou (2002) demonstrated participants whom observed an expert model improved set and serve skill more on acquisition and on the retention test than did participants who observed their own performance. Indeed, most of the empirical investigations that provide support for the benefits of observational motor learning have used skilled models (McCullagh, 1993).

It has been shown that motor skill learning benefits from augmented information (Salmoni, Schmidt, & Walter, 1984). This information can be provided prior to, during, and/or after movement, although researchers have typically focused on the role of information provided during and following movement. However, Carroll and Bandura (1982, 1985, 1990) and have pointed out the limitations of this dependence on the instrumental learning paradigm and have suggested a shift of attention to information provided prior to performance, namely the observational learning paradigm. This study will focus on validating the benefits of the observational learning paradigm.

In order to explain how skills are acquired, observational learning theory suggests that from watching others perform, a cognitive representation is formed that both initiates subsequent responses and serves as a reference to determine the correctness of the responses (McCaullagh & Weiss, 2001). Demonstrations and models are a form of information provided to learners before they execute responses. Cognitive, information processing, and direct perception approaches have all been considered as viable explanations for observational learning.

One variable, implicated by Landin (1994) in his review of the modeling literature is the importance of attention-focusing cues. He found that novice learners tended to

benefit more when videotape was combined with specific skill-related verbal cues. Research has shown that verbal instructions may not sufficiently draw the participants' attention to critical task information (Lee, Landin, & Carter, 1992). Verbal cues have been used to help students focus attention on the key elements of a motor skill (Masser, 1993). Augmented verbal cues, in conjunction with modeling, have been effective in several experiments in which participants learned practical tasks (McCullagh, Stiehl, & Weiss, 1990; Wiese-Bjornstal & Weiss, 1992) The present experiment examined the effectiveness of a skilled videotape model with or without superimposed attention-focusing cues on the performance of a basketball foul shot with the use of the participants' non-dominant hand.

Purpose of the Study

The purpose of this study was to assess participant's performance in a non-dominant hand basketball foul shot task after observing a skilled videotape model with or without attention-focusing cues.

Hypothesis

It was hypothesized that observation of a skilled videotape model with attention-focusing cues would not have a significant effect on the dominant hand basketball foul shot performances of adolescents.

Significance of the Study

Modeling techniques, specifically videotaped models, can be used along with instructions to facilitate performance (Zetou et al., 2002). There is evidence that under certain circumstances, modeling techniques may be important for acquisition of motor

skills (Ferrari, 1996; McCullagh, 1993; McCullagh & Little, 1989; Scully & Newell, 1985).

To enhance the observational learning effects of a model, attention-focusing cues may enable participants to code the observed skill better. When considering previous research (McCullagh & Weiss, 2001; Williams, Davids, & Williams, 1999), it becomes apparent that verbal cues facilitate skill acquisition by directing the viewer's attention towards what specifically to observe when watching the model. Research has been completed with children and has primarily emphasized the sequencing of motor tasks rather than the refinement of a closed motor skill. It appears that an information gap exists with respect to the use of a skilled videotape model with added attention-focusing cues of a closed motor skill. This study may have professional significance to educators, instructors, and coaches regarding acquisition of a novice motor skill task. The use of participants' non-dominant hand created a novice motor skill task.

Assumptions

The study was performed under the following assumptions:

1. Participants complied with the researcher's request to give maximum effort.
2. All participants completed the subject information questionnaire honestly and correctly (see Appendix A).
3. The participants were representative of adolescents ranging from 15 to 18 years old.
4. The basketball, backboard, net, and rim were in accordance with the National

Federation of High School Athletics (NFHSA) basketball rules and regulations.

5. Participants complied with the researcher's request to not practice outside the experimental setting.

Delimitations

The study was delimited to the following:

1. Twenty-two male and 8 female right hand dominant volunteers aged 15 to 18.
2. Twenty-two blocks of 50 trials per block over a 4-week testing period.
3. One pre-test and one post-test with no treatments.
4. Testing in the Woodstock High School gymnasium using NFHSA regulation floor markings, distance, basketball, backboard, rim, and net.
5. Specific script of attention-focusing verbal cues.

Limitations

Possible limitations of the study may include:

1. The use of volunteer participants and the sample size of $N = 30$ necessarily restricts the generalizations that can be made.
2. Although participants were encouraged to provide maximum effort, it is possible that motivation levels differed among subjects, thus affecting performance.
3. It is possible that the honesty with which the respondents completed the participants information sheet could be questionable.

4. Participants may have practiced foul shots outside the experimental environment.
5. All 30 participants were in a single gymnasium at the same time, similar to what would occur in a basketball practice session.
6. Testing was conducted in the presence of other participants, not individually.

Definition of Terms

Attention-Focusing Cue(s): an extrinsic stimulus that focuses the performer's attention on the relevant aspects of a task (Schmidt & Lee, 2005).

Foul Shot: a type of throw from the foul line given to a basketball player after a foul has been called against an opponent (Abendroth-Smith, Kras, & Strand, 1996).

Skilled Videotape Model: model that attains performance goal--made foul shots with 100 percent success (Zetou et al., 2002).

CHAPTER 2

REVIEW OF LITERATURE

This experiment was concerned with the effectiveness of a skilled videotape model with or without attention-focusing cues on the performance of a basketball foul shot task using the participants' non-dominant hand. It was hypothesized that observation of a skilled videotape model with attention-focusing cues would not have a significant effect on the dominant hand basketball foul shot performances of adolescents. The following chapter reviews four critical areas that influence the acquisition of motor skills: the study of motor learning, modeling or observational learning, attention-focusing cues, and task analysis of the basketball foul shot.

Motor Learning

The study of motor learning is considerably different from the study of performance in that the focus is on the changes in performance that occur as a direct result of practice or experience. Motor learning is defined as a "set of internal processes associated with practice or experience leading to a relatively permanent change in the capability for skilled behavior, a state sometimes termed habit" (Schmidt, 1989). Such a definition must be carefully worded to rule out changes in behavior that are due to maturation and growth or to momentary fluctuations in performance attributable to temporary factors.

