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Impact of Golf Video Games on Teaching Golf in Physical Education

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The University of Southern Mississippi

IMPACT OF GOLF VIDEO GAMES ON TEACHING GOLF IN PHYSICAL
EDUCATION

by

Ann Pohira-Vieth

Abstract of a Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

May 2010

ABSTRACT

IMPACT OF GOLF VIDEO GAMES ON TEACHING GOLF IN PHYSICAL EDUCATION

by Ann Pohira-Vieth

May 2010

Although technology has become an integral part of many classrooms across the country, the incorporation of technology through the use of video games in physical education is also becoming a mainstay in multiple school districts. In West Virginia public schools, Dance Dance Revolution (DDR) has entered the physical education classrooms as a way to help curb obesity (“Study Shows Video,” 2008). Schools in Arkansas, Missouri and Hawaii have also followed suit by adding DDR to the physical education curriculum (Gallaway & Lauson, 2006). Even though the incorporation of video games into educational programs is becoming more prevalent, there is a limited amount of research in this area and a lack of empirical studies to date that show outcomes of video games in physical education programs (Papastergiou, 2009; Hayes & Silberman, 2007; Trout & Christie, 2007).

The purpose of this study was to determine if golf video games like Tiger Woods PGA Tour 08 made for the Nintendo Wii can assist physical educators in teaching elementary school aged students how to play golf. Specifically, this study tested which mode of instruction would be best for teaching golf in physical education: golf instructor only, golf instructor and video game, or video game only. Data was gathered on distance, accuracy, and knowledge. The Benson Golf Test (1963) was used in order to measure the changes in distance and accuracy while the 20-question Modified Golf Knowledge Test

was used to test for golf knowledge. Both tests were used for pre and posttesting as part of the quasi-experimental design to test the treatment of five 45-minute physical education classes covering golf. Participants in this study included 46 students attending an elementary school in north central Florida.

In order to test for differences in distance gains of golf shots hit, an analysis of covariance (ANCOVA) showed there was no statistically significant difference in distance gains between the three modes of instructions; the video game only group, the half and half group, and the group that learned face-to-face, $F(2,38) = .014, p = .986, \eta^2 = .001$. In testing for differences in accuracy of golf shots hit, the ANCOVA showed there was no statistically significant difference in the accuracy scores between the three modes of instruction; the video game only group, the half and half group, and the face-to-face group, $F(2,38) = 1.029, p = .367, \eta^2 = .051$. When testing for improvement in golf knowledge, the ANCOVA showed there was no statistically significant difference in the golf knowledge scores between the three modes of instruction; the video game only group, the half and half group, and the face-to-face group, $F(2,40) = 2.27, p = .116, \eta^2 = .102$.

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A Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy


Approved:


Director









Dean of the Graduate School

DEDICATION

This dissertation is dedicated to my parents John and Janet Pohira, my grandmother Irene Pruchnicki, my husband Charles Vieth, and our cat “RT.” Thank you for your unconditional faith, assistance, support, and understanding.

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CHAPTER I

INTRODUCTION

With more than half of all Americans playing video games it should not surprise anyone that Dance Dance Revolution (DDR) has become part of physical education curricula in the United States (“Kids in West Virginia,” 2007; Hoye, 2007). Numerous games have added more serious content to simulate reality, allowing the gamer to learn by playing. Many teachers draw on their own video game experience to link their positive gaming experiences to learning in their classrooms. The popularity and practicality of video games for disseminating information in the classroom have been linked to an increase in student motivation, comprehension and success in sports (Hayes & Silberman, 2007).

Various research studies have documented the benefits of simulation as learning (Farrel et al., 2003; Lintern, Roscoe, Koonce, & Segal, 1990; Lintern, Sheppard, Parker & Yates, 1989; Tkaz, 1998; Vogel, Greenwood-Erickson, Cannon-Bowers, & Bowers, 2006). When researchers mention video games and education many people first think of the military or flight training programs using game simulations. Due to shrinking military budgets, Baker, Prince, Shrestha, Oser, and Salas (1993) noted that game simulations used for pilot training are an effective and inexpensive way to train air crews. Ricci, Salas, Cannon-Bowers (1996) had similar findings, indicating that gaming in military situations is potentially powerful for training because there are a variety of applications available with relatively low costs.

