

PODCASTING MENTAL IMAGES:
TECHNOLOGICAL APPLICATION OF SPORT IMAGERY

By

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CHAPTER I

INTRODUCTION

Podcasting may provide sport psychologists, coaches, and athletes the training edge required to facilitate *mental imagery* for performance enhancement. Imagery conducted for sport performance is referred to as *sport imagery*, but can be used interchangeably with the broader term mental imagery (Taylor & Wilson, 2005). Several other terms including *mental practice*, *mental rehearsal*, and *visualization* have also been used to refer to various components of mental imagery in sport (Morris, Spittle, & Watt, 2005; Taylor & Wilson, 2005; Weinberg & Gould, 2007). Specifically, sport imagery can be defined as using all senses to re-create or create a sport experience in the mind with the goal of enhancing sport performance during training and competition (Morris, Spittle, & Watt, 2005; Vealey & Greenleaf, 2001; Weinberg & Gould, 2007). Podcasting as a technological application of sport imagery may enhance mental images through auditory or visual guidance. Accordingly, an enhanced sport imagery experience could result in further improvements in sport performance.

Podcasting is the process of creating and distributing digital media files as images, audio, or video over the internet for future download and playback on a computer or a digital media player (Holtz & Hobson, 2007; Morris & Terra, 2006). However, there is much more to podcasting than simply downloading “stuff” from the internet. In fact, *podcasts* are distinguished from other media formats in that they are simple, personal, portable, always available, and relatively inexpensive (Geoghegan & Klass, 2007; Islam, 2007). The primary distinction of

podcasts is that they are automatically downloaded via subscriptions (Geoghegan & Klass, 2007). This means that new podcasts are automatically downloaded onto a computer via the internet as they become available.

The many features of podcasting make it appealing for various applications including mainstream media, professional businesses, education, medicine, faith-based organizations, and interest groups (Holtz & Hobson, 2007; IDG Global Solutions, 2006; Morris & Terra, 2006). Islam (2007) provides the following examples of how podcasting is used for different applications: IBM uses podcasting to deliver information to employees and real-time updates to investors; General Motors has a radio-style podcast featuring design, engineering, and marketing information; Drexel University produces a podcast to aid online learners; and Pal's restaurant based in Kingsport, Tennessee uses audio and video podcasts to train all their employees.

In the case of sport imagery training, podcasting may provide athletes on-demand access to guided imagery regardless of time, place, or activity. Imagine the hypothetical basketball game-day scenario:

On the morning of the championship basketball game, Joe uses his iPod to listen to a podcast on free throw shooting concentration while clicking through various images of proper shooting technique. Joe then closes his eyes and mentally practices a few shots. He feels confident. Later in the afternoon, Joe combines mental practice with physical practice during the team's shoot-around. Several made baskets further boost his confidence. On the bus ride to the game, Joe watches downloaded clips of previous games and fast-forwards to free throw shooting situations. Using all senses, Joe imagines shooting and making each shot. In the locker room, Joe listens to a relaxation script recorded by the team's sport psychologist. Joe is now physically and mentally prepared. The game goes down to the wire and Joe's team is down by one point. As time expires, Joe is fouled and has the chance to win the game. In attempt to pressure Joe, the opposing team calls a time-out. Joe goes to the bench and grabs his iPod. He watches himself making game-

winning free throws and imagines winning this game. Joe then walks to the line and calmly swishes both shots. Joe's team wins the championship and he receives MVP honors.

This is just one illustration of how podcasting can be utilized in enhancing the sport imagery experience. Specifically, podcasting may enhance *free throw imagery* and thereby improve free throw (FT) shooting performance. Basketball players, like Joe, can use podcasting as means to improve FT shooting in practice and during competition. Improved FT performance could then contribute to achieving personal goals, team goals, winning games, and winning championships. As technology continues to advance and becomes more mobile, podcasting will become even more practical and relevant for numerous sport applications.

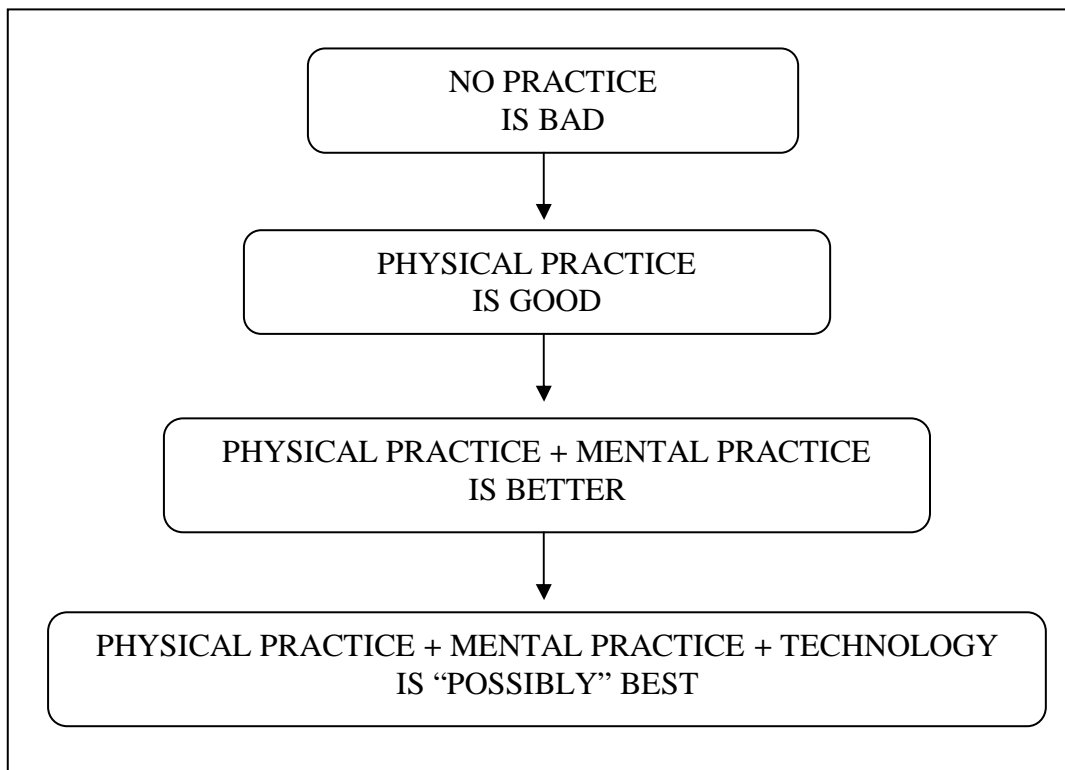
Problem

Poor FT shooting has long been a problem in the game of basketball at various levels of play including high school, college, and professional (Amberry & Reed, 1996; NCAA, 2007; Thompson, 2008). It is well established that physical practice can increase motor skill performance such as FT shooting (Laguna, 2000; Memmert, 2006; Shoenfelt, Snyder, Maue, McDowell, & Woolard, 2002; Williams, 2005; Wulf, 1999). It is also widely accepted that mental training can contribute to increases in FT shooting performance, particularly when it is combined with physical training. Taktek (2004) summarized several studies that indicate the following results: a) mental practice is superior to no practice, but can be inferior to physical practice; b) mental practice can be as effective as physical practice; and c) the combination of mental practice and physical practice can be superior to physical practice alone. However, what is not clear is whether or not technological applications (specifically podcasting) can enhance the sport imagery experience thereby enhancing sport performance. Therefore, the purpose of this study was to determine if podcasting can significantly increase FT shooting performance.

Rationale

The rationale for this study was supported by both logical and documented arguments. A diagram of logic (Figure 1) illustrates the basic rationale for conducting this study. The rationale consisted of several underlying components including: the dynamics of FT shooting (Huston & Grau, 2003; Okubo & Hubbard, 2006), the evidence that mental imagery works (Morris, Spittle, & Watt, 2005; Weinberg & Gould, 2007), the emergence of mobile technology along with the great demand for mobile devices (Holtz & Hobson, 2007; Naismith, Lonsdale, Vavaoula, & Sharples, 2004), and the phenomenal rise of podcasting as a new medium (Holtz & Hobson, 2007; Geoghegan & Klass, 2007). It is also significant to mention that since podcasting is relatively new to sport psychology research, it is likely that this study will raise many other questions that will foster future investigations.

Figure 1 Diagram of Logic



Background

Podcasting can be used for a variety of applications and is already being used in education, business, medicine, mainstream media, and entertainment (Holtz & Hobson, 2007; IDG Global Solutions, 2006; Morris & Terra, 2006). The field of sport psychology could also benefit from the use of podcasting considering that it can be instrumental in both physical and mental preparation (Berger, Pargman, & Weinberg, 2002; Moran, 2002; Taktek, 2004; Taylor & Wilson, 2005, Weinberg & Gould, 2007). For instance, coaches could use podcasts as a direct training tool for memorizing specific offensive and defensive plays, studying opponent strengths and weaknesses, and learning overall game strategy. Sport psychologists could also use podcasts to aid mental training by guiding athletes through an entire imagery script or a specific situation. In turn, athletes can use podcasts to learn new skills or improve current ones. This, of course, can be accomplished with or without supervision. Also, *podcast training* is individual-specific and can be performed at the convenience of the athlete (Geoghegan & Klass, 2007; Holtz & Hobson, 2007). The athlete can choose the type of podcast, when to listen or watch, and where to do it.

In addition, athletes could use podcasts as an alternative to physical performance, particularly during restricted playing time or during injuries. Berger, Pargman, & Weinberg (2002) stated that during the past two decades mental imagery has received a considerable amount of attention from health professionals working with ill and injured athletes. Morris, Spittle, & Watt (2005) declared that imagery can play a key role in rehabilitation as healing imagery, pain-management imagery, rehabilitation-process imagery, and performance imagery. It is evident that podcasting can be used for numerous applications and can offer an innovative strategy in facilitating sport imagery for performance enhancement during active participation and during the rehabilitation process.

Mental imagery training has been explored in various sports including basketball, baseball, golf, canoe-slalom, netball, football, darts, bowling, and many others (Brouziyne & Molinaro, 2005; Callow & Hardy, 2001; Kornspan, Overby, & Lerner, 2004; Landau, Leynes, & Libkuman, 2001; MacInyre, Moran, & Jennings, 2002; Monserrat, 2004; Paiva, 2006). Among the many sport skills, basketball FT shooting has received much attention and has been shown to benefit from mental training (Carboni, Burke, Joyner, Hardy, & Blom, 2002; Hamilton & Fremouw, 1985; Savoy & Beitel, 1996; Shambrook & Bull, 1996; Wrisberg & Anshel, 1989).

Surprisingly, only a few studies have investigated technological applications of sport imagery. Morris, Spittle, & Watt (2005) did suggest that technical techniques such as *video modeling*, *biofeedback*, and *flotation* are worthy considerations in the application of imagery in sport. Bennett (2006) recommended that podcasting can be used in athletic training to communicate with patients or athletes, distribute continuing education courses, and teach athletic training students. However, no studies have been conducted to investigate how technology (specifically podcasting) can be used to apply sport imagery for enhancing FT shooting performance. There is a clear need for more research to determine how current technology can contribute to applications of sport imagery and enhancing sport performance.

Instead, the majority of attention in podcasting has been linked to educational or training purposes. In fact, education is one area where podcasting has already received widespread acceptance as a learning medium. Educational institutions, particularly in America and Europe are using podcasts to record lectures, lessons, and other learning materials and are using podcasts to allow students to submit work and express their creativity (IDG Global Solutions, 2006). Professional businesses including IBM, The Otter Group, Herbalife, General Motors, and Capital One are also benefiting from the use of podcasts (Islam, 2007; Weinstein, 2006). These and

many other companies are using podcasts to distribute information, to train their employees, and to market new products (IDG Global Solutions, 2006; Islam, 2007; Holtz & Hobson, 2007; Morris & Terra, 2006). Sport psychology professionals need to take note on how podcasting works in the educational and corporate arenas. Specifically, sport psychologists, coaches, and athletes need to work together to determine how podcasting can be successfully incorporated for sport training and for sport competition.

Purpose

Podcasting is still a relatively new idea in sport psychology. Therefore, there are several unknowns and research is essential in filling this gap of knowledge. The goal of this study was to investigate whether podcasting can be a valid tool in facilitating sport imagery to increase FT shooting performance. This involved several objectives. Overall, I wanted to determine if podcasting can enhance the imagery experience and thereby increase FT shooting performance. I also wanted to determine whether or not listening to a podcast on an iPod would result to greater increases in FT shooting performance compared to listening to a podcast on a computer or reading from a podcast script.

There were numerous factors to consider in this study including podcast type, frequency and duration of podcasts, and location while listening to or viewing a podcast. It was also important to consider when podcasts are most effective. It should be established whether it is best to listen to or view a podcast before, during, or after shooting free throws. Another influencing factor is the nature of activity. For example, is it better to listen to or view a podcast while sitting in a quiet room or is it equally effective when performing other activities? Examining such factors will provide a better understanding on how podcasting can work in

facilitating sport imagery and enhancing sport performance. Many of these factors were considered in the design of this study.

A review of literature indicated gaps in knowledge that also contributed to the study design. Evidence is abundant that mental training is highly valued and successfully employed by elite athletes, but more research is needed to confirm that novice performers can also benefit (Liggett, 2000; Moran, 2002; Morris, Spittle, & Watt, 2005; Porter, 2003; Taktek, 2004; Taylor & Wilson, 2005; Vealey & Greenleaf, 2001; Weinberg & Gould, 2007). A study using high school subjects is appropriate and worthwhile. Also, sport imagery research has focused primarily on visual and kinesthetic imagery (Taktek, 2004). Using auditory imagery for this study can gain support for other forms of imagery.

Research Questions

Considering the research objectives and the factors involved, the following research questions were addressed in this study:

1. How does sport imagery ability relate to FT shooting performance improvement (pretest-posttest difference)?
2. Is there a significant group difference at the pretest?
3. Is there a significant group difference at each testing session (Test 1, 2, 3, 4, 5, 6)?
4. Is there a significant group difference at the posttest?
5. What is the true source of any significant group differences?

The research questions support the overall question and purpose for the study:

Does podcasting significantly increase FT performance among high school basketball players?

Significance of the Study

There is a large amount of empirical evidence that supports that mental imagery works (Liggett, 2000; Moran, 2002; Morris, Spittle, & Watt, 2005; Porter, 2003; Taktek, 2004; Taylor & Wilson, 2005; Vealey & Greenleaf, 2001; Weinberg & Gould, 2007). Anecdotal evidence is also plentiful, including several accounts from well-known athletes of various sports. For example, golfer Tiger Woods has acknowledged the importance of seeing and feeling desired shots in the mind prior to physically hitting the golf ball (Moran, 2002). Tennis great Chris Evert visualized matches based on her opponent's style of play (Weinberg & Gould, 2007). Evert was quoted that she often felt like she had already played a match even before stepping on the court (Weinberg & Gould, 2007). Hockey legend Wayne Gretzky used visualization by looking at pictures of previous champions and repeatedly envisioning himself holding the Stanley Cup (Orlick, 1998). Two-time Olympic Gold Winner Greg Louganis used imagery by visualizing his dives in slow motion (Liggett, 2000; Louganis & Marcus, 1995). Many other great athletes have been known to use some form of imagery including Muhammad Ali, Michael Jordan, Bill Russell, Andre Agassi, and Carl Lewis (Liggett, 2000; Porter, 2003).

Sport imagery is not only valued by the athletes, but also by many coaches. One coach that is probably the most recognized for using sport imagery is Hall of Fame coach Phil Jackson, who methodically employs mental concepts and techniques to the game of basketball. In Jackson's books (*Sacred Hoops: Spiritual Lessons of a Hardwood Warrior*, 1996; *More than a Game*, 2001; *The Last Season: A Team in Search of its Soul*, 2005) he described the importance of the intellectual component of playing basketball and how it contributes to personal and team success. With nine NBA (National Basketball Association) championships, Jackson's teams definitely had the mental edge over their opponents.