Historically, motor learning researchers focused on information provided to learners after action. The presentation of information feedback is a critical factor for the learning of motor activities. While research has generally supported this statement, there

is some question as to the nature of the information that should be presented to the learner and the most effective way to present the information. Knowledge of results (KR) is information about the outcome of the movement in the environment (Schmidt & Lee, 2005). Immediate knowledge of results for the present study will be obtained by the participants when the basketball does or does not go through the rim.

The learning of motor skills is based on four distinct characteristics (McCullagh, 1993; McCullagh, Weiss, & Ross, 1989). First, learning is a process of acquiring the capability for producing skilled actions; that is, learning is the set of underlying events, occurrences, or changes that happen when practice enables people to become skilled at some task. Second, learning occurs as a direct result of practice or experience. Third, learning cannot (at our current level of knowledge) be observed directly, as the processes leading to change in behavior are internal and are usually not available for direct examination; rather, one must infer that learning processes occur on the basis of the changes in behavior that can be observed. Fourth, learning is assumed to produce relatively permanent changes in the capability for skilled behavior; changes in behavior caused by easily reversible alterations in mood, motivation, or internal states (e.g., fatigue) are thought of as due to learning.

The effects of practice, the structure of practice, and the many variables in the control of the teacher, coach or instructor affect the learning of motor skills and therefore relate rather closely to the design of instructional settings that are commonly seen in schools, in training for jobs in industry, in the military, and in rehabilitation. Of most importance is the amount of practice itself (Williams, 1986). However, deliberate

practice can be modified, structured, improved, and otherwise changed in order to influence performance. One can also learn a considerable amount before actually physically practicing a motor skill. Much of this learning involves the performer trying to figure out what to do. Specifically, modeling and augmented feedback are two factors involving the preparation of the learner before skill performance (Magil, 1989).

Modeling or Observational Learning

One topic within motor learning that is specific to this study is modeling or the observational learning paradigm. Social learning theorists suggested that learning through observation of a model is powerful (Carroll & Bandura, 1982, 1985, 1990). Modeling is one important way to demonstrate the skill so that learners can directly observe the elements of the action (Gentile, 1972). Modeling or observational learning, as the phenomenon is alternatively called, can enhance motor skill learning when the learner is not directly engaged in practice (Bandura, 1997). According to Bandura (1986), modeling is primarily and information processing activity that is governed by four subprocesses: attention, retention, production, and motivational.

There is evidence that, under certain circumstances, modeling techniques such as the use of videotapes are important for the acquisition of motor skills (Ferrari, 1996; McCullagh, 1993; McCullagh & Caird, 1990; McCullagh & Little, 1989; Scully & Newell, 1985). Pollock and Lee (1992) explained that modeling is an effective teaching method because actions which are difficult to describe verbally often can be demonstrated visually. Richardson and Lee (1999) defined modeling as a procedure that provides information about the nature of a skill or a task to be performed, usually as

conceptual information about "what to do," and is provided prior to attempting performance. Effectiveness of modeling is related to (a) the characteristics of the performer, (b) the characteristics of the model, (c) the type of task, and (d) the strategies for demonstration (Rose, 1997). These points will be expanded on in the following paragraphs.

Instructors often assume that a performer can watch a model and learn something about that model's behavior. Bandura (1977,1986), who has been the most influential analyst of observational learning, asserts that the cognitive representational system laid down during observation contains two dimensions: a mental image and a verbal code of words or descriptions that pertain to movement requirements. Martens, Burwitz, and Zuckerman (1976) found that skilled performers tended to benefit more than did novice performers. They also found that novice performers tended to benefit more when videotape was combined with specific skill-related verbal cues.

A crucial factor for the effectiveness of modeling is the characteristics of the model. Martens et al., (1976) tested the idea that participants would learn more by watching someone learn a skill than by observing either a correct or incorrect model. Lirgg and Feltz (1991) questioned the generalizability of these findings, suggesting that "using familiar models may have created idiosyncratic results." Viewing a skilled model led to better performance than did viewing an unskilled model, regardless of whether the model was a teacher or peer. Zetou, Fragouli, and Tzetzis (1999) examined the influence of two types of modeling, indicating that performance was better after watching an expert model than for those who watched their own movements on videotape.

Another characteristic of a model is that of a model's skill or ability level in a task. More skillful models motivate increased imitation by a performer (Bandura, 1977), and also direct more attentional processes toward a model's behavior (Bandura, 1969). Thus, Bandura (1986) suggested that models who have demonstrated high competence, who are purported experts, who demonstrate a certain level of ability, and who possess status-conferring symbols are more likely to command attention and serve as more influential sources of behavior than models who lack these qualities.

The nature of the task being modeled determines what information it presents to the participant for observation (Rikli & Smith, 1980). If skills, such as a basketball foul shot, have a very complex spatial path, demonstration is the best learning support because it provides the dynamic spatial transformations that are not possible with verbal representation (Carroll & Bandura, 1982). With closed motor skills such as a soccer pass, modeling may enhance motor skill acquisition (Janelle et al., 2003).

Another important factor related to the effectiveness of modeling are the strategies for demonstration. Many researchers have recommended that the use of verbal cues should accompany the demonstrations, especially when the participants are children. In examining the effects of modeling in combination with verbal feedback Tzetzis, Mantis, Zachopoulou, and Kioumourtzoglou (1999) indicated that the combination of videotaped and model presentation with knowledge of performance was important in assisting learners to become proficient at skiing skills, both in speed and in technique. Janelle et al., (2003), suggest that learning was facilitated through the use of verbal and visual attentional cues in combination with the video model.

Attention-Focusing Cues

One informational variable, implied by Rothstein and Arnold (1976) in their review of the modeling literature, that has received experimental attention is the role of attention-focusing cues. The term cue can be defined as a stimulus, either intrinsic or extrinsic, that focuses the performer's attention on the relevant aspects of a task (Williams, 1985). A teaching cue can be defined as a verbalized word or phrase or an action that communicates the critical features of a movement skill to a student (Rink, 1998). Verbal cues are short, concise phrases, often consisting of just one or two important phrases or words that convey the critical elements of the movement to the student (Landin, 1994). Verbal cues help students focus their attention on certain aspects of the task, which allows them to possess a greater understanding of the task, thus leading to greater learning (Lee & Solmon, 1992).