The collection of empirical and anecdotal evidence makes it apparent that sport imagery plays a key role in athletic performance and sport success. Research findings also indicate that sport imagery is more effective when it is combined with physical practice (Morris, Spittle, & Watt, 2005; Taktek, 2004; Weinberg & Gould, 2007). Any improvements to either mental training or physical training, or both, would certainly result in greater gains in sport performance. Therefore, it is important to determine the best methods to enhance the sport imagery experience in conjunction with physical training.

Technology can enhance the sport imagery experience through the use of technological applications and the use of technical devices (Morris, Spittle, & Watt, 2005). An innovative way to apply technology for sport imagery is through podcasting. Podcasting is a compelling technique because it combines current communication technology with the iPod, perhaps the most popular modern device to date (Mack & Ratcliffe, 2007). In January 2008 Apple reported that the number of iPods sold have reached over 140 million, making the iPod the most widely-used digital device worldwide (Benderoff, 2008; Kahney, 2005; Oswald, 2008; Vann, 2008).

Significant findings of this study will have several contributions. Overall, findings of this study will add to the body of knowledge in sport psychology. Specific contributions include the following: 1) significant results will strengthen the evidence that technology can enhance the imagery experience, 2) significant results will validate podcasting as a successful method in increasing FT shooting performance, 3) significant results will confirm that novice performers can successfully conduct sport imagery like their expert counterparts, 4) significant findings will strengthen support for auditory imagery as an effective form of sport imagery, and 5) this study will generate more questions that will foster future research.

Delimitations

This study was delimited by the following:

1. Study was conducted from January 2008 through March 2008.
2. The sample population for the study included both male and female high school basketball players from Oklahoma, but gender differences were unaccounted for.
3. Administration of testing was conducted on different days and at separate locations.

Assumptions

This study included the following assumptions:

1. Subjects performed at maximum effort during all FT testing sessions.
2. Subjects conducted mental practice at home as instructed.
3. Subjects answered all the questions on the Sport Imagery Evaluation truthfully.

Hypotheses

The following hypotheses were made in this study:

1. Sport imagery ability is related to FT shooting performance improvement.
2. No significant group difference is present at the pretest.
3. Significant group difference is present at each testing session (Test 1, 2, 3, 4, 5, 6)
4. Significant group difference is present at the posttest.
5. The true source of any significant group difference is between one of the experimental groups and the control group.

Null Hypothesis

The null hypothesis for the pretest, testing sessions (test 1-6), and posttest:

Pretest H₀: script ≠ computer ≠ iPod ≠ control

Test 1-6 H₀: script = computer = iPod

Posttest H₀: script = computer = iPod = control

* Each hypothesis was tested at $p < .05$

Definition of Terms

The following terms are operationally defined:

Biofeedback – a technique used in sport psychology to enhance sport imagery and athletic performance involving the use of various electronic devices to detect or record physiological signals (i.e. heart rate, brain activity, muscle tension, etc.).

Floatation – a technique used in sport psychology to enhance sport imagery and athletic performance involving the use of a floatation tank in which the athlete floats supine (with most of the body under water except the face, chest, and abdomen).

Free Throw Imagery – the use of sport imagery techniques to enhance free throw shooting performance during practice and competition.

Imagery script – a scripted dialogue of a sport imagery event or experience intended to be read or listened to during sport imagery training.

iPod – digital media player created by Apple, Inc. (includes all iPod models).

Podcast – refers to the media file in podcasting, usually in the form of images, audio, or video.

Podcast training – the use of podcasts for imagery training to enhance sport performance.

Podcasting – the process of creating and distributing digital media files (images, audio, or video) over the internet for future download and playback on a computer or a digital media player.

Sport Imagery – using all senses to re-create or create a sport experience in the mind with the goal of enhancing sport performance during training and competition.

Video modeling – a technique used in sport psychology to enhance sport imagery and athletic performance involving the use of video equipment to view an expert athlete performing a skill correctly or at peak performance.

Summary

Podcasting is a promising technological application of sport imagery to enhance sport performance. The purpose of this study was to determine if podcasting can significantly increase FT shooting performance among high school basketball players. Significant findings of this study will contribute to the field of sport psychology, provide supporting evidence that technology can enhance the imagery experience, recommend that podcasting is a valid method in increasing FT shooting performance, confirm that novice performers can successfully conduct sport imagery like their expert counterparts, and support auditory imagery as an effective form of sport imagery. In addition, since podcasting is relatively new to sport psychology research, it is expected that this study will produce other questions that will foster future investigations.

The following chapters include a review of literature (Chapter II), a description of methods and procedures used in the study (Chapter III), a presentation and discussion of results (Chapter IV), and a summary of significant findings, conclusions, and recommendations for future research (Chapter V). In addition, all documents and forms that were used for the study are included in the appendix section.

CHAPTER II

REVIEW OF LITERATURE

Introduction

The review of literature in this study included a variety of sources including research journals, articles, books, interviews, and expert knowledge. The literature review is divided into four parts: 1) Free Throw Shooting, 2) Sport Imagery, 3) Technology, and 4) Summary. The objective was to discuss relevant information, examine past research, find gaps in knowledge, and justify why this study is important in the field of Sport Psychology.

Free Throw Shooting

The free throw (FT) shot is possibly the most difficult task performed in the game of basketball. Despite little physical effort, the absence of defense, and a total of 10 seconds to complete the shot, FTs are still missed on a regular basis. Free throw statistics for college and professional basketball confirm that poor FT shooting has been a common problem of the game for many years. Prior to the 1996 season, the NCAA (National Collegiate Athletic Association) FT average was only about 66 percent (Amberly & Reed, 1996). According to official NCAA statistics, the national FT average for Division I men's basketball in the 1990's was 67.8 percent (NCAA, 2007). From 2000 to 2007 official NCAA statistics indicate a small improvement, but FT shooting averages remained low at 68.8 percent (NCAA, 2007). Professional athletes are also poor FT shooters, despite being recognized as some of the best basketball players in the world.

For the last 30 years, players in the NBA (National Basketball Association) have performed league FT averages ranging from 73.7 percent to 76.5 percent (Thompson, 2008).

It is debatable whether missed FT shots are more a result of physical errors or mental errors, but it is certain that both play a major factor. Dr. Tom Amberry, self-proclaimed as the world's greatest free throw shooter by making 2,750 consecutive free throws, believes that poor free throw shooting in the NBA and NCAA is a result of poor mechanics and an inability of the players to control their mental game (Amberry & Reed, 1996). The consensus among other experts, sport psychologists, coaches, and players is that FT shooting has both physical and mental demands. Empirical evidence confirms that there are numerous physical and mental factors involved in successfully completing FT shots.

Physical Factors

Considering several physical factors, any two FT shots will not be exactly the same. From the moment the athlete approaches the FT line to the release of the basketball, various elements of the FT process will vary. Physical factors that may influence the success of the FT shot could include physical conditioning, shooting dynamics, shooting stance, shooting form, shooting technique, pre-shot routines, practice variables, game conditions, and external stimuli (Booher, 1990; Czech, Ploszay, & Burke, 2004; Geisler & Leith, 2001; Kladopoulos & McComas, 2001; Kozar, Vaughn, Whitfield, Lord, & Dye, 1994; Kozar, Whitfield, Lord, & Mechikoff, 1993; Ma & Kaber, 2006; Mack, 2001; Memmert, 2006; Okubo & Hubbard, 2006; Sampaio & Janeira, 2003; Shoenfelt, 1991; Shoenfelt, Snyder, Maue, McDowell, & Woolard, 2002; Zachry, Wulf, Mercer, & Bezodis, 2005). Any one or a combination of these physical factors could cause a slight error, resulting in a missed FT shot.

Mental Factors

The success of the FT shot is also affected by several mental factors including confidence, focus, concentration, motivation, arousal, stress, anxiety, choking, and superstition (Cleary & Zimmerman, 2001; Cornelius, Silva, Conroy, & Petersen, 1997; Dandy, Brewer, & Tottman, 2001; Foster & Weigand, 2006; Jones, Hanton, & Swain, 1994; McQuown, 2001; Pronin, Wegner, McCarthy, Rodriguez, 2006; Ruot, Hall, & Shapiro, 2004; Wang, Marchant, & Morris, 2004). Similar to physical factors, any one or a combination of mental factors can result in a missed FT shot.

Physical vs. Mental Practice

To offset the many physical and mental factors that may affect the FT shot, sport performance training must involve both forms of practice. In general, physical practice is the standard method for learning and enhancing sport skills. However, mental practice is gaining ground particularly among elite performers (Liggett, 2000; Moran, 2002; Morris, Spittle, & Watt, 2005; Porter, 2003; Taktek, 2004; Taylor & Wilson, 2005; Vealey & Greenleaf, 2001; Weinberg & Gould, 2007). Some of the greatest athletes including Michael Jordan, Wayne Gretzky, and Tiger Woods have been known to incorporate mental training into their practice regimen (Moran, 2002; Orlick, 1998; Porter, 2003).

In comparison, some research studies have reported similar results between mental practice groups and physical practice groups (Hall, Bernoties, & Schmidt, 1995; Kohl & Roenker, 1980; Taktek, 2004). Some studies indicate that the combination of physical practice and mental practice is superior to physical practice alone (Kohl, Ellis, & Roenker, 1992; Taktek, 2000, 2004; Weinberg, 1981), while other studies did not find a significant difference (Kohl, Ellis, & Roenker, 1992; Taktek, 2000, 2004). Overall, it can be summarized that any practice is

better than no practice, physical practice is greater than or equal to mental practice, and that the combination of physical and mental practice is greater than or equal to physical practice alone (Hall, Bernoties, & Schmidt, 1995; Kohl, Ellis, & Roenker, 1992; Kohl & Roenker, 1980; Moran, 1996, 2002, 2004; Taktek, 2000, 2004; Weinberg, 1981). Therefore, mental practice is a recommended adjunct to physical practice in achieving optimal sport performance.

Sport Imagery

The emergence and development of sport psychology has provided a better understanding of cognitive processes and gives insight on how the mind contributes to sport performance. It is now generally accepted that sport imagery works, and there is an abundance of empirical and anecdotal evidence to support this idea (Liggett, 2000; Louganis & Marcus, 1995; Moran, 1996, 2002, 2004; Morris, Spittle, & Watt, 2005; Orlick, 1998; Porter, 2003; Taktek, 2000, 2004; Taylor & Wilson, 2005; Vealey & Greenleaf, 2001; Weinberg & Gould, 2007).

Among the many sport skills investigated, basketball FT shooting has received much attention and has been shown to benefit from sport imagery training (Carboni, Burke, Joyner, Hardy, & Blom, 2002; Hamilton & Fremouw, 1985; Savoy & Beitel, 1996; Shambrook & Bull, 1996; Wrisberg & Anshel, 1989). Landau, Leynes, & Libkuman (2001) stated that a basketball player who simulates the movements of a free throw shot can envision changes in the muscle tension or the view of the basketball hoop to facilitate a successful free throw. In this case, basketball athletes are able to internally and externally manipulate physical components in the mind to achieve a successful shot each and every time. A basketball player could imagine never missing another FT shot. However, Landau, Leynes, & Libkuman (2001) also warn that this could lead to a distortion in reality. Goff & Roediger (1998) called this distortion in reality the “imagination inflation,” which does not necessarily affect actual sport performance.

Key Characteristics

Sport imagery can be defined as using all senses to re-create or create a sport experience in the mind with the goal of enhancing sport performance during training and competition (Morris, Spittle, & Watt, 2005; Vealey & Greenleaf, 2001; Weinberg & Gould, 2007). As mentioned by Morris, Spittle, & Watt (2005), this definition is best understood in conjunction with Vealey & Greenleaf's (2001) discussion of the three key characteristics of sport imagery: 1) imagery involves the recreation of a previous sport experience or the creation of a new one, 2) imagery is a polysensory experience and should incorporate as many senses as possible, and 3) imagery does not require external stimuli – everything can occur in the mind. Therefore, all three characteristics are essential and must be incorporated as part of a successful sport imagery experience.

Imagery Type

There are different forms of sport imagery. Taktek (2004) mentioned three forms of imagery as defined by Jeannerod (1994) which included visual imagery (imitating a movement), temporal imagery (anticipating an action), and kinesthetic imagery (feeling of body sensations). Weinberg & Gould (2007) indicated four types of imagery (visual, kinesthetic, auditory, and olfactory), and determined that most research studies focus on visual and kinesthetic imagery. Moran (2002) described three imagery types (visual, auditory, and kinesthetic) and specified that two thirds of our mental images are visual in nature. Mahoney & Avenier (1977) established an internal (imagery within one's body) and external perspective (external observer) for mental imagery.

Farahat, Ille, & Thon (2004) examined the effect of visual and kinesthetic imagery determining that both imagery groups performed better than two control groups, and that the

visual group performed better than the kinesthetic group. This finding was inconsistent with general study results that indicate that kinesthetic imagery is superior to visual imagery in the acquisition of motor skills and performance (Taktek, 2004). Effectiveness between different types of imagery may be due to the nature of the sport skill. As Hall, Buckolz, & Fishburne (1992) indicated, kinesthetic imagery may be better for learning closed skills and visual imagery is better for learning open skills. Other factors that could influence imagery effectiveness are individual imagery ability and learning level (Taktek, 2004).

Imagery Application

Research focus and imagery application have primarily involved visual and kinesthetic imagery. However, this does not mean that other types of imagery such as auditory imagery, olfactory imagery, and temporal imagery are less important. This also includes the differentiation between internal and external imagery. According to Weinberg & Gould (2007), the best way to conduct imagery for maximal performance is to combine various forms of imagery. In addition, individual differences may play a big factor in successfully conducting imagery. Despite what research studies indicate, the ultimate decision of choosing the type of imagery must be given to the individual learner. Only he or she can truly determine what specific imagery program works best according to his or her imagery ability and personal preference.

Technology

Sport psychologists, along with coaches and athletes, are already using modern devices such as digital cameras, digital video recorders, computers, and various software programs in conjunction with mental imagery (Straub, 2003). It is likely that using the latest technology will generate innovative applications of imagery for skill acquisition and performance enhancement.

There are several high-tech devices available today, particularly mobile devices, which have great potential in functioning as technical tools for sport imagery. Examples of mobile devices include digital media players, smartphones, personal digital assistants, and handheld personal computers. The iPod is perhaps the most popular modern device to date (Mack & Ratcliffe, 2007). The number of iPods sold have reached over 140 million, making the iPod the most widely-used digital device worldwide (Benderoff, 2008; Kahney, 2005; Oswald, 2008; Vann, 2008).

Technology is constantly evolving. This means that older, inferior products are always being replaced by high-tech models that are more advanced, more efficient, and more reliable. New products have several advantages. One advantage is that new models usually have more functions and applications. Also, next-generation models often possess a distinctive aesthetic value or “cool factor” effect. In some cases, this may entice individuals to try something new or different. It is apparent that “many athletes are attracted to approaches that involve new technology,” (Morris, Spittle, & Watt, 2005), thereby promoting the practice of mental techniques. So for athletes who normally would not be interested in mental imagery techniques, he or she may actually try it if “cool” gadgets (specifically iPods) are involved.

Current Techniques

Technical techniques via video modeling, biofeedback, and flotation are suggested as worthy considerations in the application of imagery in sport (Morris, Spittle, & Watt; Fletcher, 2005). Research evidence supports that the use of technical aids can potentially facilitate mental practice by increasing the accuracy and efficacy of imagery (Morris, Spittle, & Watt; Fletcher, 2005). For instance, Mayers (2005) determined that video modeling was successful in increasing free throw shooting accuracy among high school basketball players. Aldridge, Morris, and

Anderson (2003) found that self efficacy and basketball free throw shooting performance significantly increased for participants in the imagery-plus-floatation condition. Biofeedback studies have also shown positive results in increasing sport performance, but have yielded inconsistent results (Kavussanu, Crews, & Gill, 1998).