Verbal and visual teaching cues constitute a particularly effective method of giving instructions and providing feedback to students in physical education (Konukman & Petrakis, 2001). Novice athletes are likely to gain little insight from watching experts unless specifically cued regarding where to watch and what to look for (Janelle et al., 2003). It is important to provide verbal cues along with visual cues to help students understand the feedback they are given.

With respect to the use of videotape modeling feedback, cues typically are used to focus the learner's attention on a particular aspect of the visual information available. While videotaped modeling may be beneficial, it has been suggested (Newell & Walter, 1981) that a videotaped replay may provide too much information to the learner.

Bandura's (1986) qualification that "people cannot learn much by observation unless they attend to, and accurately perceive, the relevant aspects of the modeled activities". Thus, providing cues to focus attention on critical aspects of the task is an important consideration when using videotape modeling.

Even with the presentation of cues to help the learner focus his or her attention on the most relevant aspects of information feedback, it must be remembered that feedback provides information only about movement outcome and movement dynamics (Magil, 1989). The learner must still decide how to change his or her performance on subsequent trials. Although this information may allow the learner to acquire the appropriate movement pattern, it may be inefficient in doing so.

Magil (1989) states that selecting the correct cues is one of the most important elements that an instructor includes in the teaching process. Learners will attend to the aspects of the demonstration that are most meaningful to them, but unless they are taught which cues are most important, they do not know what to look for first. In addition to focusing a learner's attention to essential elements of the model, meaningful cues will combine information and in the process, reduce the amount of verbal information that is given to the learner (Magil, 1993). Because learners attend to a limited amount of new material for a limited time, such a routine should enhance learning. Cues may provide hooks on which to hang memories of the instruction.

Roach and Burwitz (1996) assessed both the form and accuracy of cricket batting and found that verbal cues in conjunction with modeling led to better performance than either modeling alone or a controlled condition. Doody et al., (1985) concluded that a

combination of auditory and visual demonstrations produced better performance than either visual demonstrations or control conditions without demonstrations. Therefore, the present experiment examined the effectiveness of two information feedback conditions with and without attention focusing cues on the learning of the basketball foul shot using the participant's non-dominant hand. The assumption behind providing attention-focusing cues is that cues help the learner focus on the most relevant aspect of the motor skill to be performed. This information may be useful for physical activity professionals as they attempt to understand and improve the facilitation of skill learning.

Task Analysis of Basketball Foul Shot

In order to create meaningful verbal cues, it is important to create a task analysis of the skill. A task analysis is a process of determining the underlying abilities and structure of a task or occupation (Schmidt & Lee, 2005). For the current study, the basketball foul shot was the motor skill. The basketball foul shot requires adjustments in speed, accuracy, and fine muscular movements for control and precision. Knudson (1993) and Abendroth-Smith et al., (1996) suggest that the skilled basketball shooting motion consists of a sequentially timed coordination of accelerations and decelerations of the body segments that originate with the feet and progress to the distal segment of the shooting hand and fingers. When broken down into more specific principles that can be used as attention-focusing cues foul shooting skills include:

1. The shooter should be sure not to step toward the basket.
2. The arms and the body follow-through are pointed directly toward the basket.

3. The eyes should not follow the path of the ball in flight, but should be fixed on the target.
4. The release point should be high.
5. The angle of projection should be a smooth, curved, parabolic path.

These foul shooting principles are the basis for the five verbal cues given to the participants.

CHAPTER 3

METHODOLOGY

The purpose of this study was to assess participant's performance of a basketball foul shot using participants' non-dominant hand. Participants observed a skilled videotape model with or without attention-focusing cues in conjunction with practice trials. The aim of this study was to examine these conceptual and practical distinctions so as to determine the optimal means of observational learning.

Hypothesis

It was hypothesized that observation of a skilled videotape model with attention-focusing cues would not have a significant effect on the dominant hand basketball foul shot performances of adolescents.

Research Design

This study was of quasi-experimental nature. The purpose was to assess a participant's subsequent performance in a non-dominant hand basketball foul shot task after observing a skilled videotape model and either receiving or not receiving attention-focusing cues of the skilled videotape model's performance. The study analyzed an independent variable (attention-focusing cues) as predictors of the dependent variable (acquisition of skill).

Participant Selection

The researcher read the participant recruitment script (see Appendix A) to over 100 students from three different study hall classes. Forty-six participants returned the participant questionnaire (see Appendix B) and were given the parental consent form (see

Appendix C). Forty participants returned the parental consent form. The researcher called the 40 participants parent or guardian and verbally confirmed the written parent consent form. Two participants were eliminated because the parent or guardian verbally confirmed the participant forged the written parental consent form. Eight participants were eliminated due to the high number of absences over the previous four weeks indicated by the participants on the participant questionnaire (see Appendix A).

The experimental population included 30 volunteer participants, 22 male and 8 female, who ranged in age from 15 to 18 years old. The researcher limited the population to 30 participants because of time to collect data and apparatus constraints. During a pilot study, it took approximately 10 minutes to complete 50 basketball foul shots for one participant. During a 50-minute class period, with 6 basketball rims and backboards, the maximum number of participants that could be tested was 30. None of the participants described themselves as ambidextrous. Participants were randomly assigned to one of two groups of 15 participants, with an equal number of males (n = 11) and females (n = 4) in each group.

Research Apparatus

The study was conducted in an indoor gymnasium (24.5 X 18.3 m) with 6 basketball rims and backboards. A solid curtain, which dropped from the ceiling, divided the gymnasium into two sides, north and south, for a total of 3 rims and backboards per side. The basketballs (men's), rims, backboards, nets, and floor markings were in accordance with National High School Federation of Athletics basketball rules and regulations. Each basket had a rack of four basketballs placed one foot left center of the

free throw line. Two Sony color monitors (120-cm screen, measured diagonally) and Sony DVD (Digital Video Display) players were used for observing the model's performance and cues. Each monitor and DVD player was placed at opposite ends of the gymnasium and with a chair directly in front of the equipment for participants to sit in while watching the videotape.