Podcasting

Podcasting is not an invention, but rather the convergence of existing technologies. All that is needed to create and distribute a podcast is a microphone, a computer, and internet access. Podcasting has been used for a variety of applications and functions including listening to music, hearing the news, studying for class, writing a novel, running a business, and even learning medical procedures (Authors, 2007; Deahl, 2007; Hartman & Jackson, 2007; Koo & Kwong, 2006; Lee & Chan, 2005; Vogele & Gard, 2006; Weinstein, 2006).

Since humble beginnings in 2002, podcasting quickly became a technological phenomenon. Success may be due to several reasons. Mainly, it is likely the combination of technological innovations that made podcasting feasible and the cultural demands of advanced technology that made podcasts appealing (Holtz & Hobson, 2007). Success could also be credited to the desire for individuals to create and distribute podcasts, especially since podcasts are so easy to record, edit, and send through the internet (Geoghegan & Klass, 2007; Holtz & Hobson, 2007; Morris & Terra, 2006).

It is evident that podcasting is a new medium that is here to stay. Its development will continually be driven by the growth of mobile technology and the many mobile devices that are invented and upgraded to meet demand. Technological advancement will only make podcasting more appealing and applicable in various applications. Specifically, podcasting presents as an innovative tool in applying sport imagery for performance enhancement.

Sport Imagery & Podcasting Connection

Surprisingly, the connection between sport imagery and podcasting has not been explored. Instead research focus in podcasting has been mostly directed to educational or training purposes (Authors, 2007; Chan & Lee, 2007; Dale, 2007; Koo & Kwong, 2006; Lee & Chan, 2005; Maag, 2006; Ralph & Olsen, 2007; Rossi, 2007; Shim, 2007). Three of the four studies in the *Dissertations and Theses Abstracts & Indexes* also explore podcasting applications in education. The most relevant reference found was from Bennett (2006) who recommends that podcasting can be used in athletic training. However, like many others, Bennett intended for podcasting to be used as a teaching tool. Furthermore, the nature of the article was based on personal recommendations and did not have empirical support. Altogether, no studies have established that podcasting can be used for sport imagery training. Future research needs to address this gap in knowledge.

Summary

Researchers, sport psychologists, coaches, and athletes must work together to explore how technology can enhance physical and mental training. We need to establish how podcasting can facilitate sport imagery to achieve peak sport performance. Specifically, we need to determine how podcasting can enhance FT imagery to improve FT shooting performance. Current and future research is essential in meeting these goals.

The following chapters describe the methods and procedures of this study (Chapter III), a summary of study results (Chapter IV), and a discussion and recommendations for future investigation (Chapter V). Considering that this study was the first to explore podcasting as a technological application of sport imagery to enhance FT performance, study findings will greatly contribute to the body of knowledge in sport psychology.

CHAPTER III

METHODS AND PROCEDURES

Introduction

The methods and procedures chapter describes the design and the specific procedures employed in this study. The methods and procedures chapter is divided into seven parts: 1) research design, 2) population and sample, 3) sampling procedures, 4) instrumentation, 5) data collection and procedures, 6) data analysis, and 7) limitations.

The purpose of this study was to determine if podcasting can significantly increase free throw (FT) shooting performance among high school basketball players. Specifically, the following research questions were asked:

1. How does sport imagery ability relate to FT shooting performance improvement (pretest-posttest difference)?
2. Is there a significant group difference at the pretest?
3. Is there a significant group difference at each testing session (Test 1, 2, 3, 4, 5, 6)?
4. Is there a significant group difference at the posttest?
5. What is the true source of any significant group differences?

Research Design

A quasi-experimental design (comparison group pretest-posttest design) was used to determine if podcasting was statistically significant in increasing FT shooting performance among high school basketball players. Although a true experimental design was preferred, it was

not possible to randomly assign subjects into groups. Instead, subjects were assigned into groups according to their availability to participate and their ownership of an iPod and computer. It is important to note that while a quasi-experimental design is weak in controlling for internal validity, it can be strong in controlling for threats to external validity (Saint-Germain, 2008). In this study, the subjects represent the population group in that the individuals who already owned an iPod and a computer would be the same individuals who would be able and more likely to use podcasting in a normal setting. Therefore, selecting a quasi-experimental design is adequate for this study. The design for this study followed the classical paradigm for sport imagery research (as stated in Taktek, 2004) consisting of three to four participant groups and three experimental phases (pre-test phase, treatment phase, posttest phase).

Population and Sample

Ten basketball teams (consisting of approximately 150 players) from Oklahoma were recruited to participate in the study. Six teams chose to participate, but only four teams were included in the study. Two teams were excluded prior to the beginning of the study; one team was removed due to their inability to participate and the other team was removed because the school board was not able to submit a letter of consent prior to the beginning of the study.

The sample for the study included 36 (12 male, 24 female) high school basketball players from four Oklahoma public school teams. Specifically, 27 (nine male and 18 female) players participated in the experimental groups (script, computer, iPod) and nine (three male and six female) players participated in the control group. Participating players were 18 years old or younger.

Sampling Procedures

Permission to recruit subjects was granted by the Oklahoma State University Institutional Review Board to conduct human subject research. Ten basketball teams from the Northwest and the Northeast regions of Oklahoma were recruited to participate in this study. Coaches from the respective teams were contacted either by letter, e-mail, phone call, or personal meeting. All participating teams were public high schools.

Permission to recruit subjects was also obtained from the school board, principal, and coach of each participating school. Official consent letters were required from a representative of the school board, the principal, and the head coach of the participating schools. Once the letters were submitted, players from the participating teams were recruited during separate team meetings held either prior to or following team practice. During the recruitment process, players were informed of the nature of the study, the study requirements, the time commitment and schedule, the testing protocol, the significance of the study, and any possible risks involved. It was emphasized that participation in the study was strictly voluntary.

All players received a recruitment package consisting of the following materials:

1) Letter to the Parent or Legal Guardian (Appendix C), 2) Letter to the Player (Appendix D), 3) Parental Consent Form (Appendix E), and 4) Assent Form (Appendix F). Players were instructed to review the consent forms with their parents or legal guardian. Upon full understanding and consent to participate, players returned the signature page of both the Parental Consent Form and the Assent Form. A master copy of all forms was given to the team's head coach in case additional copies were needed.

Players were surveyed to determine how many individuals owned or had access to an iPod and computer for use during the study. As indicated in the research design, subjects were

assigned into groups according to their availability to participate and their ownership of an iPod and computer. Therefore, players who had access to an iPod and computer were assigned to the iPod group or the computer group. Subjects in the iPod group were allowed to use any iPod model or any digital device (MP3 player) to download the podcast. The remaining players were then assigned to the script group or the control group. Players who were not able to commit for all testing sessions were automatically assigned to the control group. Subjects in the control group were not required to participate in the FT imagery training or the six testing sessions. Control group subjects were only required to participate in the pretest and posttest.

Instrumentation

Sport Imagery Evaluation

The Sport Imagery Evaluation (Vealey & Greenleaf, 2001) was used in this study to evaluate the athlete's imagery ability. According to Vealey & Greenleaf (2001), the Sport Imagery Evaluation measures the athlete's ability to experience different senses, emotions, and perspectives during imagery. Vealey & Greenleaf (2001) adds that although there are other inventories available, the Sport Imagery Evaluation seems to be the most useful for the coach and practitioner.

The administration and scoring of the Sport Imagery Evaluation (Appendix K) was approximately 15 minutes for each team. Components of the Sport Imagery Evaluation consisted of four general sport situations: 1) Practicing Alone, 2) Practicing with Others, 3) Practicing in a Contest, and 4) Recalling a Peak Performance. Players read each scenario and were asked to rate their imagery experience in seven areas: 1) visual, 2) auditory, 3) kinesthetic, 4) emotion, 5) internal perspective, 6) external perspective, and 7) controllability. Ratings were on a 5-point Likert scale (1 = less vivid image to 5 = most vivid image).

The scoring and interpretation of scores was based on the following scale: excellent (20-18), good (17-15), average (14-12), fair (11-8), and poor (7-4). In addition, the scores for each of the seven areas of imagery were added to obtain a cumulative score. The average score was used as the overall imagery score. This overall imagery score was used as the indicator for the player's ability to conduct sport imagery.

Free Throw Imagery Script

An original FT imagery script (Appendix L) was used for this study. The FT imagery script was specifically created as the podcast source for all experimental groups (script, computer, iPod). The FT imagery script consisted of a brief introduction, the actual FT imagery dialogue, and a conclusion stating instructions and reminders.

The podcast (entitled *Free Throw Imagery*) can be found by going to the following web address: http://osuresearchstudy.mypodcast.com/2008/01/FT_Imagery_Training-73135.html or by subscribing to the podcast on iTunes. The podcast was originally recorded by the principal investigator of this study via the online service www.MyPodcast.com. Production of the podcast using the MyPodcast website was simple, quick, and free of charge. The podcast was recorded and became available for download within 10 to 15 minutes. However, the process may be longer depending on the number of edits when recording.

Subscribing to the podcast on iTunes was accomplished by following five simple steps: 1) open iTunes, 2) right click on the "advanced" tab, 3) right click on "subscribe to podcast..." on the drop down menu, 4) enter the following web address in the pop-up window: <http://osuresearchstudy.mypodcast.com/rss.xml>, and 5) press play to listen to the podcast on the computer (computer group) or transfer the podcast onto an iPod by linking the device to the computer (iPod group).

Podcast

Cost-effectiveness was the primary goal in creating the podcast for this study. Therefore, every effort was made to use personal equipment as well as use online resources that were free of charge. The total expenditure for podcasting in this study was less than 10 dollars (the computer microphone was \$9.66).

The following materials were used to create the FT podcast:

1. Cyber Acoustics computer stand microphone (model MC-1060)
 - purchased at Wal-Mart Supercenter
 - cost - \$9.66
2. MyPodcast Recorder
 - downloaded from www.MyPodcast.com
 - FREE
3. MyPodcast web host
 - www.MyPodcast.com
 - FREE
4. iTunes
 - downloaded from www.apple.com/itunes/download/
 - FREE
5. Personal computer
 - Dell XPS Gen2 Laptop
6. Personal iPod
 - Apple iPod nano 3rd Generation
7. Internet connection
 - Suddenlink High Speed Internet

In addition to cost-effectiveness, creating the podcast for the study was relatively simple. The website, www.MyPodcast.com, provided the recording software as well as the web hosting site to store the podcast. Using the Cyber Acoustics microphone, the MyPodcast recorder, and a Dell laptop, the podcast was recorded onto the MyPodcast website service. Once established, the podcast became available for download. At that point, anyone with an internet connection was able to download the podcast.

Subjects in the computer group were instructed to download the podcast through iTunes and listen to the podcast directly on their computers. Subjects in the iPod group were instructed to take an extra step by linking their iPod with their computer. Subjects in the iPod group would then listen to the podcast on their iPod instead of their computer. Subjects in the script group did not have to conduct the download procedures, instead they were simply provided a written version of the podcast. Subjects in the control group did not participate in podcast training. Therefore, control group subjects were instructed not to download or listen to the podcast during the testing phase of the study.

Data Collecting Procedures

Data collection began in January 2008 and was completed in March 2008. The study was designed as an 8-week study, consisting of a pretest, six separate testing sessions, and a posttest. Subjects attended an orientation meeting at their respective schools one week prior to data collection. The orientation meeting was held to collect consent forms, to discuss the data collecting procedures, to distribute instruction forms, to assign groups, and to answer any questions or concerns. The subjects were assigned to the following four groups: 1) script group, 2) computer group, 3) iPod group, and 4) control group.

Free Throw Shooting Format

Free throw shots in this study were performed in a predesigned format (Table 1). Subjects shot a total of 25 free throws in groups of one, two, and three. Subjects were asked to use this format of shooting free throws to imitate a basketball game situation. During competition, a player who is fouled is awarded one, two, or three free throws depending on the penalty.

The free throw shooting format consisted of 5 sets; shooting one, two, or three free throws consecutively. For example, a player would perform the following FT shooting sequence for set #1: 1) shoot one FT on the first turn, then rotate; 2) shoot two consecutive FTs on the second turn, rotate again; and 3) shoot three consecutive FTs on the last turn. The player at that point would rotate again and begin the next shooting set on the next turn. This FT shooting sequence was followed for sets #1 through #4. On the fifth and final set, a player would shoot only one FT to complete the free throw shooting format of 25 total free throws. This free throw shooting format was successfully implemented for the pretest, all six testing sessions, and the posttest.

Table 1 Free Throw Shooting Format

SET 1	SET 2	SET 3	SET 4	SET 5
1	1	1	1	1
2	2	2	2	0
3	3	3	3	0

Poteet (1999) used a similar shooting format, which he referred to as the *transfer design format*. The transfer design format consisted of 100 free throws, which was divided into 10 sets and 5 segments. Each set and segment combination had a predetermined number of shots (one, two, or three). The set and segment combination for #1 through #5 mirrored that of set and segment combination for #6 through #10.

Free Throw Imagery Training

Subjects assigned into the three experimental groups (script, computer, iPod) participated in FT imagery training sessions for six weeks. The FT imagery session was conducted weekly at the schools by the principal investigator prior to each FT shooting session. The goal was to prepare subjects mentally prior to the physical performance of shooting free throws. The duration of the FT imagery session was approximately five minutes in length and was conducted in a quiet area or separate room.

The FT imagery training session involved guided imagery via podcast training. Specifically, subjects in the iPod and computer groups listened to the audio podcast that guided them through a FT shooting experience. Subjects were instructed to close their eyes and carefully listen to each word. Subjects were also encouraged to focus on key words while imagining themselves shooting FTs in the gym. Key words in the podcast such as “relaxed, feel, scent, hear, sound, see, confident, and focus” were included in the podcast to enhance the FT imagery experience. As indicated, imagery is a polysensory experience and should incorporate as many senses as possible to achieve optimal performance (Vealey & Greenleaf, 2001). Subjects in the script group received similar instructions. However, instead of listening to an audio podcast subjects in the script group read a written dialogue of the podcast.

Subjects in all three experimental groups also conducted two additional FT imagery training at home. The two additional sessions were to be conducted at the convenience of the subject, with the following conditions: 1) subjects must follow their corresponding group instructions, 2) the sessions must be two separate sessions, and 3) the sessions were not conducted on the same day as the weekly training sessions at school. The weekly FT imagery training schedule is shown in Table 2.

Table 2 Free Throw Imagery Training Schedule

GROUP	DAY 1	DAY 2	DAY 3
Script	5 min School	5 min Home	5 min Home
Computer	5 min School	5 min Home	5 min Home
iPod	5 min School	5 min Home	5 min Home
Control	DNP	DNP	DNP

* DNP = Did not Participate

A total of 15 minutes of FT imagery training was conducted weekly (90 minutes total for six weeks). Specifically, subjects in the iPod group listened to the FT podcast on their iPod; subjects in the computer group listened directly on their computer or laptop; and subjects in the script group read the podcast dialogue in text form. Subjects in the script group were given a copy of the FT Imagery Script (Appendix L) for home use. Subjects in the iPod and computer groups were given written instructions how to download the podcast (Appendix M).

Orientation

One week prior to the beginning of the study, subjects attended an orientation session. The following objectives were met during the orientation: 1) provided detailed information regarding the study schedule, 2) assigned subjects into groups, 3) distributed corresponding group instructions, 4) collected consent forms, 5) completed the Sport Imagery Evaluation (experimental groups only), and 6) answered questions and concerns. The subjects were also reminded of contact information for the principal investigator, the research advisor, and the IRB chair.

Location, Equipment, & Schedule

The orientation and all testing sessions were held in the gymnasium of each of the participating teams. The basketball equipment used was also the property of the schools. The basketball goals were regulation height (10 ft.) and the FT line was regulation distance (15 ft.) from the backboard. The male subjects used a regulation men's high school basketball (29.5-30 in. circumference, 20-22 oz. weight) and female subjects used a regulation women's high school basketball (28.5-29 in. circumference, 18-20 oz. weight). The primary investigator provided the podcast production equipment, as well as the score cards and pencils. The FT testing schedule (Appendix O) for each team was arranged with the head coach prior to the beginning of the study. Testing days were scheduled around game schedule and practice schedule. However, some testing days were rescheduled due to schedule changes.