Creation of Skilled Videotape Model

The skilled videotape model was a 21 year old male, left hand dominant, former Division II collegiate basketball player. The skilled model was chosen because he demonstrated the five components of Abendroth-Smith et al., (1996) and Knudson (1993) foul shooting principles. The model was recorded from left, front, and behind views. Approximately 10 to 12 attempts per view were recorded from the left, front, and back views of the skilled model using his left hand. These attempts gave the researcher many attempts and views to choose from for the best visual picture for the final videotape. From these attempts and different views, a skilled videotape model was edited and created that showed five different attempted foul shots from different angles. The skilled videotape model does not show the flight of the basketball on every attempt. Attempt one was recorded from the left view showing only the legs and feet. Participants do not see the flight of the ball in attempt one. Attempt two was recorded from the left and behind view focusing on the torso and arms. During attempt two, participants observed a made foul shot recorded from the behind view. Attempt three was recorded from the front view showing the head and eyes. Participants do not see the flight of the basketball. Attempt four was recorded from the left view highlighting the torso and arms.

Participants do not see the flight of the ball. Attempt five was recorded from the left view showing basket, model, and arc of the basketball. Participants do see a made foul shot in attempt five. Each attempt lasted less than 10 seconds for a total viewing time of less than one minute for the skilled videotape model.

Once the skilled videotape model was created, verbal and visual attention-focusing cues were edited to the videotape. For each attempt, a verbal and visual cue was superimposed on the video to indicate critical areas of interest. For each attempt the participants heard the attention-focusing cue and witnessed the visual cue.

Procedures for Data Collection

After University of Northern Iowa Institutional Review Board and administrative approval (see Appendix D), 30 participants were randomly assigned to one of two experimental groups: skilled videotape model without attention-focusing cues or skilled videotape model with attention-focusing cues. Within each group, participants were randomly assigned to one of the three baskets and randomly assigned a testing order. Each participant entered the gymnasium and collected a Pearson 50 question multiple choice answer form each testing session.

Participants were not allowed to take a pre-shot routine. Participants were instructed to release the ball within the 10-second time limit. Participants were asked to release the basketball with their non-dominant hand through the hoop 18 inches (45 cm) in diameter and 10 feet high (3.03m), preferably without the ball touching the rim. Participants were positioned at the center of the foul shot line 15 feet (4.545 m) away from the backboard and could not cross over the foul line. Participants were to use a set-

shot form, as opposed to a jump shot or a hook shot, for example, and were to release the ball with their non-dominant hand, not both hands. Participants were given the basketball or grabbed one off the rack one step behind the 15-foot foul line. Distracting fellow participants was discouraged.

Foul shots where the participant crossed over the 15-foot foul shot line were counted as a missed attempt. Not releasing the basketball within 10 seconds of being given the basketball was recorded as a missed attempt. All participants completed 20 practice sessions, 5 sessions per week (Monday, Tuesday, Wednesday, Thursday, and Friday) for four weeks. Participants attempted 50 foul shots (Kernodle & Carlton, 1992) with the non-dominant hand each practice session. This procedure resulted in 1,000 acquisition foul shots recorded for data. Data scores were collected on the Pearson 50 question multiple choice answer key for number of made and missed foul shots.

For the attention-focusing cues condition, an attempt was made to provide additional information that would cue the participant as to where to look while viewing the skilled videotape model. The cue was given prior to viewing the model's attempt and was based on task analysis of the optimal basketball shooting motion (Abendroth-Smith et al., 1996; Knudson, 1993). Collectively, this work indicates that the skilled basketball shooting motion consists of a sequentially timed coordination of accelerations and decelerations of the body segments that originate with the feet and progress to the distal segment of the shooting hand and fingers.

The information to the attention-focusing cue groups was used to focus or cue the participant's attention upon five areas of importance when observing the model. Based

on the study by Kernodle and Carlton (1992) who provided participants with 10 cues to focus their attention on the relevant aspects of knowledge of performance. The following five cues were given:

1. Focus on the feet. Notice how they do not move forward or backwards.
2. Focus on the shooting elbow, shoulder, and wrist. Notice how they are in line with the basket.
3. Focus on the eyes. Notice how the eyes stay focused on the front of the rim.
4. Focus on the wrist. Notice the height and angle of release.
5. Focus on the path of the ball. Notice the high arc.

Scoring

Similar scoring was used by Kernodle and Carlton (1992) with an overhand throw task. Testing procedures were the same for all participants. On the first day, participants performed 50 foul shots with the non-dominant hand without any videotape model to receive data for a pretest result. In each of the next 20 sessions, after participants were given instructions, 50 foul shots were attempted and scores were collected on made or missed foul shots. No videotape model or attention-focusing verbal cues were given before the first foul shot. After completion of the 10th foul shot, participants watched the videotape model in accordance with their assigned group (Kernodle & Carlton, 1992). Only the participant testing watched the videotape model with or without cues while the other participants waited. The same testing procedures were used for all 20 testing days. On the 21st day, all subjects were instructed to perform 50 foul shots with no videotape modeling or videotape model with attention-focusing cues. Upon completion of the post-

test foul shots, participants were thanked and asked if they would like a copy of the results when finished. Participants were asked to take no practice dribbles, shoot with their non-dominant hand, and release the ball within 10 seconds. Scores were recorded on a Pearson 50 question multiple choice answer bubble sheet. The letter A bubble was darkened for foul shots made and the letter B bubble was darkened for foul shots missed.

Data Description

The primary data consists of the pretest and posttest scores made after attempting 50 foul shots. Secondary data consists of the number of made acquisition foul shots given the total number of practice trials. Fifty fouls shots were attempted per day over a 20 day practice trials for a total of 1,000 acquisition foul shots.

Data Analysis

The data were analyzed with respect to performance outcome. Foul shots made were used as the measure of basketball performance outcome. Foul shots made were measured by the basketball falling through the rim and net using a set-shot form by the subject within 10 seconds and behind the 15-foot foul shot line.

The practice phase consisted of 1,000 trials on the foul shot task blocked across 50 trials per practice session. Thus, a total of 20 practice sessions defined the acquisition phase. The statistical analysis consisted of an independent samples t-test that examined the difference between groups on pre and posttest results.

CHAPTER 4

RESULTS

The present experiment examined the effectiveness of skilled videotape model with or without attention-focusing cues on the performance of a basketball foul shot task using the non-dominant hand. It was hypothesized that observation of a skilled videotape model with or without attention-focusing cues would have no significant effect on adolescent male and female non-dominant hand basketball foul shot performance of adolescents.