Testing

Subjects in the experimental groups (script, computer, iPod) participated in eight testing sessions (a pretest, six separate testing sessions, and a posttest). Subjects in the control group participated in the pretest and posttest only. The purpose of the pretest was to record baseline scores. The objective in the six testing sessions was to incorporate the FT imagery training as well as record FT shots and track progress. The posttest was conducted to obtain the final scores. Scores in all testing sessions were used in the analysis.

Pretest

All experimental groups (script, computer, iPod) and the control group participated in the pretest. The pretest session was conducted to record baseline scores. No FT imagery training was conducted in the pretest. Subjects were given a 5-minute warm-up prior to shooting the test free

throws. Subjects were allowed to shoot any type of shot during the warm-up period. At the end of the warm-up, subjects were divided into groups corresponding to the number of basketball goals in the gym. Each subject followed the predetermined FT shooting format (Table 1). Subjects recorded the number of made shots on their FT score card (Appendix N) and submitted them to the principal investigator for computation.

After all subjects completed their FTs and submitted their scores, there was a short meeting to discuss the upcoming procedures of the study. Subjects were reminded to conduct their home FT imagery sessions. Subjects in the iPod and computer groups received podcast download instructions (Appendix M) and subjects in the script group received a typed copy of the FT imagery script (Appendix L).

Testing 1-6

Only the experimental groups (script, computer, iPod) participated in the six testing sessions. The FT imagery training was incorporated in the testing sessions. Each testing session followed the same plan:

- FT Imagery Training
- 5-minute warm-up
- Divide into groups
- Shoot 25 FTs using the FT shooting format
- Record and submit scores

Posttest

The posttest was conducted to replicate the pretest conditions. Therefore, FT imagery training was not conducted prior to shooting posttest free throws. It is important to note that subjects did not receive additional training or feedback at the pretest, at the six testing sessions, or at the posttest. Excluding team practices and games, subjects were instructed not to practice free throws outside the norm with intent to do well in the study. The subjects were encouraged to do their best during testing, but influencing factors that may affect the study were avoided. These included positive factors that could increase performance or negative factors that could decrease performance. Examples of positive factors included giving advice to correct shooting form or technique and providing feedback in the form of verbal cues or clapping. Negative factors included any interference such as excessive noise, physical contact to the player, and obstruction of the goal. By avoiding influencing factors, it is safe to suggest that any significant group differences found is due to the treatment (podcasting).

Data Analysis

The purpose of this study was to determine if podcasting can significantly increase FT shooting performance among high school basketball players. Specifically, the following research questions were asked:

1. How does sport imagery ability relate to FT shooting performance improvement (pretest-posttest difference)?
2. Is there a significant group difference at the pretest?
3. Is there a significant group difference at each testing session (Test 1, 2, 3, 4, 5, 6)?
4. Is there a significant group difference at the posttest?
5. What is the true source of any significant group differences?

In answering these research questions, all data for this study was analyzed via the Statistical Package for the Social Sciences (SPSS) 14.0 for Windows Graduate Student Version (Release 14.0.2).

The following analyses for the five research questions were conducted at $p < .05$:

1. A pretest-posttest difference was calculated and then correlated with the imagery ability score.
2. A one-way ANOVA was conducted to test for group differences at the pretest.
3. A one-way ANOVA was conducted to test for group differences at each testing session (test 1-6).
4. A one-way ANOVA was conducted to test for group differences at the posttest.
5. A Tukey post hoc test was conducted to determine the true source of the group difference at the posttest.

The results of the data analysis are discussed in detail in the following chapter (Chapter IV). In addition to answering the research questions, effect size was also of interest. Therefore, omega squared (w^2) was calculated to adjunct the interpretation of results. This is also discussed in detail in the next chapter.

Limitations

This study had the following limitations:

1. Small sample size ($n = 36$)
2. Limited study duration (8 weeks)
3. Group assignment was dependent upon subject ownership of an iPod and computer

CHAPTER IV

RESULTS AND DISCUSSION

Introduction

The purpose of this study was to determine if podcasting can significantly increase free throw (FT) shooting performance among high school basketball players. This chapter presents the study results in detail and provides a discussion regarding the results. Presentation of results is organized to answer the specific research questions:

1. How does sport imagery ability relate to FT shooting performance improvement (pretest-posttest difference)?
2. Is there a significant group difference at the pretest?
3. Is there a significant group difference at each testing session (Test 1, 2, 3, 4, 5, 6)?
4. Is there a significant group difference at the posttest?
5. What is the true source of any significant group differences?

In addition to answering the research questions, the effect size for the study was also of interest. Therefore, omega squared (w^2) was calculated to determine what inferences can be made about the population of this study. However, w^2 was only calculated for a significant F value.

In the subsequent sections of this chapter, the findings of this study are reported as clearly and concisely as possible without author bias. In doing so, each research question is addressed separately by outlining the test analysis used and presenting the results in a narrative format

supplemented by tables and figures. Finally, a discussion of key findings is provided that explains what was found in the study.

Group Distribution

Group distribution for this study is shown in Table 3. A total of 36 subjects participated in the study, with nine players in each of the four groups. Specifically, the iPod and computer groups each had nine female players, the script group had nine male players, and the control group had three male and six female players.

Table 3 Group Distribution

Group	iPod	Computer	Script	Control
# of Subjects	9	9	9	9

Data

The data (Appendix P) analyzed in the study was the total number of free throws made at each testing session including the pretest, the six testing sessions, and the posttest. Subjects in the experimental groups (script, computer, iPod) shot 25 FTs at each testing session with a total of 200 FTs for the study. Subjects in the control group only shot a total of 50 FTs for the study, since control group subjects only participated in the pretest and posttest (and did not participate at any of the six testing sessions).

The scores from the Sport Imagery Evaluation (Appendix K) were also analyzed. The average score of the seven imagery component scores was used as the imagery ability score. The imagery ability score was then correlated with the pretest-posttest difference of successful free throws to determine how imagery ability relates to FT performance improvement.

Results

Research question #1:

- How does sport imagery ability relate to FT shooting performance improvement (pretest-posttest difference)?

Descriptive statistics (Table 4) indicated that the mean and standard deviation for subjects in the experimental groups (script, computer, iPod) was 13.87 ± 3.00 for imagery ability and 3.00 ± 3.90 for the pretest-posttest difference.

Table 4 Imagery Ability & Pretest-Posttest Difference

Descriptive Statistics			
	Mean	Std. Deviation	N
prepostdiff	3.00	3.903	27
imagery	13.87	3.003	27

A 2-tailed Pearson product-moment correlation (Table 5) indicated that there was an indirect or negative relationship ($r = -.167$, $p < .05$) between sport imagery ability and FT shooting performance improvement (pretest-posttest difference). Using the eyeball method (Salkind, 2000), there was a weak or no relationship between sport imagery ability and FT shooting performance improvement. The coefficient of determination ($r^2 = .03$), indicated that only 3% of the variability is shared between the two variables. This indicated that there was 97% of variability unaccounted for.

Table 5 Imagery Ability & Pretest-Posttest Difference

		Correlations	
		prepostdiff	imagery
prepostdiff	Pearson Correlation	1	-.167
	Sig. (2-tailed)		.404
	N	27	27
imagery	Pearson Correlation	-.167	1
	Sig. (2-tailed)	.404	
	N	27	27

Research question #2:

- Is there a significant group difference at the pretest?
- H_0 : script \neq computer \neq iPod \neq control ($p < .05$)

Descriptive statistics (Table 6) indicated that the means and standard deviations for the pretest indicated that the iPod group (19.00 ± 4.50) performed the highest, followed by the computer group (15.33 ± 3.97) and the control group (15.11 ± 3.92). The script group performed the lowest (13.33 ± 4.39).

Table 6 Pretest

Descriptives

pretest

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
script	9	13.33	4.387	1.462	9.96	16.71	8	20
computer	9	15.33	3.969	1.323	12.28	18.38	10	22
iPod	9	19.00	4.500	1.500	15.54	22.46	10	24
control	9	15.11	3.919	1.306	12.10	18.12	9	20
Total	36	15.69	4.528	.755	14.16	17.23	8	24

A one-way ANOVA (Table 7) indicated that there were no pre-existing group mean differences at the pretest [$F_{(3,32)} = 2.884$, $p < .05$]. The null hypothesis was rejected. Therefore, it was appropriate to conduct ANOVA on the following testing sessions (test 1-6) and the posttest.

Table 7 Pretest

ANOVA

pretest

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	152.750	3	50.917	2.884	.051
Within Groups	564.889	32	17.653		
Total	717.639	35			

Research question #3:

- Is there a significant group difference at each testing session (Test 1, 2, 3, 4, 5, 6)?
- H_0 : script = computer = iPod ($p < .05$)

Test 1

Descriptive statistics (Table 8) indicated that the means and standard deviations for Test 1 indicated that the iPod group (16.33 ± 3.32) performed the best, followed respectively by the computer group (16.00 ± 3.32) and the script group (15.33 ± 2.83).

Table 8 Test 1

Descriptives

test1

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
script	9	15.33	2.828	.943	13.16	17.51	9	18
computer	9	16.00	3.317	1.106	13.45	18.55	8	19
iPod	9	16.33	3.317	1.106	13.78	18.88	11	22
Total	27	15.89	3.068	.590	14.68	17.10	8	22

A one-way ANOVA (Table 9) indicated that there were no group mean differences at Test 1

[$F_{(2, 24)} = 2.33, p < .05$]. The null hypothesis was accepted.

Table 9 Test 1

ANOVA

test1

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.667	2	2.333	.233	.794
Within Groups	240.000	24	10.000		
Total	244.667	26			

Test 2

Descriptive statistics (Table 10) indicated that the means and standard deviations for Test 2 indicated that the iPod group (18.33 ± 3.20) performed the best, followed respectively by the computer group (17.22 ± 2.28) and the script group (15.33 ± 4.80).

Table 10 Test 2
Descriptives

test2

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
script	9	15.33	4.796	1.599	11.65	19.02	5	20
computer	9	17.22	2.279	.760	15.47	18.97	12	19
iPod	9	18.33	3.202	1.067	15.87	20.79	12	23
Total	27	16.96	3.664	.705	15.51	18.41	5	23

A one-way ANOVA (Table 11) indicated that there were no group mean differences at Test 2 [$F_{(2, 24)} = 1.62, p < .05$]. The null hypothesis was accepted.

Table 11 Test 2
ANOVA

test2

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	41.407	2	20.704	1.616	.220
Within Groups	307.556	24	12.815		
Total	348.963	26			

Test 3

Descriptive statistics (Table 12) indicated that the means and standard deviations for Test 3 indicated that the iPod group (18.33 ± 3.16) performed the best, followed respectively by the script group (17.56 ± 4.07) and the computer group (16.78 ± 2.68).

Table 12 Test 3
Descriptives

test3

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
script	9	17.56	4.065	1.355	14.43	20.68	10	23
computer	9	16.78	2.682	.894	14.72	18.84	12	20
iPod	9	18.33	3.162	1.054	15.90	20.76	15	24
Total	27	17.56	3.286	.632	16.26	18.86	10	24

A one-way ANOVA (Table 13) indicated that there were no group mean differences at Test 3 [$F_{(2, 24)} = .484, p < .05$]. The null hypothesis was accepted.

Table 13 Test 3
ANOVA

test3

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.889	2	5.444	.484	.622
Within Groups	269.778	24	11.241		
Total	280.667	26			

Test 4

Descriptive statistics (Table 14) indicated that the means and standard deviations for Test 4 indicated that the iPod group (20.00 ± 3.04) performed the best, followed respectively by the computer group (18.33 ± 3.24) and the script group (16.22 ± 3.42).

Table 14 Test 4
Descriptives

test4

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
script	9	16.22	3.420	1.140	13.59	18.85	13	22
computer	9	18.33	3.240	1.080	15.84	20.82	12	22
iPod	9	20.00	3.041	1.014	17.66	22.34	15	24
Total	27	18.19	3.487	.671	16.81	19.56	12	24

A one-way ANOVA (Table 15) indicated that there were no group mean differences at Test 4 [$F_{(2, 24)} = 3.08, p < .05$]. The null hypothesis was accepted.

Table 15 Test 4
ANOVA

test4

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	64.519	2	32.259	3.078	.065
Within Groups	251.556	24	10.481		
Total	316.074	26			

Test 5

Descriptive statistics (Table 16) indicated that the means and standard deviations for Test 5 indicated that the iPod group (17.56 ± 3.17) performed the best, followed respectively by the computer group (16.11 ± 3.76) and the script group (14.78 ± 2.68).

Table 16 Test 5
Descriptives

test5

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
script	9	14.78	2.682	.894	12.72	16.84	11	19
computer	9	16.11	3.756	1.252	13.22	19.00	9	20
iPod	9	17.56	3.167	1.056	15.12	19.99	13	23
Total	27	16.15	3.313	.638	14.84	17.46	9	23

A one-way ANOVA (Table 17) indicated that there were no group mean differences at Test 4

[$F_{(2, 24)} = 1.66, p < .05$]. The null hypothesis was accepted.

Table 17 Test 5
ANOVA

test5

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	34.741	2	17.370	1.663	.211
Within Groups	250.667	24	10.444		
Total	285.407	26			

Test 6

Descriptive statistics (Table 18) indicated that the means and standard deviations for Test 6 indicated that the iPod group (18.33 ± 3.54) performed the best, followed respectively by the script group (17.89 ± 3.89) and the computer group (15.56 ± 4.28).

Table 18 Test 6

Descriptives

test6

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
script	9	17.89	3.887	1.296	14.90	20.88	13	24
computer	9	15.56	4.275	1.425	12.27	18.84	9	21
iPod	9	18.33	3.536	1.179	15.62	21.05	11	23
Total	27	17.26	3.957	.762	15.69	18.82	9	24

A one-way ANOVA (Table 19) indicated that there were no group mean differences at Test 6

[$F_{(2, 24)} = 1.31, p < .05$]. The null hypothesis was accepted.

Table 19 Test 6

ANOVA

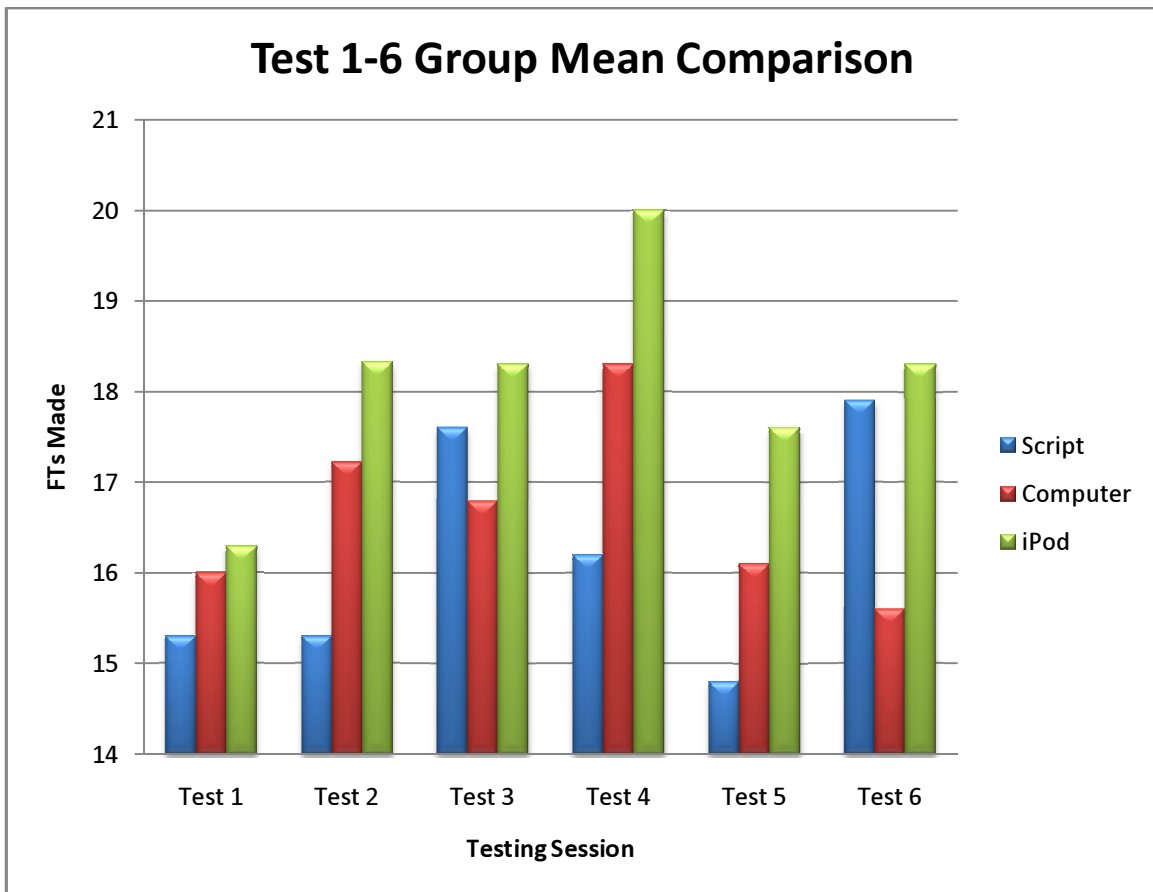
test6

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	40.074	2	20.037	1.310	.288
Within Groups	367.111	24	15.296		
Total	407.185	26			

Test 1-6 Comparison

The grand mean scores for the experimental groups for Test 1 through Test 6 were as follows: script group (16.2), computer (16.7), and iPod (18.1). A visual representation of group means at each testing session is shown in Figure 2. It is clear that the subjects in the iPod group performed the highest, scoring higher than the subjects in the computer and script groups at each of the six testing sessions. Overall the script group and the computer group performed relatively the same, considering the score fluctuations between testing sessions.

Figure 2 Test 1-6 Group Means



Research question #4:

- Is there a significant group difference at the posttest?
- H_0 : script = computer = iPod = control

Descriptive statistics (Table 20) indicated that the means and standard deviations for the posttest indicated that the iPod group (21.00 ± 2.87) performed the highest, followed by the computer group (18.56 ± 2.83) and the script group (17.11 ± 4.43). The control group performed the lowest (15.78 ± 4.47).

Table 20 Posttest

Descriptives

posttest								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
script	9	17.11	4.428	1.476	13.71	20.52	10	22
computer	9	18.56	2.833	.944	16.38	20.73	14	22
iPod	9	21.00	2.872	.957	18.79	23.21	16	25
control	9	15.78	4.466	1.489	12.34	19.21	9	22
Total	36	18.11	4.076	.679	16.73	19.49	9	25

A one-way ANOVA (Table 21) indicated that there were significant group mean differences at the posttest [$F_{(3, 32)} = 3.221, p < .05$]. The null hypothesis was rejected. Therefore, it was appropriate to conduct a post hoc analysis to determine the true source of the difference.

Table 21 Posttest

ANOVA

posttest					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	134.889	3	44.963	3.221	.036
Within Groups	446.667	32	13.958		
Total	581.556	35			

Research question #5:

- What is the true source of any significant group differences?

A Tukey post hoc test (Table 22) indicated that the true source of the significant group difference at the posttest was between the iPod group and the control group (p value = .028). This suggests that podcasting through the use of an iPod was a valid method in increasing FT shooting performance, specifically when compared to individuals who did not participate in mental imagery training.

**Table 22 Tukey Post Hoc
Multiple Comparisons**

Dependent Variable: posttest
Tukey HSD

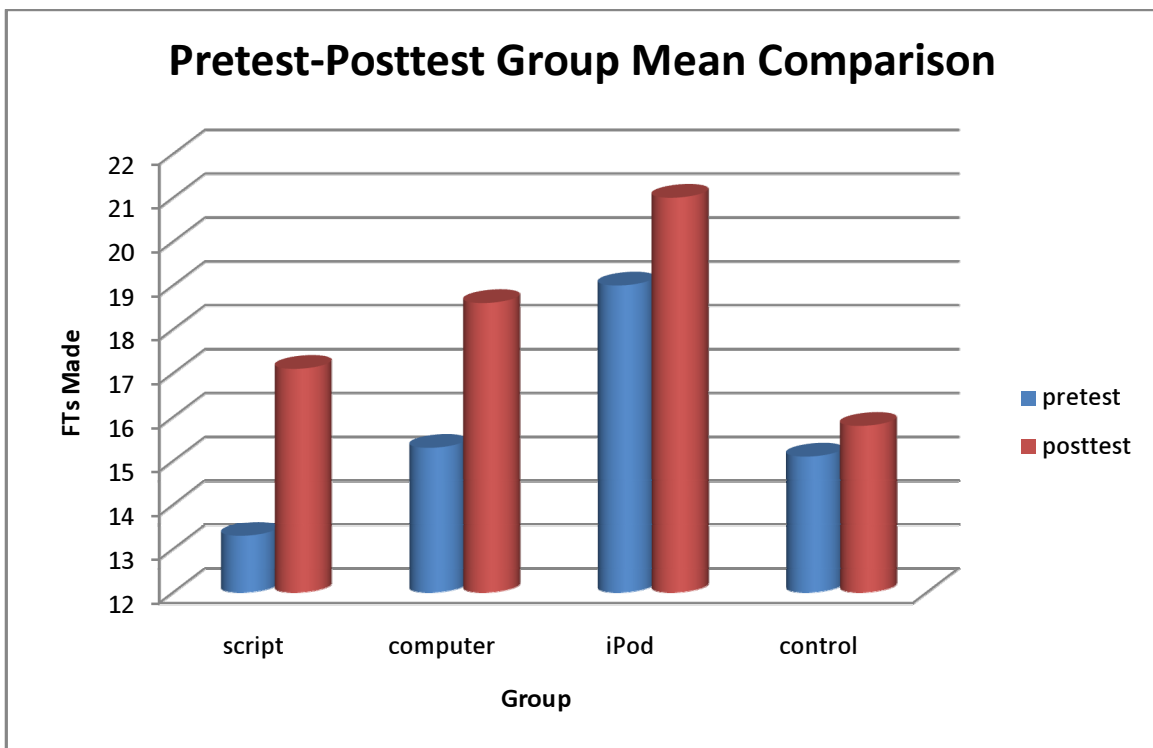
(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
script	computer	-1.444	1.761	.845	-6.22	3.33
	iPod	-3.889	1.761	.143	-8.66	.88
	control	1.333	1.761	.873	-3.44	6.11
computer	script	1.444	1.761	.845	-3.33	6.22
	iPod	-2.444	1.761	.516	-7.22	2.33
	control	2.778	1.761	.406	-1.99	7.55
iPod	script	3.889	1.761	.143	-.88	8.66
	computer	2.444	1.761	.516	-2.33	7.22
	control	5.222*	1.761	.028	.45	9.99
control	script	-1.333	1.761	.873	-6.11	3.44
	computer	-2.778	1.761	.406	-7.55	1.99
	iPod	-5.222*	1.761	.028	-9.99	-.45

*. The mean difference is significant at the .05 level.

Pretest – Posttest Comparison

The comparison of group means between the pretest and posttest (Figure 3) indicated that all experimental groups (script, computer, iPod) performed higher at the posttest. The control group also improved slightly at the posttest. A visual representation of group means at the pretest and posttest is shown in Figure 3. Specifically at the pretest, the iPod group (19.0) performed the highest followed respectively by the computer group (15.3), the control group (15.1), and the script group (13.3). At the posttest, the iPod group (21.0) performed the highest followed respectively by the computer group (18.6), the script group (17.1), and the control group (15.8). Overall, the script group had the highest improvement (+ 3.8) and the control group had the lowest improvement (+ 0.7).

Figure 3 Pretest-Posttest Group Means



Effect Size

The effect size for the study was also of interest. Since SPSS does not provide an effect size for a one-way ANOVA, the effect size was hand calculated using values from the SPSS output. Omega squared (w^2) was used instead of r^2 to calculate the effect size because in general w is a more accurate measure (Field, 2005). Specifically, w^2 uses the average variance of the model and the error variance. This results in a higher estimate of r .

The following formula was used in calculating w^2 :

$$w^2 = \frac{SS_{\text{bw}} - (k - 1) MS_{\text{error}}}{SS_{\text{tot}} + MS_{\text{error}}}$$

Calculation of w^2 for this study was .16. Therefore, w equals .40. According to the standards for population effect sizes defined by Cohen (1988), there was a very large effect in this study. Specifically, 40 percent of the variability was accounted for. Keppel & Wickens (2004) states that large effects are widely known and nothing is to be gained in verifying them unless they are made possible by advances in instrumentation or the introduction of new paradigms.

Discussion

There were several key findings in this study. A weak correlation ($r = -.167, p < .05$) between imagery ability and the pretest-posttest difference indicated that imagery ability had little or no relationship with improvement in FT shooting performance. Specifically, only 3% of the shared variability was accounted for. This indicated that 97% of improvement in FT shooting performance was the result of other factors. It can be suggested that a much larger amount of variability is due to unknown variables.

A one-way ANOVA indicated that there were no pre-existing group mean differences at the pretest [$F_{(3, 32)} = 2.884, p < .05$]. Therefore, it was appropriate to conduct ANOVA on the following testing sessions (test 1-6) and the posttest. Surprisingly, there were no significant group differences at any of the six testing sessions. However, a comparison of group means did indicate that the iPod group (18.1) performed higher than the computer group (16.7) and the script group (16.2).

Conversely, a one-way ANOVA indicated that there were significant group mean differences at the posttest [$F_{(3, 32)} = 3.221, p < .05$]. Therefore, it was appropriate to conduct a post hoc analysis to determine the true source of the difference. A Tukey post hoc test indicated that the true source of the significant group difference at the posttest was between the iPod group and the control group (p value = .028). The comparison of group means at the posttest indicated that the iPod group (21.0) performed the highest followed respectively by the computer group (18.6), the script group (17.1), and the control group (15.8). Overall, the script group had the highest improvement (+ 3.8) and the control group had the lowest improvement (+ 0.7).

Finally, calculating omega squared indicated that there was a very large effect size ($w^2 = .16$) in this study and that 40% of the variability was accounted for. Taken together, the key findings of this study provide valuable information in answering the research questions as well as offering new questions. In the following chapter, the research questions and new questions are presented as part of the explanation of study findings. In addition, the last chapter includes conclusion statements and recommendations for future research.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

This final chapter presents a summary of the study and the significant conclusions drawn from the data analyzed in Chapter IV. As part of the discussion the following topics will be discussed: study relation to current literature, surprises in the study, generalized interpretations, implications for action, and recommendations for future research.

Summary of the Study

Podcasting may provide sport psychologists, coaches, and athletes the training edge required to facilitate FT imagery. Accordingly, an enhanced FT imagery experience can contribute to increases in FT shooting performance. The purpose of this study was to determine if podcasting can significantly increase FT shooting performance among high school basketball players. The following research questions guided the analysis of data: 1) How does sport imagery ability relate to FT shooting performance? 2) Is there a significant group difference at any of the testing sessions? 3) What is the true source of any significant group differences?

The results of the study indicated that there was a weak indirect relationship ($r = -.167$, $p < .05$) between sport imagery ability and FT shooting performance improvement. Specifically, 97% of shared variability was unaccounted for. This suggests that FT imagery training can improve FT shooting performance, despite the individual's ability level to conduct sport imagery. Surprisingly, there were no significant group differences found among the experimental

groups (script, computer, iPod) at any of the six testing sessions. A comparison of group means did indicate that the iPod group (18.1) performed higher than both the computer group (16.7) and the script group (16.2).

However, a one-way ANOVA indicated that there were significant group mean differences at the posttest [$F_{(3, 32)} = 3.221, p < .05$]. Therefore, it was appropriate to conduct a Tukey post hoc test which indicated that the true source of the significant group difference was between the iPod group and the control group (p value = .028). This suggests that podcasting through the use of an iPod is a valid method in increasing FT shooting performance, specifically when compared to individuals who do not participate in mental imagery training.

Lastly, this study had a very large effect size ($w^2 = .16$) which indicates that the sample used was representative of the population. Therefore, we can generalize that podcasting is a valid method in improving FT shooting performance and should be utilized by other Oklahoma basketball teams during practice and competition.

Related Literature

No studies have been conducted to investigate how technology (specifically podcasting) can be used to apply sport imagery for enhancing FT shooting performance. Instead, the majority of attention in podcasting has been linked to educational or training purposes. The findings of this study confirm evidence that mental imagery works and can contribute to sport performance enhancement. There is a large amount of empirical and anecdotal evidence in sport psychology that indicate that sport imagery facilitates sport performance, particularly when it is combined with physical training. The findings of this study adhere to this body of knowledge. Most importantly, this study breaks new ground in that it gives an innovative approach to sport

imagery. More research is needed to support that podcasting is a valid technical tool of sport imagery for enhancing sport performance.

Surprises

Surprisingly, there were no significant group differences found among the experimental groups (script, computer, iPod) at any of the six testing sessions. This could be a result of the small sample size. It could also mean that podcasting works as a technological application of sport imagery regardless of the type of podcast. It was also surprising that the iPod group outperformed the computer and script groups at all six testing sessions as well as the pretest and posttest. It was interesting that the majority of subjects in the iPod group were not the top performers on their team. A general observation was made during the study that subjects in the iPod group seemed more attentive and interested in the study.

Conclusions

Based on the results of this study, several inferences can be made. First, it is concluded that podcasting is a valid technological application of sport imagery that results to FT shooting performance enhancement among high school basketball players. Future research should investigate whether podcasting is applicable for other skill levels and for other sport activities. Secondly, podcast training should involve listening to podcasts on an iPod rather than listening on a computer or reading a script. However, it may be possible that podcast training via a computer or a written script can be as effective. This should be confirmed by future studies with larger sample sizes. Thirdly, podcasting may improve the sport imagery experience in other areas of performance enhancement. This could include training components in motivation, positive reinforcement and feedback, relaxation, concentration and attention control, and goal-setting. Studies in any of these areas would be very interesting. Finally, podcasting is a recommended

adjunct to mental and physical training that can benefit sport psychologists, the coaching staff, and most importantly the athletes.

Implication for Action

As indicated, podcasting can provide sport psychologists, coaches, and athletes the training edge required to obtain peak performance. The use of the iPod is certainly an innovative application of sport imagery, particularly due to its simplicity, mobility, and popularity. Therefore, everyone involved should work together to determine the best methods in applying podcasting as part of the training regimen and competition.

Recommendations

Several recommendations are presented to improve the current study and encourage future research. A true experimental study with a larger sample size is recommended. Skill level of athletes should also be investigated. It would be significant to determine whether podcasting can be effective in sport imagery training for collegiate and professional athletes. A longitudinal study involving an entire season or an entire playing career would be very interesting. Exploring video podcasting is another exciting study, considering that video is now the preferred method. Finally, other technological applications should also be explored. Technology is always advancing, and we should utilize the benefits of new devices and techniques. Future research in sport imagery training, for example, could include applications of video gaming, 3D technology, and holographic imaging.

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APPENDICES

APPENDIX A

Institutional Review Board Letter of Approval

Oklahoma State University Institutional Review Board

Date: Monday, January 14, 2008
IRB Application No ED07129
Proposal Title: Podcasting Mental Images: Technological Application of Sport Imagery

Reviewed and Processed as: Expedited (Spec Pop)

Status Recommended by Reviewer(s): Approved Protocol Expires: 1/13/2009

Principal Investigator(s)

Tom Darling	Steven Edwards
180 Student Union	180 Colvin Center
Stillwater, OK 74078	Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

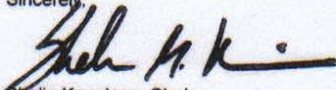
The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to ensure the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 219 Cordell North (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,



Shelia Kennison, Chair
Institutional Review Board

APPENDIX B

Letter to the Principal and School Board

TOM DARLING

180 Student Union #1013 Stillwater, OK 74078 • tom.darling@okstate.edu • (918) 289-1628

January 14, 2008

Principal and School Board:

I am a graduate student at Oklahoma State University. As partial fulfillment of the requirements for a doctoral degree in Health & Human Performance, I am conducting a dissertation study. The project is entitled Podcasting Mental Images: Technological Application of Sport Imagery. This research is a study in Sport Psychology. Basically, it is a basketball study investigating how free throw shooting can improve by using advanced methods of mental training through the use of technological devices.