Data Analysis

Overall mean score for the 30 subjects (see Appendix E) on the pretest was 5.3 made foul shots per 50 attempted ($SD = 4.1$) with a range of 0 to 16. Overall posttest mean score was 15.9 made foul shots per 50 attempted ($SD = 5.3$). A paired sample t-test was calculated to compare the overall mean pretest score to the mean posttest score. Results revealed a significant increase in basketball foul shot performance ($t(29) = 10.93$, $p<.001$). On average, subjects increased 10.6 foul shots made from the pretest to the posttest or 100%.

An independent samples t-test was then performed to compare the mean pretest scores of the two groups. No significant differences were found ($t(28) = 0.62$, $p > .05$) with the 15 participants in the no attention-focusing cues group having a pretest mean score of 5.8 foul shots made ($SD = 4.5$) and the 15 participants in the attention-focusing cues group having a mean score of 4.9 foul shots made ($SD = 3.7$) out of 50 attempted.

These results indicate that the two randomly assigned groups were fairly equal in their pretest shooting performance.

Since no significant differences between the randomly assigned groups were found on the pretest performance scores, the posttest scores were directly compared using an independent samples t-test. Results indicated that scores on the attempted basketball foul shot posttest were significantly different between groups, ($t(28) = -2.4$, $p < .05$). The posttest mean scores revealed that students who observed the skilled videotape model while also receiving attention-focusing cues had a higher foul shot performance ($M = 18.1$; $SD = 3.5$) than the subjects in group one who observed the skilled videotape model without attention-focusing cues ($M = 13.7$; $SD = 5.9$).

Follow-up analysis concerning the performance during the acquisition phase indicated that subjects without attention-focusing cues and modeling made 3,188 basketball foul shots for an average of 212.5 shots made per 1,000 attempts. Results revealed that subjects with attention-focusing cues and modeling made 3,449 basketball foul shots for an average of 229.9 shots made per 1000 attempts. Thus, the group receiving attention-focusing cues also made a higher number of shots during the acquisition phase of the experiment. Subjects who watched the skilled videotape model with attention-focusing cues were 24% more effective in the basketball foul shot task than the subjects who did not.

CHAPTER 5

DISCUSSION

One of the main objectives of physical education teachers, coaches, and professionals who teach motor skill development is to determine the most efficient and effective teaching techniques so as to provide the learner with the greatest opportunity for successful performance of the motor skill. Thus, the purpose of this study was to determine the effectiveness of attention-focusing cues on the participant's acquisition of a basketball foul shot. It was hypothesized that observation of a skilled videotape model with attention-focusing cues would not have a significant effect on adolescent male and female non-dominant hand basketball foul shot performances.

Summary of Findings

The results of this study indicated that observing a skilled videotape model with attention-focusing cues had a significant positive effect on the acquisition of basketball foul shot performance. The participants who watched the skilled videotape model with attention-focusing cues made significantly more basketball foul shots than the subjects who watched the skilled videotape model without attention-focusing cues. This study indicated that after 20 days of basketball foul shot practice sessions, subjects who watched a skilled videotape model with attention-focusing cues had higher posttest mean scores than subjects who watched a skilled videotape model without attention-focusing cues. Likewise, subjects receiving the attention-focusing cues performed better during the acquisition phase of the experiment, making an average of 17.4 more shots over the course of the 20 practice sessions. These results suggest that watching a skilled videotape

model with attention-focusing cues combined with physical practice can significantly improve novice subjects' basketball foul shot performances.

Discussion of Findings

This experiment was designed to examine how attention-focusing cues would effect the observer's acquisition of basketball foul shot performance using the non-dominant hand. One possible explanation for the results of this study is that the verbal cues gave the subjects specific movement outcome and dynamics to focus on while watching the skilled videotape model. The results from this study support the literature that indicates that videotape modeling is best used with the attention-focusing verbal cues to increase the motor skill development and acquisition (Janelle et al., 2003; Pollock & Lee, 1992; Zetou et al., 2002). Unless taught which cues are most important, learners do not know what to look for and probably will attend to the aspects of the videotape model that are most meaningful to them.

The task of the basketball foul shot gives the participant immediate and clear knowledge of results. However, it is up to the participants to decide how to change his or her performance during subsequent trials. To help instruct participants on proper knowledge of performance, attention-focusing cues may aid the performer. These findings are consistent with previous reseach on the observational learning paradigm (Ferrari, 1996; McCullagh, 1993) and suggest that verbal/visual cues enhance the acquisition and performance of a novice motor skill task. However, the findings did indicate that both groups increased foul shot performance.

Indeed, with the present study, the researcher noticed participants within group two verbalizing the attention-focusing cues to themselves, as well as to other group members. This repetition of the verbal cues might have aided the acquisition of the appropriate movement outcome. The results also indicate that the subjects who received attention-focusing cues made more foul shots during the 20-day acquisition phase. These results are similar to findings by other studies (Janelle et al., 2003; Landin, 1994). Perhaps these participants were able to make more motor performance adjustments over time based on the specific cues they received.

Another explanation for the results could be due to an increase in motivation because of increased practice performance results. Bandura (1986) recognized the role of external, vicarious, and self-incentives in the observational learning process. Participants may have attended to and remembered the modeled behavior and have the physical skills to excute the skill, but if not sufficiently motivated, behavioral enactment will not occur (McCullagh & Weiss, 2001). Perhaps with an increase in performance outcome, the participants were motivated to more closely attend to the attention-focusing cues with the presumption that those elements would further increase the possibility of the appropriate movement pattern.

While meaningful because it is practical and experimental, the present study is not without limitations. First, the generalizeability of the results is limited by the requirement of having participants use his or her non-dominant hand. The selection of the task requiring the use of the non-dominant hand ensured that subjects in the present study were indeed at a beginning skill level. However, since motor performance is mostly

concerned with the best possible learning technique for optimal performance, future research should study the effects of a skilled videotape model with or without attention-focusing cues on subjects using of his or her dominant hand. This study should be replicated with a larger number of participants and should eventually examine both skilled and unskilled performers.