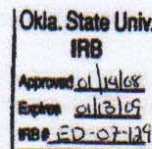
Participants will utilize personal devices (i.e. iPod/Mp3 player or computers) to conduct imagery training. This will be done at the individual's own time. There will also be scheduled testing sessions on school grounds, to be conducted either before or after the team's practice. Sessions are expected to last between 30 minutes to one hour. The Principal Investigator and team coaches will be present during the sessions.

Student athletes are being recruited to participate in this research study. **Participation in this study is strictly voluntary.** Participants may also choose to withdraw from the study at any time without penalty or harm. However, since participants are not of legal age consent is required from the following individuals: a parent or legal guardian, school board official, principal, and coach. Please review the enclosed Informed Consent Form carefully, which will be sent home to the parents. Although your signature is not required on the form, **I will need a formal letter on letterhead stating consent for me to recruit players from your school.**

Thank you for your consideration. Please feel free to contact me for any questions or concerns. You may reach me at (918) 289-1628 or by e-mail at tom.darling@okstate.edu. You may also choose to contact my advisor, Steve Edwards at (405) 744-7476 or steveed@okstate.edu; or the OSU IRB chair, Dr. Shelia Kennison at (405) 744-1676 or irb@okstate.edu.

Sincerely,

Tom Darling
Health & Human Performance
Oklahoma State University
Stillwater, OK 74078
tom.flores@okstate.edu
(918) 289-1628



APPENDIX C

Letter to the Parent or Legal Guardian

TOM DARLING

180 Student Union #1013 Stillwater, OK 74078 • tom.darling@okstate.edu • (918) 289-1628

January 14, 2008

Dear Parent/Legal Guardian:

I am a graduate student at Oklahoma State University. As partial fulfillment of the requirements for a doctoral degree in Health & Human Performance, I am conducting a dissertation study. The project is entitled Podcasting Mental Images: Technological Application of Sport Imagery. This research is a study in Sport Psychology. Basically, it is a basketball study investigating how free throw shooting can improve by using advanced methods of mental training through the use of technological devices.

Participants will utilize personal devices (i.e. iPod/Mp3 player or computers) to conduct imagery training. This will be done at the individual's own time. There will also be scheduled testing sessions on school grounds, to be conducted either before or after the team's practice. Sessions are expected to last between 30 minutes to one hour. The Principal Investigator and team coaches will be present during the sessions.

Your child is being recruited to participate in this research study. **Participation in this study is strictly voluntary.** Your child may also choose to withdraw from the study at any time without penalty or harm. However, since your child is not of legal age consent is required from a parent or legal guardian. Please review the enclosed Informed Consent Form carefully. Upon reading and fully understanding the nature of the study and the rights of the participants, please sign and return the form indicating your consent for your child to participate in this study.

Thank you for your consideration. Please feel free to contact me for any questions or concerns. You may reach me at (918) 289-1628 or by e-mail at tom.darling@okstate.edu. You may also choose to contact my advisor, Steve Edwards at (405) 744-7476 or steveed@okstate.edu; or the OSU IRB chair, Dr. Shelia Kennison at (405) 744-1676 or irb@okstate.edu.

Sincerely,

Tom Darling
Health & Human Performance
Oklahoma State University
Stillwater, OK 74078
tom.flores@okstate.edu
(918) 289-1628



APPENDIX D

Letter to the Player

TOM DARLING

180 Student Union #1013 Stillwater, OK 74078 • tom.darling@okstate.edu • (918) 289-1628

January 14, 2008

Dear Player:

I am a graduate student at Oklahoma State University. As partial fulfillment of the requirements for a doctoral degree in Health & Human Performance, I am conducting a dissertation study. The project is entitled Podcasting Mental Images: Technological Application of Sport Imagery. This research is a study in Sport Psychology. Basically, it is a basketball study investigating how free throw shooting can improve by using advanced methods of mental training through the use of technological devices.

Participants will utilize personal devices (i.e. iPod/Mp3 player or computers) to conduct imagery training. This will be done at the individual's own time. There will also be scheduled testing sessions on school grounds, to be conducted either before or after the team's practice. Sessions are expected to last between 30 minutes to one hour. The Principal Investigator and team coaches will be present during the sessions.

You are being recruited to participate in this research study. **Participation in this study is strictly voluntary.** You may also choose to withdraw from the study at any time without penalty or harm. However, any person that is not of legal age (18 or over) is considered a minor and must obtain consent from a parent or legal guardian. A parent/legal guardian must sign and return the **Informed Consent Form (Parental Consent)**. Also, please review the enclosed **Assent Form** carefully. Upon reading and fully understanding the nature of the study and your rights as a participant, please sign and return the form indicating your consent to participate in this study. If you are not a minor, parental consent is not necessary and you only need to sign and return the **Informed Consent Form (Participant Consent)**.

Thank you for your consideration. Please feel free to contact me for any questions or concerns. You may reach me at (918) 289-1628 or by e-mail at tom.darling@okstate.edu. You may also choose to contact my advisor, Steve Edwards at (405) 744-7476 or steveed@okstate.edu; or the OSU IRB chair, Dr. Shelia Kennison at (405) 744-1676 or irb@okstate.edu.

Sincerely,

Tom Darling
Health & Human Performance
Oklahoma State University
Stillwater, OK 74078
tom.flores@okstate.edu
(918) 289-1628



APPENDIX E

Parental Consent Form

INFORMED CONSENT FORM
(Parental Consent for Participants under 18)



This form is intended for **parental consent for individuals under the age of 18** to participate in the proposed research study. Parents, please read this consent form completely. This form outlines the study objectives and procedures. This form also describes participant rights. If you have any questions or concerns, please do not hesitate to contact one of the individuals listed under the contacts section.

Participation in this study is strictly voluntary. However, any participant under the age of 18 is considered a minor and must have consent from a parent or legal guardian prior to participation in the study. Upon reading and understanding this form in full, please sign and date accordingly giving authorization for your child to participate in the study. Remember, **participation in this study is voluntary.** Therefore, you or your child may choose to withdraw from the study at any time without penalty or harm.

Project Title: **Podcasting Mental Images: Technological Application of Sport Imagery**

Investigator:

Tom V. Darling
Doctoral Candidate, Health & Human Performance – Oklahoma State University
Master of Science, Exercise Science/Gerontology – University of Louisiana at Monroe
Bachelor of Science, Exercise & Sport Science – Phillips University (OK)

Purpose:

This dissertation study is in partial fulfillment of the requirements for a doctoral degree in Health & Human Performance at Oklahoma State University.

The purpose of this research study is to investigate whether technology can enhance the sport imagery experience, thereby increasing sport performance. Specifically, I plan to explore how iPods may enhance mental practice to improve free throw shooting accuracy. Your child is being recruited to participate in this research study.

Overview:

This research is a study in sport psychology. Basically, it is a basketball study investigating how free throw shooting can improve by using advanced methods of mental training. In this study, your child will practice sport imagery techniques in attempt to improve free throw shooting accuracy. Study procedures are outlined on the next page.



Procedures:

Participants for this study are being recruited from Oklahoma Junior High and Senior High Schools. In addition to parental consent, approval to participate will be obtained from the player, coach, principal, and the school board. Participants will be involved in the study for approximately 8 weeks between January 2008 and March 2008.

Degree of involvement during this time will depend on grouping of participants. Participants may be grouped into one of the following 3 groups: 1) iPod group – listening to a mental imagery script on an iPod, 2) computer group – listening to a mental imagery script on a computer, and 3) script group – reading a mental imagery script.

Grouping is primarily dependent upon ownership or ability to obtain access to such devices (i.e. iPod and computer) for home use. The Principal Investigator will only be able to provide use to one laptop and one iPod for testing sessions. Participants in the iPod group will need to have access to an Apple iPod or compatible Mp3 device, and will also need to access a computer to download the podcast. Participants in the computer group will need a computer only to listen to the podcast. Individuals who cannot gain access to an iPod or computer will be placed in the script group. Typed scripts will be provided for these individuals for home use and during testing sessions.

Prior to the beginning of the study, participants will attend an orientation meeting to discuss study details, objectives, and requirements. Participants will hear a brief overview of Sport Imagery. Once all consent forms have been submitted, the study will officially begin. At that time, participants will complete the *Sport Imagery Evaluation* (SIE - a questionnaire that will evaluate the individual's ability to conduct mental imagery).

Actual testing will involve a total of 8 testing sessions (1 pretest, 6 testing sessions, and 1 posttest). The testing sessions will be conducted by the Principal Investigator in a group setting, unless participants are selected as part of a control group. In this case, participants will be instructed to conduct testing sessions with coach supervision only. During all testing sessions, participants will conduct their corresponding mental training and then will shoot free throws in a predesigned format. Participants will shoot free throws with their perspective group members. In addition, participants will be asked to conduct a few minutes of mental training in between testing sessions. Mental training will be conducted at the individual's own time, outside the scheduled testing session days. Physical and mental free throws will be recorded on a Free Throw Shooting Log and on a Sport Imagery Diary.



The orientation and all testing sessions will be conducted on school grounds, scheduled either before or after team practice. Sessions are expected to last between 30 minutes to one hour. The Principal Investigator and/or team coach will be present during all sessions.

At the end of the study, participants will again complete the SIE to determine if imagery skills have improved. Once all data have been collected and analyzed, participants will be informed of study results. Upon request, parents and coaches may also request a copy of results. Results will contain a brief summary of results and statistical data. No personal identifier or sensitive data will be included.

Risks of Participation:

There are **no known risks** associated with this project which are greater than those ordinarily encountered in shooting free throws.

Benefits:

Participants are expected to benefit from the study by increasing their free throw shooting accuracy.

Confidentiality:

Confidentiality is of highest priority. All data and records will be kept confidential. All written data and computer records will be kept in a central location. Only the Principal Investigator will have direct access to the data and records. Computer data will be password protected on a personal laptop and backed-up onto a flash drive. The flash drive along with all paper documents will be stored in a locked storage. Data will be submitted in sealed envelopes directly to the Principal Investigator.

For increased protection, each participant will be given a code number. This number will be used instead of the individual's name or any other identifier. Again, all records will be stored securely and only researchers and individuals responsible for research oversight will have access to the records. It is possible that the consent process and data collection will be observed by research oversight staff responsible for safeguarding the rights and wellbeing of people who participate in research.

All participants will be given written results of the study. Results will be shared with coaches of participating teams. Upon request, parents may also obtain a copy of study results. Records (including the link between names and code numbers) may be kept up to one year. During this time, all participants, coaches, and parents of participants may request a copy of these records. However, after one year's time all records will be destroyed properly. Only the final results will be available thereafter.



Compensation:

Participation in the study is strictly voluntary. No compensation will be provided.

Contacts:

If you have questions or concerns about the research study (or if you have any questions or concerns about your rights as a research volunteer), please feel free to contact the following individuals:

- Tom Darling, principal investigator, 918-289-1628 or tom.darling@okstate.edu.
- Dr. Steve Edwards, Advisor, 405-744-7476 or steveed@okstate.edu.
- Dr. Shelia Kennison, IRB Chair, 219 Cordell North, Stillwater, OK 74078, 405-744-1676 or irb@okstate.edu.

Participant Rights:

Participation is strictly voluntary and that individuals can choose not to participate in the study. Individuals who do choose to participate may also choose to withdraw from the study at any time without penalty or harm. There are no risks to participants due to early withdrawal from the study. If you choose to withdraw from the study, please inform or contact one of the individuals listed under the contacts section.

Participation in the study may be terminated by the Principal Investigator if an individual presents any inappropriate behavior or conduct that may be considered harmful to oneself, other individuals, or the study procedures.

The participant or the participant's parent/legal guardian may contact the research team at any time for any questions or concerns.

PLEASE SIGN SIGNATURE PAGE ON PAGE 5

Participation in the study is greatly appreciated. If you have read and fully understand the consent form, please sign and date as designated below indicating consent for your child to participate in the study. Any participant under the age of 18 is considered a minor and requires consent from a parent or legal guardian.

Parental Signature for Minor

I have read and fully understand the consent form. As a parent or legal guardian, I authorize that my child _____ (print name) can participate in the described research. A copy of this form will be given to me upon request.

Parent/Guardian Name (printed) Date

Signature of Parent/Guardian Date

I certify that I have personally explained this document before requesting that the participant sign it.

Signature of Researcher Date

Okla. State Univ. IRB Approved 1/14/08 Expires 1/13/09 IRB # E007129
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APPENDIX F

Assent Form

ASSENT FORM
(Consent for Participants under 18)



This form is intended for **consent for individuals under the age of 18** to participate in the proposed research study. Please read this consent form completely. This form outlines the study objectives and procedures. This form also describes participant rights. If you have any questions or concerns, please do not hesitate to contact one of the individuals listed under the contacts section.

Participation in this study is strictly voluntary. However, any participant under the age of 18 is considered a minor and must have consent from a parent or legal guardian prior to participation in the study. Your parent/legal guardian must sign a separate informed consent form entitled - **INFORMED CONSENT FORM (Parental Consent for Participants under 18)**. Upon reading and understanding this form in full, please sign and date accordingly giving your consent to participate in the study. Remember, **participation in this study is voluntary**. Therefore, you may choose to withdraw from the study at any time without penalty or harm.

Project Title: **Podcasting Mental Images: Technological Application of Sport Imagery**

Investigator:

Tom V. Darling
Doctoral Candidate, Health & Human Performance – Oklahoma State University
Master of Science, Exercise Science/Gerontology – University of Louisiana at Monroe
Bachelor of Science, Exercise & Sport Science – Phillips University (OK)

Purpose:

This dissertation study is in partial fulfillment of the requirements for a doctoral degree in Health & Human Performance at Oklahoma State University.

The purpose of this research study is to investigate whether technology can enhance the sport imagery experience, thereby increasing sport performance. Specifically, I plan to explore how iPods may enhance mental practice to improve free throw shooting accuracy. You are being recruited to participate in this research study.

Overview:

This research is a study in sport psychology. Basically, it is a basketball study investigating how free throw shooting can improve by using advanced methods of mental training. In this study, you will practice sport imagery techniques in attempt to improve free throw shooting accuracy. Study procedures are outlined on the next page.



Procedures:

Participants for this study are being recruited from Oklahoma Junior High and Senior High Schools. In addition to parental consent, approval to participate will be obtained from the player, coach, principal, and the school board. Participants will be involved in the study for approximately 8 weeks between January 2008 and March 2008.

Degree of involvement during this time will depend on grouping of participants. Participants may be grouped into one of the following 3 groups: 1) iPod group – listening to a mental imagery script on an iPod, 2) computer group – listening to a mental imagery script on a computer, and 3) script group – reading a mental imagery script.

Grouping is primarily dependent upon ownership or ability to obtain access to such devices (i.e. iPod and computer) for home use. The Principal Investigator will only be able to provide use to one laptop and one iPod for testing sessions. Participants in the iPod group will need to have access to an Apple iPod or compatible Mp3 device, and will also need to access a computer to download the podcast. Participants in the computer group will need a computer only to listen to the podcast. Individuals who cannot gain access to an iPod or computer will be placed in the script group. Typed scripts will be provided for these individuals for home use and during testing sessions.

Prior to the beginning of the study, participants will attend an orientation meeting to discuss study details, objectives, and requirements. Participants will hear a brief overview of Sport Imagery. Once all consent forms have been submitted, the study will officially begin. At that time, participants will complete the *Sport Imagery Evaluation* (SIE - a questionnaire that will evaluate the individual's ability to conduct mental imagery).