Conclusions and Implications

One implication from the results of the study could be the self-centered observational learning that occurred. Participants were not in the presence of another instructor, teacher, or coach. It may be possible for participants to make adjustments in motor patterns from the skilled videotape model and precise attention-focusing cues. Participants must understand that practice is one major element along with the skilled videotape model and attention-focusing cues that changes motor skill behavior.

In conclusion, based on the results from this study, the use of a skilled videotape model with attention-focusing cues can be significantly influential in the development and acquisition of a closed-motor skill such as the basketball foul shot. These results support the observational learning paradigm. It is suggested that additional research be done in different practice settings, with both genders, at different levels of expertise, and with skills of different complexity. With more extensive research the modeling or observational learning paradigm may provide more practical application information for teachers, coaches, and instructors.

REFERENCES

Abendroth-Smith, J., Kras, J., & Strand, B. (1996). Get aboard the B-BOAT (Biomechanically Based Observation and Analysis for Teachers). *The Journal of Physical Education, Recreation & Dance, 67* (8), 20-23.

Bandura, A. (1969). *Principles of behavior modification.* New York: Holt, Rinehart, and Winston.

Bandura, A. (1977). *Social learning theory.* Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1986). *Social foundations of thought and action.* Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1997). *Self-Efficacy: The exercise of self-control.* New York: Freeman.

Carroll, W. R., & Bandura, A. (1982). The role of visual monitoring in observational learning of action patterns: Making the unobservable observable. *Journal of Motor Behavior, 14* (2), 152-167.

Carroll, W. R., & Bandura, A. (1985). Role of timing of visual monitoring and motor rehearsal in observational learning of action patterns. *Journal of Motor Behavior, 17,* 269-281.

Carroll, W. R., & Bandura, A. (1990). Respresentation guidance of action production in observational learning: A casual analysis. *Journal of Motor Behavior, 22,* 85-97.

Doody, S. G., Bird, A. M., & Ross, D. (1985). The effect of auditory and visual models on acquisition of a timing task. *Human Movement Science, 4,* 271-181.

Ferrari, D. (1996). Observing the observer: Self-regulation in the observational learning of motor skills. *Developmental Review, 16,* 203-240.

Gentile, A. M. (1972). A working model of skill acquisition with application to teaching. *Quest, 17,* 3-23.

Janelle, C. M., Champenoy, J. D., Coombes, S. A., & Mousseau, M. B. (2003). Mechanisms of attentional cueing during observational learning to facilitate motor skill acquisition. *Journal of Sports Sciences, 21,* 825-838.

Kernodle, M. W. & Carlton, L. G. (1992). Information feedback and the learning of multiple-degree-of-freedom activities. *Journal of Motor Behavior, 24,* (2), 187-196.

Knudson, D. (1993). Biomechanics of the basketball jump shot – six key teaching points. *The Journal of Physical Education, Recreation, and Dance, 64* (2), 67-73.

Konukman, F., & Petrakis, E. (2001). Verbal and visual teaching cues for tennis. *Journal of Physical Education, Recreation, and Dance, 72,* (3), 38-43.

Landin, D. (1994). The role of verbal cues in skill learning. *Quest, 46,* 299-313.

Lee, A. M., & Landin, D. K., & Carter, J. A. (1992). Student's thoughts during tennis instruction. *Journal of Teaching in Physical Education, 11,* 256-267.

Lee, A. M., & Solomon, M. A. (1992). Cognitive conceptions of teaching and learning motor skills. *Quest, 44,* 57-71.

Lirgg, C. D., & Feltz, D. L. (1991). Teacher versus peer models revisited: Effects on motor performance and self-efficacy. *Research Quarterly for Exercise and Sport, 62,* 217-224.

Magil, R. A. (1989). *Motor learning: Concepts and applications.* Dubuque, IA: W. C. Brown.

Magil, R. A. (1993). *Modeling and verbal feedback influences on skill learning. International Journal of Sport Psychology, 24,* 358-369.

Martens, R., Burwitz, L., & Zuckerman, J. (1976). Modeling effects on motor performance. *Research Quarterly, 47,* 277-291.

Masser, L. S. (1993). Critical cues help first-grade students' achievement in handstands and forward rolls. *Journal of Teaching in Physical Education, 12,* 301-312.

McCullagh, P. (1993). Modeling: Learning, developmental, and social psychology considerations. In R. N. Singer, M. Murphey, & L. K. Tennant (Ed.), *Handbook of research on sport psychology* (pp.106-126). New York: MacMillan.

McCullagh, P., & Caird, J. (1990). Correct and learning models and the use of model knowledge of results in the acquisition and retention of a motor skill. *Journal of Human Movement Studies, 18,* 107-116.

McCullagh, P., & Little, W. S. (1989). A comparison of modalities in modeling. *Human Performance, 2,* 107-116.

McCullagh, P., Stiehl, J., & Weiss, M. R. (1990). Development modeling effects on the quantitative and qualitative aspects of motor performance. *Research Quarterly for Exercise and Sport, 61,* 344-350.

McCullagh, P., & Weiss, M. R. (2001). Modeling: Considerations for motor skill performance and psychological responses. In R. N. Singer, H. A. Hausenblas, & C. M. Janelle (Ed.), *Handbook of sport psychology* (2nd ed., pp. 205-238). New York: Wiley.

McCullagh, P., & Weiss, M. R., & Ross, D. (1989). Modeling considerations in motor skill acquisition and performance: An integrated approach. *Exercise and Sport Sciences Reviews, 17,* 475-513.

Newell, K. M., & Walter, C. B. (1981). Kinematic and kinetic parameters as information feedback in motor skill acquisition. *Journal of Human Movement Studies, 7,* 235-254.

Pollock, B. J., & Lee, T. D. (1992). Effects of the model's skill level on observational motor learning. *Research Quarterly for Exercise and Sport, 63,* 25-29.

Richardson, J. R., & Lee, T. D. (1999). The effects of proactive and retroactive demonstrations on learning signed letters. *Acta Psychologica, 101,* 79-90.

Rikli, R., & Smith, G. (1980) Videotape feedback effects on tennis serving form. *Perceptual and Motor Skills, 50,* 895-901.

Rink, J. E. (1998). *Teaching physical education for learning* (3rd ed.). New York, WCB/McGraw-Hill.

Roach, N. K., & Burwitz, L. (1996). Observational learning in motor skill acquisition: the effect of verbal directing cues. In J. Watkins, T. Reilly, & L. Burwitz (Eds.), *Sports science: Proceedings of the VIII commonwealth and international conference on sport, physical education, dance, recreation and health* (pp. 349-354). London: E. & F. N. Spon.

Rose, J. D. (1997) *A multilevel approach to the study of motor control and learning.* Needham Heights, MA: Allyn & Bacon.

Ross, D., Bird, A. M., Doody, S. G., & Zoeller, M. (1985). Effects of modeling and videotape feedback with knowledge of results on motor performance. *Human Movement Science, 4,* 149-157.

Rothstein, A. L., & Arnold, R. K. (1976). Bridging the gap: Application of research on videotape feedback and bowling. *Motor Skills: Theory Into Practice, 1,* 35-62.

Salmoni, A. W., Schidt, R. A., & Walter, C. B. (1984). Knowledge of results and motor learning: A review and critical reappraisal. *Psychological Bulletin, 95,* 355-386.

Schmidt, R. A. (1989). Toward a better understanding of the acquisition of skill: Theoretical and practical contributions of the task approach. In J. S. Skinner, C. B. Corbin, D. M. Landers, P. E. Martin, & C. L. Wells (Ed.), *Future directions in exercise and sport science research* (pp. 395-410). Champaign, IL: Human Kinetics.

Schmidt, R. A., & Lee, T. D. (2005). *Motor control and learning.* Champaign, IL. Human Kinetics.

Scully, D. M., & Newell, K. M. (1985). Observational learning and the acquisition of motor skills: Toward a visual perception perspective. *Journal of Human Movement Studies, 11,* 169-186.

Tzetzis, J., Mantis, K., Zachopoulou, E., & Kioumourtzoglou, E. (1999). The effect of modeling and verbal feedback on skill learning. *Journal of Human Movement Studies, 36,* 137-151.

Wallace, S. A., & Hagler, R. W. (1979). Knowledge of performance and the learning of a closed motor skill. *Research Quarterly, 50,* 265-271.

Weinberg, R., & Jackson, A. (1990). Building self-efficacy in tennis players: A coach's perspective. *Journal of Applied Sport Psychology, 2,* 164-174.

Wiese-Bjornstal, D. M., & Weiss, M. R. (1992). Modeling effects on children's form of kinematics, performance outcome, and cognitive recognition of a sport skill: An integrated perspective. *Research Quarterly for Exercise and Sport, 63,* 73-75.

Williams, J. G. (1985). Perceiving human movement: A review of research with implications for the use of the demonstration during motor learning. *Physical Education Review, 9* (1), 53-58.

Williams, J. G. (1986). Throwing action from full-cue and motion only video-models of an arm movement sequence. *Perceptual and Motor Skills, 68,* 259-266.

Williams, A. M., Davids, K. and Williams, J. G. (1999). *Visual perception and action in sport.* London: E & FN Spon.

Zetou, E., Fragouli, M., & Tzetzis, G. (1999). The influence of star and self-modeling on volleyball acquisition. *Journal of Human Movement Studies, 37,* 127.

Zetou, E., Tzetzis, G., Vernadakis, N., & Kioumourtzoglou, E. (2002). Modeling in learning two volleyball skills. *Perceptual and Motor Skills, 94,* 1131-1142.

APPENDIX A

PARTICIPANT QUESTIONAIRE

PARTICIPANT QUESTIONAIRE

Directions: Please print your name and circle the one correct answer for each of the five questions.

LAST NAME:_____ FIRST NAME_____

1. Do you have basketball experience at the organized recreational, club, high school or college level? Yes or No

2. Which hand would you use to shoot a basketball? Left or Right

3. During the previous four weeks of school, how many days have you been absent?

   0 to 2 3 to 4 5 to 6 7 to 8

4. When was the last time you shot a basketball?

   Last week Last month Last year Can't remember

5. Do you enjoy watching basketball games? Yes or No

APPENDIX B

PARTICIPANT RECRUITMENT SCRIPT

PARTICIPANT RECRUITMENT SCRIPT

My name is Mr. Beard and I teach Physical Education at Woodstock High School. I am attempting to earn a Master's degree in sports psychology from the University of Northern Iowa. To complete this Master's degree, I must conduct a research study for my thesis paper.

I am here to ask for volunteers participants for my research study. The study involves a willingness to shoot fifty free throws every school day for four weeks during your third hour study hall. Participants are at no physical or mental risk of injury.

I am recruiting participants' who are right hand dominant, have no previous experience with any organized basketball team, and who will be accountable all the days of data collection. I do not have any authority to pay you, grant you academic credit hours, or service credits. This is completely a voluntary commitment. If you are interested, please complete the participant questionnaire.

APPENDIX C

PARENT & PARTICIPANT CONSENT FORM

PARENT & PARTICIPANT CONSENT FORM

Your child has been invited to participate in a research project conducted through the University of Northern Iowa. UNI requires that you give your signed agreement to allow your child to participate in this project. The following information is provided to help you make an informed decision whether or not to participate. The study is designed to discover how physical education teachers can improve student's free throw shooting for higher success rates among students using a videotape model.

During third hour, students will meet in the Shipley Gymnasium and be assigned to a basket and a group of four people. Each student will shoot fifty free throws and after certain number of trials will be asked to watch a videotape of a skilled person shooting free throws and then continue shooting. At the end of the study all free throw attempts will be recorded and analyzed for rate of motor learning success. Students will be under the direction of the researcher during third hour for twenty-three school days. The study begins on Monday, May 2 and concludes on Thursday, June 2. A benefit that may result from participation in this study is that the students will improve his/her basketball free throw skill.

The student's confidentiality will be maintained by giving each student a testing identification number. Information obtained during this study that could identify your child will be kept strictly confidential. The summarized findings with no identifying information may be published in an academic journal or presented at a scholarly conference.

Your child's participation is completely voluntary. He or she is free to withdraw from participation at any time or to choose not to participate at all, and by doing so, your child will not be penalized or lose benefits to which he/she is otherwise entitled.