Actual testing will involve a total of 8 testing sessions (1 pretest, 6 testing sessions, and 1 posttest). The testing sessions will be conducted by the Principal Investigator in a group setting, unless participants are selected as part of a control group. In this case, participants will be instructed to conduct testing sessions with coach supervision only. During all testing sessions, participants will conduct their corresponding mental training and then will shoot free throws in a predesigned format. Participants will shoot free throws with their perspective group members. In addition, participants will be asked to conduct a few minutes of mental training in between testing sessions. Mental training will be conducted at the individual's own time, outside the scheduled testing session days. Physical and mental free throws will be recorded on a Free Throw Shooting Log and on a Sport Imagery Diary.



The orientation and all testing sessions will be conducted on school grounds, scheduled either before or after team practice. Sessions are expected to last between 30 minutes to one hour. The Principal Investigator and/or team coach will be present during all sessions.

At the end of the study, participants will again complete the SIE to determine if imagery skills have improved. Once all data have been collected and analyzed, participants will be informed of study results. Upon request, parents and coaches may also request a copy of results. Results will contain a brief summary of results and statistical data. No personal identifier or sensitive data will be included.

Risks of Participation:

There are **no known risks** associated with this project which are greater than those ordinarily encountered in shooting free throws.

Benefits:

Participants are expected to benefit from the study by increasing their free throw shooting accuracy.

Confidentiality:

Confidentiality is of highest priority. All data and records will be kept confidential. All written data and computer records will be kept in a central location. Only the Principal Investigator will have direct access to the data and records. Computer data will be password protected on a personal laptop and backed-up onto a flash drive. The flash drive along with all paper documents will be stored in a locked storage. Data will be submitted in sealed envelopes directly to the Principal Investigator.

For increased protection, each participant will be given a code number. This number will be used instead of the individual's name or any other identifier. Again, all records will be stored securely and only researchers and individuals responsible for research oversight will have access to the records. It is possible that the consent process and data collection will be observed by research oversight staff responsible for safeguarding the rights and wellbeing of people who participate in research.

All participants will be given written results of the study. Results will be shared with coaches of participating teams. Upon request, parents may also obtain a copy of study results. Records (including the link between names and code numbers) may be kept up to one year. During this time, all participants, coaches, and parents of participants may request a copy of these records. However, after one year's time all records will be destroyed properly. Only the final results will be available thereafter.



Compensation:

Participation in the study is strictly voluntary. No compensation will be provided.

Contacts:

If you have questions or concerns about the research study (or if you have any questions or concerns about your rights as a research volunteer), please feel free to contact the following individuals:

- Tom Darling, principal investigator, 918-289-1628 or tom.darling@okstate.edu.
- Dr. Steve Edwards, Advisor, 405-744-7476 or steveed@okstate.edu.
- Dr. Shelia Kennison, IRB Chair, 219 Cordell North, Stillwater, OK 74078, 405-744-1676 or irb@okstate.edu.

Participant Rights:

Participation is strictly voluntary and that individuals can choose not to participate in the study. Individuals who do choose to participate may also choose to withdraw from the study at any time without penalty or harm. There are no risks to participants due to early withdrawal from the study. If you choose to withdraw from the study, please inform or contact one of the individuals listed under the contacts section.

Participation in the study may be terminated by the Principal Investigator if an individual presents any inappropriate behavior or conduct that may be considered harmful to oneself, other individuals, or the study procedures.

The participant or the participant's parent/legal guardian may contact the research team at any time for any questions or concerns.

PLEASE SIGN SIGNATURE PAGE ON PAGE 5

Participation in the study is greatly appreciated. If you have read and fully understand the consent form, please sign and date as designated below indicating consent to participate in the study. Any participant under the age of 18 is considered a minor and requires additional consent from a parent or legal guardian.

Participant Signature (Minor)

I have read and fully understand the consent form. In addition to consent by a parent/legal guardian, I _____ (print name) give my consent to participate in the described research. I sign it freely and voluntarily. A copy of this form will be given to me upon request.

Participant Name (printed)

Date

Signature of Participant

Date

I certify that I have personally explained this document before requesting that the participant sign it.

Signature of Researcher

Date



APPENDIX G

Informed Consent Form

(Legal Age)

INFORMED CONSENT FORM
(Consent for Participants 18 and over)



This form is intended for **consent for individuals 18 years and over** to participate in the proposed research study. Please read this consent form completely. This form outlines the study objectives and procedures. This form also describes participant rights. If you have any questions or concerns, please do not hesitate to contact one of the individuals listed under the contacts section.

Participation in this study is strictly voluntary. Since you are an individual of legal age, parental/legal guardian consent is not necessary. Upon reading and understanding this form in full, please sign and date accordingly giving your consent to participate in the study. Remember, **participation in this study is voluntary.** Therefore, you may choose to withdraw from the study at any time without penalty or harm.

Project Title: Podcasting Mental Images: Technological Application of Sport Imagery

Investigator:

Tom V. Darling
Doctoral Candidate, Health & Human Performance – Oklahoma State University
Master of Science, Exercise Science/Gerontology – University of Louisiana at Monroe
Bachelor of Science, Exercise & Sport Science – Phillips University (OK)

Purpose:

This dissertation study is in partial fulfillment of the requirements for a doctoral degree in Health & Human Performance at Oklahoma State University.

The purpose of this research study is to investigate whether technology can enhance the sport imagery experience, thereby increasing sport performance. Specifically, I plan to explore how iPods may enhance mental practice to improve free throw shooting accuracy. You are being recruited to participate in this research study.

Overview:

This research is a study in sport psychology. Basically, it is a basketball study investigating how free throw shooting can improve by using advanced methods of mental training. In this study, you will practice sport imagery techniques in attempt to improve free throw shooting accuracy. Study procedures are outlined on the next page.



Procedures:

Participants for this study are being recruited from Oklahoma Junior High and Senior High Schools. In addition to parental consent, approval to participate will be obtained from the player, coach, principal, and the school board. Participants will be involved in the study for approximately 8 weeks between January 2008 and March 2008.

Degree of involvement during this time will depend on grouping of participants. Participants may be grouped into one of the following 3 groups: 1) iPod group – listening to a mental imagery script on an iPod, 2) computer group – listening to a mental imagery script on a computer, and 3) script group – reading a mental imagery script.

Grouping is primarily dependent upon ownership or ability to obtain access to such devices (i.e. iPod and computer) for home use. The Principal Investigator will only be able to provide use to one laptop and one iPod for testing sessions. Participants in the iPod group will need to have access to an Apple iPod or compatible Mp3 device, and will also need to access a computer to download the podcast. Participants in the computer group will need a computer only to listen to the podcast. Individuals who cannot gain access to an iPod or computer will be placed in the script group. Typed scripts will be provided for these individuals for home use and during testing sessions.

Prior to the beginning of the study, participants will attend an orientation meeting to discuss study details, objectives, and requirements. Participants will hear a brief overview of Sport Imagery. Once all consent forms have been submitted, the study will officially begin. At that time, participants will complete the *Sport Imagery Evaluation* (SIE - a questionnaire that will evaluate the individual's ability to conduct mental imagery).

Actual testing will involve a total of 8 testing sessions (1 pretest, 6 testing sessions, and 1 posttest). The testing sessions will be conducted by the Principal Investigator in a group setting, unless participants are selected as part of a control group. In this case, participants will be instructed to conduct testing sessions with coach supervision only. During all testing sessions, participants will conduct their corresponding mental training and then will shoot free throws in a predesigned format. Participants will shoot free throws with their perspective group members. In addition, participants will be asked to conduct a few minutes of mental training in between testing sessions. Mental training will be conducted at the individual's own time, outside the scheduled testing session days. Physical and mental free throws will be recorded on a Free Throw Shooting Log and on a Sport Imagery Diary.



The orientation and all testing sessions will be conducted on school grounds, scheduled either before or after team practice. Sessions are expected to last between 30 minutes to one hour. The Principal Investigator and/or team coach will be present during all sessions.

At the end of the study, participants will again complete the SIE to determine if imagery skills have improved. Once all data have been collected and analyzed, participants will be informed of study results. Upon request, parents and coaches may also request a copy of results. Results will contain a brief summary of results and statistical data. No personal identifier or sensitive data will be included.

Risks of Participation:

There are **no known risks** associated with this project which are greater than those ordinarily encountered in shooting free throws.

Benefits:

Participants are expected to benefit from the study by increasing their free throw shooting accuracy.

Confidentiality:

Confidentiality is of highest priority. All data and records will be kept confidential. All written data and computer records will be kept in a central location. Only the Principal Investigator will have direct access to the data and records. Computer data will be password protected on a personal laptop and backed-up onto a flash drive. The flash drive along with all paper documents will be stored in a locked storage. Data will be submitted in sealed envelopes directly to the Principal Investigator.

For increased protection, each participant will be given a code number. This number will be used instead of the individual's name or any other identifier. Again, all records will be stored securely and only researchers and individuals responsible for research oversight will have access to the records. It is possible that the consent process and data collection will be observed by research oversight staff responsible for safeguarding the rights and wellbeing of people who participate in research.

All participants will be given written results of the study. Results will be shared with coaches of participating teams. Upon request, parents may also obtain a copy of study results. Records (including the link between names and code numbers) may be kept up to one year. During this time, all participants, coaches, and parents of participants may request a copy of these records. However, after one year's time all records will be destroyed properly. Only the final results will be available thereafter.



Compensation:

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Contacts:

If you have questions or concerns about the research study (or if you have any questions or concerns about your rights as a research volunteer), please feel free to contact the following individuals:

- Tom Darling, principal investigator, 918-289-1628 or tom.darling@okstate.edu.
- Dr. Steve Edwards, Advisor, 405-744-7476 or steveed@okstate.edu.
- Dr. Shelia Kennison, IRB Chair, 219 Cordell North, Stillwater, OK 74078, 405-744-1676 or irb@okstate.edu.

Participant Rights:

Participation is strictly voluntary and that individuals can choose not to participate in the study. Individuals who do choose to participate may also choose to withdraw from the study at any time without penalty or harm. There are no risks to participants due to early withdrawal from the study. If you choose to withdraw from the study, please inform or contact one of the individuals listed under the contacts section.

Participation in the study may be terminated by the Principal Investigator if an individual presents any inappropriate behavior or conduct that may be considered harmful to oneself, other individuals, or the study procedures.

The participant or the participant's parent/legal guardian may contact the research team at any time for any questions or concerns.

PLEASE SIGN SIGNATURE PAGE ON PAGE 5

APPENDIX H

Consent Letter from the School Board



Karl A. White
BUSINESS MANAGER & CLERK FOR THE BOARD

21 December 2007

Tom Darling
Health and Human Performance
Oklahoma State University
Stillwater, OK 74078

Re: Consent to recruit Enid students

Dear Mr. Darling:

You may recruit Enid Public School students to voluntarily participate in your study as long as each of them obtains prior written consent from parent(s) or guardian(s). Please be advised that although your protocol has not been shared completely with me, I must stipulate that no Enid student may be identified by name, social security number or any other positive identifier in any portion of your study that could be published either in print, electronically or digitally.

Should you have any questions regarding this conditional approval please do not hesitate to contact me at any of the contact points listed in this letterhead.

Sincerely,

Karl A. White

*Excellence.
Pride. Success.*

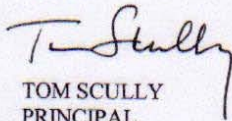
500 S. Independence, Enid, OK 73701 | Phone 580.234.5270 | Fax 580.249.3565
www.enidpublicschools.org | kawhite@enidk12.org

GLENCOE PUBLIC SCHOOLS
201 LONE CHIMNEY ROAD
GLENCOE, OK 74032

JANUARY 14, 2008

TO OKLAHOMA STATE UNIVERSITY:

AS PRINCIPAL OF GLENCOE SCHOOLS, I AM AWARE OF THE STUDY MR.
DARLING IS WANTING TO CONDUCT, AND GIVE HIM MY PERMISSION TO
DO SO.



TOM SCULLY
PRINCIPAL
GLENCOE HIGH SCHOOL

APPENDIX I

Consent Letter from the Principal



ENID HIGH SCHOOL

611 WEST WABASH ENID, OKLAHOMA 73701-7299

OFFICE OF THE PRINCIPAL

Phone (580)234-2404 • (580)249-3527 • Fax (580)249-3576

January 16, 2008

OKLAHOMA STATE UNIVERSITY
STILLWATER, OK 74078

To Whom It May Concern:

I, Jim Beierschmitt give consent for Tom Darling to conduct his
basketball research study with the Enid High Pacer Girl's Basketball Team.


Sincerely,

Jim Beierschmitt
Principal
Enid High School

GLENCOE PUBLIC SCHOOLD
201 LONE CHIMNEY ROAD
GLENCOE, OK 74032

TO WHOM IT MAY CONCERN:

GLENCOE SCHOOLS GIVES PERMISSION FOR MR. TOM DARLING TO
CONDUCT A STUDEY WITH OUR BASKETBALL PLAYERS FOR HIS
BASKETBALL RESEARCH.


RICK BALES
ATHLETIC DIRECTOR
GLENCOE SCHOOLS

Board of Education

Rex Tautfest, President
Jim Buntt, Vice-President
Cheryl Lane, Clerk
Butch Crenshaw, Member
Shirley Burgess, Member

**Frontier Public
School**

P.O. Box 130, 17750 Valley Rd.
Red Rock, OK 74651

Office: (580) 723-4361 • Fax: (580) 723-4516

Administration

Terri Tafinger
Superintendent of Schools (580) 723-4361
Randy Robinson
High School Principal (580) 723-4360
Greg Jackson
PK-8th Principal (580) 723-4582
Bob Weckstein
Assistant Principal (580) 723-4223

January 11, 2008

To whom it may concern:

Frontier Schools gives permission for Oklahoma State to conduct a basketball research study, under the direction of Tom Darling.



Bob Weckstein
Elementary Principal
Athletic Director



"Home of the Mustangs"

APPENDIX J

Consent Letter from the Coach

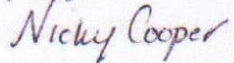
14' December, 2007

Nicky Cooper
Head Girls Basketball Coach
Enid High School
611 W. Wabash
Enid, OK 73701
(580) 402-1855

To Whom It May Concern.

I give consent for Tom Darling to perform a statistical basketball study with the Enid Pacer Basketball Team. This Research Study is in conjunction with Oklahoma State University. If you have any questions please call me on the above number.

Nicky Cooper



Enid Pacer Basketball




Jason Reece
Head Coach

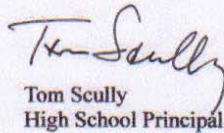
January 14, 2008

To Whom It May Concern:

We hereby grant permission to Tom Darling, a student of Oklahoma State University, to conduct a mental-imagery study of free-throw shooting, as it pertains to our boys' varsity basketball team.

Sincerely,


Jason Reece
Head Coach


Tom Scully
High School Principal

100 Lone Chimney Road
Glencoe, OK 74032
580-669-2261 HS 580-669-2575 GYM 580-669-2961 FAX
405-880-4315 CELL

November 27, 2007

To Whom It May Concern:

As the head coach for Stillwater Junior High freshmen girls' basketball team, I am giving my consent for Tom Darling to use members of my team to participate in his dissertation study. The majority of my nineteen team members are interested in being a part of this study to help improve their free throw shooting techniques. The athletic director, Darren Nelson, and the head principal, Trent Swanson, for the Junior High have been informed with the details of the study and have approved it being conducted with these athletes. I am looking forward to witness the outcomes of this study and how it may affect our team. Please do not hesitate to contact me at anytime. Thank you.

Sincerely,

Amanda Taylor
Stillwater Junior High
ataylor@stillwater.k12.ok.us
(405) 533-6420

APPENDIX K

Sport Imagery Evaluation

SPORT IMAGERY EVALUATION

As you complete this evaluation, remember that imagery is more than just visualizing something in your mind's eye. Vivid images may include many senses, such as seeing, hearing, feeling, touching, and smelling. Vivid images also may include feeling emotions or moods.