If you have questions about the study you may contact or desire information in the future regarding your child's participation or the study generally, you can contact Steve Beard at 815-206-2296, sbeard@d200.mchenry.k12.il.us, or the project investigator's faculty advisor Dr. Mick Mack at the department of Health Physical Education and Leisure Services, University of Northern Iowa 319-273-6129. You can also contact the office of Human Participants Coordinator, University of Northern Iowa, at 319-273-2748, for answers to questions about rights of research participants.

I am fully aware of the nature and extent of my child's participation in this project as stated above and the possible risks arising from it. I hereby agree to allow my son/daughter to participate in this project. I have received a copy of this form.

_____	_____
(Signature of parent/legal guardian)	(Date)
_____	_____
(Printed name of parent/legal guardian)	(Date)
_____	_____
(Signature of participant)	(Date)
_____	_____
(Printed name of participant)	(Date)
_____	_____
(Signature of principal investigator)	(Date)
Steven E. Beard _____	_____
(Printed name of principal investigator)	(Date)

APPENDIX D

ADMINISTRATION APPROVAL FORM

Project Title: Effects of a Skilled Videotape Modeling With or Without Attention-Focusing Cues on the Performance of a Basketball Foul Shot

Name of Investigator: Steven E. Beard

This letter is a request to use the Woodstock High School Shipley Gymnasium during third hour from May 2 to June 2 for the purpose of collecting data on participants' ability to shoot free throws with the help of a videotape model with or without verbal cues.

The participants' parents have signed a written permission paper and were given a copy. The subjects were recruited from third hour study hall. Each parent was notified by telephone. The investigator was given permission to use Woodstock High School basketballs by Joe Conroy, head men's basketball coach. Participants were told they were at no risk of physical harm during the study. The investigator instructed the subjects that no financial, academic credit, or service credit would be given for time and effort volunteered. Each participant would be given an identification number for the study to assure confidentiality.

If you have any questions about the study you may contact Steven E. Beard at 815-206-2296 or sbeard@d200.mchenry.k12.il.us.

I am fully aware of the nature and extent of this project and the possible risks arising from it. I hereby agree to given permission for this project. I acknowledge I have received a copy of this consent statement.

(Signature of administrator)	(Date)
Sandra J. Theriault	May 01, 2005
(Printed name of administrator)	(Date)
(Signature of investigator)	(Date)
Steven E. Beard	May 01, 2005
(Printed name of investigator)	(Date)

APPENDIX E

FOUL SHOT SCORES

ID #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Number of Made Foul Shots per 50 attempts														
Pre-Test	0	4	9	11	16	9	4	0	3	6	9	8	1	4	3
Practice															
Day 1	0	7	12	14	16	12	6	0	5	5	14	14	1	5	4
Day 2	0	9	14	15	14	16	7	0	6	10	17	17	4	11	5
Day 3	8	5	16	18	9	10	15	4	11	8	9	9	8	8	4
Day 4	1	5	18	15	10	8	9	1	8	8	14	8	5	5	5
Day 5	0	15	16	13	13	16	13	2	8	10	11	13	7	9	8
Day 6	0	15	10	13	12	16	2	0	7	17	12	7	10	9	10
Day 7	0	13	16	13	13	11	6	2	8	19	7	9	11	9	9
Day 8	1	12	17	13	9	17	18	0	7	2	10	14	7	13	10
Day 9	7	11	19	23	15	16	7	0	8	13	16	11	6	9	8
Day 10	2	15	21	20	12	13	8	1	5	15	13	10	11	17	7
Day 11	2	17	23	16	16	12	9	2	14	16	12	9	6	8	9
Day 12	2	14	13	14	16	11	10	0	14	14	12	8	3	12	10
Day 13	0	16	16	17	13	12	10	3	9	13	15	14	10	12	10
Day 14	0	12	13	15	16	13	13	3	8	14	16	9	10	12	12
Day 15	1	13	8	21	7	12	10	1	10	12	15	10	12	11	12
Day 16	0	11	9	28	9	14	13	0	5	18	16	14	10	10	14
Day 17	0	11	11	25	12	15	12	1	8	17	15	13	9	8	15
Day 18	1	15	14	26	14	10	10	1	9	19	18	18	8	6	14
Day 19	3	16	18	25	13	16	12	2	10	20	19	14	14	8	15
Day 20	3	14	16	26	11	15	15	1	11	16	16	19	12	4	12
Post-Test	2	15	16	25	12	16	14	2	12	18	17	18	14	9	16

ID #	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	Number of Made Foul Shots per 50 attempts														
Pre-Test	3	4	4	1	7	7	16	8	6	3	2	3	3	4	2
Practice															
Day 1	4	6	6	0	9	2	14	8	7	5	3	5	3	4	6
Day 2	4	8	6	1	10	6	13	5	6	6	2	6	5	6	4
Day 3	2	9	11	0	12	8	15	6	6	5	4	10	4	4	5
Day 4	1	11	5	0	13	14	16	5	10	7	10	10	4	9	9
Day 5	6	12	13	1	18	11	12	11	7	7	12	5	0	8	11
Day 6	3	10	16	3	18	20	13	8	12	8	18	3	1	9	8
Day 7	12	7	12	2	18	7	10	5	11	13	16	5	2	12	9
Day 8	12	8	15	7	18	12	9	3	15	15	12	8	5	11	10
Day 9	16	15	7	4	17	11	10	8	7	17	15	11	4	9	11
Day 10	14	9	14	3	23	12	14	9	11	19	19	12	6	14	9
Day 11	11	4	10	5	19	6	16	14	15	15	13	12	9	15	9
Day 12	16	3	16	3	23	8	17	7	14	20	17	5	7	14	10
Day 13	12	12	15	4	16	13	14	10	16	13	18	7	8	18	11
Day 14	15	11	15	6	19	14	18	12	16	16	19	5	8	19	15
Day 15	15	7	9	5	32	8	16	7	15	14	17	6	11	17	16
Day 16	17	15	17	3	21	16	13	13	19	17	16	9	13	15	15
Day 17	15	18	15	7	17	16	19	11	13	14	15	11	12	16	16
Day 18	16	11	14	9	19	18	22	10	15	18	18	13	13	19	18
Day 19	14	22	16	11	22	14	20	15	18	20	20	15	15	21	20
Day 20	15	20	15	5	19	16	20	14	17	18	20	14	16	18	19
Post-Test	15	24	17	9	23	18	18	19	19	19	19	16	17	21	17