In this exercise you will read descriptions of general sport situations. You are to imagine the situation and provide as much detail from your imagination as possible to make the image as real as you can. Then you will be asked to rate your imagery in seven areas:

- a. How vividly you saw or visualized the image.
- b. How clearly you heard the sounds.
- c. How vividly you felt your body movements during the activity.
- d. How clearly you were aware of your mood or felt your emotions of the situation.
- e. Whether you could see the image from inside your body.
- f. Whether you could see the image from outside your body.
- g. How well you could control the image.

After you read each description, think of a specific example of it – the skill, the people involved, the place, the time. Then close your eyes and take a few deep breaths to become as relaxed as you can. Put aside all other thoughts for a moment. Keep your eyes closed as you try to imagine the situation as vividly as you can.

There are, of course, no right or wrong images. Use your imagery skills to create the most vivid and clear image that you can. After you have completed imagining each situation, rate your imagery skills using the following scales.

For items a-f:

1. = no image present
2. = not clear or vivid, but a recognizable image
3. = moderately clear and vivid image
4. = clear and vivid image
5. = extremely clear and vivid image

For item g:

1. = no control at all of image
2. = very hard to control
3. = moderate control of image
4. = good control of image
5. = complete control of image

Practicing Alone

Select one specific skill or activity in your sport, such as shooting free throws, performing a parallel bar routine, executing a takedown, throwing a pass, hitting a ball, or swimming the butterfly. Now imagine yourself performing this activity at the place where you normally practice (gym, pool, rink, field, court) without anyone else present. Close your eyes for about one minute and try to see yourself at this place, hear the sounds, feel your body perform the movement, and be aware of your state of mind or mood. Try to see yourself from behind your eyes or from inside your body. Then, try to see yourself from outside your body, as if you were watching a videotape of yourself performing.

- | | | | | | |
|--|---|---|---|---|---|
| a. Rate how well you <i>saw</i> yourself doing the activity. | 1 | 2 | 3 | 4 | 5 |
| b. Rate how well you <i>heard</i> the sounds of doing the activity. | 1 | 2 | 3 | 4 | 5 |
| c. Rate how well you <i>felt yourself</i> making the movements. | 1 | 2 | 3 | 4 | 5 |
| d. Rate how well you were aware of your <i>mood</i> . | 1 | 2 | 3 | 4 | 5 |
| e. Rate how well you were able to see the image from <i>inside</i> your body. | 1 | 2 | 3 | 4 | 5 |
| f. Rate how well you were able to see the image from <i>outside</i> your body. | 1 | 2 | 3 | 4 | 5 |
| g. Rate how well you <i>controlled</i> the image. | 1 | 2 | 3 | 4 | 5 |

Practicing With Others

You are doing the same activity, but now you are practicing the skill with your coach and teammates present. This time, however, you make a mistake that everyone notices. Close your eyes for about one minute to imagine making the error and the situation immediately afterward as vividly as you can. First, try to experience the feelings you have as you make the mistake. Then, quickly try to re-create the situation in your mind and imagine yourself correcting the mistake and performing perfectly. Try to see the image from behind your eyes or from inside your body as you correct the mistake. Next, try to see the image as if you were watching through a video camera as you correct the mistake.

- | | | | | | |
|--|---|---|---|---|---|
| a. Rate how well you <i>saw</i> yourself in this situation. | 1 | 2 | 3 | 4 | 5 |
| b. Rate how well you <i>heard</i> the sounds in this situation. | 1 | 2 | 3 | 4 | 5 |
| c. Rate how well you <i>felt yourself</i> making the movements. | 1 | 2 | 3 | 4 | 5 |
| d. Rate how well you <i>felt the emotions</i> of this situation. | 1 | 2 | 3 | 4 | 5 |
| e. Rate how well you were able to see the image from <i>inside</i> your body. | 1 | 2 | 3 | 4 | 5 |
| f. Rate how well you were able to see the image from <i>outside</i> your body. | 1 | 2 | 3 | 4 | 5 |
| g. Rate how well you <i>controlled</i> the image. | 1 | 2 | 3 | 4 | 5 |

Playing in a Contest

Imagine yourself performing the same or similar activity in competition, but imagine yourself doing the activity very skillfully and the spectators and teammates showing their appreciation. As you imagine the situation, try to see the crowd and hear the noise they are making. Imagine yourself feeling confident in your ability to perform, as well as your ability to handle the pressure. Now close your eyes for about one minute and imagine this situation as vividly as possible. Try to image yourself performing from inside your body, as if you were actually performing, as well as from outside your body, as if you were a spectator.

- | | | | | | |
|--|---|---|---|---|---|
| a. Rate how well you <i>saw</i> yourself in this situation. | 1 | 2 | 3 | 4 | 5 |
| b. Rate how well you <i>heard</i> the sounds in this situation. | 1 | 2 | 3 | 4 | 5 |
| c. Rate how well you <i>felt yourself</i> making the movements. | 1 | 2 | 3 | 4 | 5 |
| d. Rate how well you <i>felt the emotions</i> of this situation. | 1 | 2 | 3 | 4 | 5 |
| e. Rate how well you were able to see the image from <i>inside</i> your body. | 1 | 2 | 3 | 4 | 5 |
| f. Rate how well you were able to see the image from <i>outside</i> your body. | 1 | 2 | 3 | 4 | 5 |
| g. Rate how well you <i>controlled</i> the image. | 1 | 2 | 3 | 4 | 5 |

Recalling a Peak Performance

Recall one of your all-time best performances – a performance in which you felt confident, in control, in the zone. Close your eyes for about one minute and try to see yourself in that situation, feel your emotions, and re-create the experience. Imagine your performance and re-create the feelings you experienced, both mentally and physically, during that performance. Try to see the image from within yourself, and then try to image the situation from outside yourself.

- | | | | | | |
|--|---|---|---|---|---|
| a. Rate how well you <i>saw</i> yourself in this situation. | 1 | 2 | 3 | 4 | 5 |
| b. Rate how well you <i>heard</i> the sounds in this situation. | 1 | 2 | 3 | 4 | 5 |
| c. Rate how well you <i>felt yourself</i> making the movements. | 1 | 2 | 3 | 4 | 5 |
| d. Rate how well you <i>felt the emotions</i> of this situation. | 1 | 2 | 3 | 4 | 5 |
| e. Rate how well you were able to see the image from <i>inside</i> your body. | 1 | 2 | 3 | 4 | 5 |
| f. Rate how well you were able to see the image from <i>outside</i> your body. | 1 | 2 | 3 | 4 | 5 |
| g. Rate how well you <i>controlled</i> the image. | 1 | 2 | 3 | 4 | 5 |

Scoring

Now let's determine your imagery scores and see what they mean. Sum the ratings for each category and record them below.

<i>Directions</i>	<i>Dimension</i>	<i>Score</i>
Sum all <i>a</i> items	Visual	_____
Sum all <i>b</i> items	Auditory	_____
Sum all <i>c</i> items	Kinesthetic	_____
Sum all <i>d</i> items	Emotion	_____
Sum all <i>e</i> items	Internal perspective	_____
Sum all <i>f</i> items	External perspective	_____
Sum all <i>g</i> items	Controllability	_____

Interpret your scores in the visual, auditory, kinesthetic, emotion, and controllability categories based on the following scale: excellent (20-18), good (17-15), average (14-12), fair (11-8), and poor (7-4). Notice the categories in which your scores were low and refer to exercises in the chapter to increase your imagery ability in those areas. All of these categories are important from imagery training, so don't just rely on your visual sense. Work to improve the others! Remember, it takes practice but you *can* increase your imagery ability. Good luck!

Vealey, R. & Greenleaf, C. (2001). Seeing Is Believing: Understanding and Using Imagery in Sport. In Williams, J. (Ed.), *Applied Sport Psychology: Personal Growth to Peak Performance*, (4th ed., 276-278). Mountain View, California: Mayfield Publishing Company.

APPENDIX L

Free Throw Imagery Script

FREE THROW IMAGERY SCRIPT

THIS IS TOM DARLING FROM OKLAHOMA STATE UNIVERSITY. YOU ARE ABOUT TO LISTEN TO A PODCAST ON FREE THROW IMAGERY TRAINING. PLEASE GET READY. CAREFULLY LISTEN TO EACH WORD AND IMAGINE YOURSELF SHOOTING FREE THROWS IN THE GYM. CLOSE YOUR EYES. THE TRAINING BEGINS NOW...

I close my eyes to imagine myself shooting and making free throws. Counting down...3 – 2 – 1 (breathing in and out), I am fully **relaxed** and **ready**. I square myself on the Free Throw line, centering my feet and body to the backboard and goal. With the dark orange basketball in my hands it **feels** light and the grip is strong. The **scent** of the gym is familiar to me. As I bounce the ball, I can **hear** every bounce. The **sound** and **feel** of each bounce is perfect. I am now ready to make the shot.

I place my shooting hand center on the ball and my off-hand just to the side. My elbows are in tight next to my body in correct shooting form. I now **focus** my eyes on the target. The bright orange, circular goal is steady. In one fluid motion, I bend my knees and I fully extend my shooting arm upon the release of the ball. I **feel** the ball spin off my fingertips with just the right push to the shot. I then **see** the ball travel through the air with perfect arc.

I **feel** confident that the shot is going in. It does! I **see** the ball fall through the middle of the goal and I **hear** a perfect swish. I **feel** good about making the shot. I knew all along that I would make it. I am now ready to make the next shot.

THIS IS THE END OF THE FREE THROW IMAGERY TRAINING. PLEASE GET READY TO SHOOT 25 MENTAL FREE THROWS (IN SETS OF 1, 2, & 3). REMEMBER TO RECORD YOUR SCORE AFTER EACH SET. PLEASE CONDUCT THIS TRAINING 3 TIMES PER WEEK. ONCE YOU HAVE COMPLETED ALL SESSIONS, PLEASE SUBMIT YOUR SCORES. THANK YOU.

© Darling, T. V. (2008)

APPENDIX M

Podcast Download Instructions

Podcast Download Instructions

Computer group & iPod group:

1. Download iTunes 7.6 for free by visiting the website: www.apple.com/itunes/download/.
2. In iTunes, right click on the [Advanced] tab.
3. On the drop down menu, right click on [Subscribe to Podcast...].
4. A pop-up window appears. Enter the following URL:
<http://osuresearchstudy.mypodcast.com/rss.xml>.
5. The download process will take a few seconds. Once completed, the podcast called “Free Throw Imagery” will be available under Podcasts in the iTunes Library.
6. Research subjects in the computer group should listen to the podcast on their computers by pressing the [Play] button.

iPod group only:

- 1) After the podcast has been downloaded onto iTunes, sync your iPod by plugging in the usb connectors to both your computer and your iPod.
- 2) The download process will take a few seconds. On your iPod, in the main menu, scroll to the Podcasts subtitle and click the center button.
- 3) Find the podcast called “Free Throw Imagery” and press [Play] to listen.

Direct Link:

http://osuresearchstudy.mypodcast.com/2008/01/FT_Imagery_Training-73135.html

APPENDIX N

Free Throw Score Sheet

NAME **Pretest**
Date

1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____

TOTAL _____ % _____

NAME **Test 1**
Date

1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____

TOTAL _____ % _____

NAME **Test 2**
Date

1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____

TOTAL _____ % _____

NAME **Test 3**
Date

1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____

TOTAL _____ % _____

NAME **Test 4**
Date

1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____

TOTAL _____ % _____

NAME **Test 5**
Date

1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____

TOTAL _____ % _____

NAME **Test 6**
Date

1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____

TOTAL _____ % _____

NAME **Posttest**
Date

1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____ 2 _____ 3 _____
1 _____

TOTAL _____ % _____

APPENDIX O

Free Throw Testing Schedule

	script	computer	iPod	control
Orientation	14-Jan	14-Jan	14-Jan	14-Jan
Pretest	16-Jan	17-Jan	17-Jan	16-Jan
Test 1	21-Jan	23-Jan	23-Jan	DNP
Test 2	28-Jan	30-Jan	30-Jan	DNP
Test 3	4-Feb	6-Feb	6-Feb	DNP
Test 4	11-Feb	13-Feb	13-Feb	DNP
Test 5	20-Feb	19-Feb	19-Feb	DNP
Test 6	25-Feb	26-Feb	26-Feb	DNP
Posttest	4-Mar	3-Mar	3-Mar	4-Mar

DNP = Did not Participate

APPENDIX P

Raw Data

1	10	9	5	19	13	16	13	10	7.4	0
1	13	16	19	10	15	14	14	16	16.6	3
1	8	15	16	20	14	14	20	20	15.7	12
1	16	18	14	20	17	13	18	17	16.4	1
1	8	15	13	13	13	12	16	13	12.6	5
1	11	15	13	15	13	11	14	13	17.7	2
1	20	18	18	19	19	19	22	22	14.7	2
1	16	18	20	23	22	18	24	22	12.7	6
1	18	14	20	19	20	16	20	21	13.4	3
2	10	8	12	12	12	12	12	14	10.4	4
2	19	16	18	20	17	19	18	21	7.4	2
2	18	19	18	16	16	17	15	18	16.1	0
2	14	16	18	20	22	20	19	22	12.4	8
2	14	17	15	16	18	16	18	18	16.1	4
2	10	15	18	15	21	19	21	22	9.1	12
2	16	19	18	18	21	14	10	18	13.3	2
2	22	16	19	19	21	19	18	19	12.7	-3
2	15	18	19	15	17	9	9	15	10.1	0
3	23	19	21	20	24	23	23	25	18.1	2
3	16	15	20	16	21	19	20	22	15.7	6
3	24	14	18	19	16	13	16	18	15.9	-6
3	21	14	16	22	22	18	22	24	13.6	3
3	23	22	23	24	19	21	19	23	17.0	0
3	10	11	12	15	15	15	11	16	12.1	6
3	20	19	20	15	19	16	18	20	17.0	0
3	16	17	18	17	23	18	17	21	15.7	5
3	18	16	17	17	21	15	19	20	14.7	2
4	11	14	.	3
4	20	22	.	2
4	20	15	.	-5
4	9	9	.	0
4	12	11	.	-1
4	18	17	.	-1
4	16	14	.	-2
4	16	22	.	6
4	14	18	.	4

VITA

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ABSTRACT

PURPOSE: The purpose of this study was to determine if podcasting can significantly increase FT shooting performance among high school basketball players. **METHODS:** The sample for the study included 36 (12 male, 24 female) Oklahoma high school basketball players. Subjects were assigned into four groups (script, computer, iPod, control group) and were tested in three phases (pretest, treatment, posttest). The treatment phase consisted of imagery training (via podcasting) and FT shooting for six weeks. **RESULTS:** A total of 200 FT shots for the experimental groups was analyzed and compared to a total of 50 FT shots for the control group. Surprisingly, there were no significant group differences found among the experimental groups at any of the six testing sessions. However, a comparison of group means and the grand mean for the six testing sessions did indicate that the iPod group (18.1) performed higher than the computer group (16.7) and the script group (16.2). Also, a one-way ANOVA of the posttest indicated that there were significant group mean differences [$F_{(3, 32)} = 3.221, p < .05, w = .40$]. A Tukey post hoc test indicated that the true source of the significant group difference was between the iPod group and the control group. A comparison of posttest group means indicated that the iPod group (21.0) was the top performer, followed by the computer group (18.6), the script group (17.1), and the control group (15.8). Overall, the script group had the highest improvement (+ 3.8) and the control group had the lowest improvement (+ 0.7). **CONCLUSION:** Podcasting is a valid technological application of sport imagery that can improve FT shooting performance among high school basketball players. Podcasting is recommended as an adjunct to mental and physical training that can benefit sport psychologists, the coaching staff, and most importantly the athletes.

Key Words: Sport Imagery, Podcasting, Free Throw, Basketball, iPod

DISSERTATION CHAIR: _____ Dr. Steven W. Edwards _____