Vogel, Greenwood-Ericksen, et al. (2006) point out that the use of games in computer-assisted instruction encourages student’s motivation to learn. Students tend to become more excited during hands-on video or computer game exercises. Computer

games like “The Political Machine” provide a real life simulation where students act as campaign manager for a presidential campaign making decisions about political platforms and fund-raising (Long, 2007). Students take what they learn during the game simulator and apply it to real life. Good video games can teach students to be innovators, and increase student comprehension and critical evaluation skills.

Using video games in a physical education class can be another way to incorporate technology into the classroom and can meet technology standards (Hayes & Silberman, 2007). Technology in general education as well as physical education, is becoming more of a mainstay, making it more accessible to educators (Townsend & Gurtvich, 2002). One of the most popular video games in physical education currently in use is DDR (Trout & Christie, 2007). Because of its popularity the media has taken an interest in DDR and so have researchers in West Virginia, where a study is currently underway to study the health benefits of the game (“Kids in West Virginia,” 2007; Trout & Christie, 2007). However, because of the newness of the technology and popularity of incorporating video games into physical education, no study has investigated the learning benefits of sports video games such as golf.

This dissertation will address the idea that video games can be used as a teaching tool in physical education classes to assist with student learning. The results of this study should encourage physical educators to use sports video games such as bowling, tennis, basketball, football, soccer, and golf in their classes to aid in instruction. Specifically this study validated the use of the Tiger Woods PGA Tour 08 video game in teaching golf by comparing student performances based on mode of instruction.

Purpose of Study

The purpose of this study was to determine if golf video games can assist physical educators in teaching elementary school aged students how to play golf. Specifically, this study tested which mode of instruction would be best for teaching golf in physical education: golf instructor only, golf instructor and video game, or video game only. Data was collected for distance, accuracy, and knowledge.

Research Questions

1. Which group of students showed the greatest improvement in distance at the end of five 45-minute instructional periods: students that are taught how to play golf playing Tiger Woods PGA Tour 08, students that only receive face-to-face instruction, or students that play Tiger Woods PGA Tour 08 and receive face-to-face instruction?
2. Which group of students showed the greatest improvement in accuracy at the end of five 45-minute instructional periods: students that are taught how to play golf playing Tiger Woods PGA Tour 08, students that only receive face-to-face instruction, or students that play Tiger Woods PGA Tour 08 and receive face-to-face instruction?
3. Which group of students showed the greatest improvement in golf knowledge at the end of five 45-minute instructional periods: students that are taught how to play golf playing Tiger Woods PGA Tour 08, students that only receive face-to-face instruction, or students that play Tiger Woods PGA Tour 08 and receive face-to-face instruction?

Definition of Terms

The following terms have been defined for the study as follows:

1. Accuracy: The score that was recorded as the deviation of each ball hit moves to the right or left of the center line ranging in numbers for zero to nine using the

Benson Golf Test (Adams, 2000; Collins & Hodges, 1978).

2. Beginning golfer: Any person that has played five or less rounds of golf will be considered a beginning golfer. In order for a golfer to establish a handicap index, the United States Golf Association requires five scores be posted at a golf club (USGA, n.d.).
3. Distance: The distance each ball travels beyond the hitting line in terms of yards using the Benson Golf Test (Collins & Hodges, 1978).
4. Edugaming: The combination of video games and learning.
5. Exergaming: The combination of video games and exercise.
6. Experienced golfer: Any person that has played six or more rounds of golf.
7. Face-to-face instruction: Instruction, practice and feedback given directly to students in a teacher student environment without the use of video games.
8. Game console: An operating system that plays video games stored on an optical disc using a television to display the game. The three current major manufacturers that design game consoles are Sony which has designed the PlayStation models, Nintendo, and Microsoft which has designed all of the XBOX models (Czarnecki, 2007).
9. Gamepad: The device players use on the Sony Playstaion and Xbox 360 to make plays on the video game.
10. Gamer: Participants that have played at least one video game on any entertainment platform in the past six months.
11. Golf Knowledge: The amount of basic golf information a person has that was measured in terms of the Modified Golf Knowledge Test.
12. Half and half: Instruction, practice and feedback given directly to students half the

time in a face-to-face learning mode and the other half of the time in a video game only learning mode.

13. Nintendo Wii: The video game console produced by Nintendo was first released in the United States on November 19, 2006 and was designed as the company's new generation game console (Sanders & Casamassina, 2006).
14. Novice gamer: Participants that may have played video games before but who have not played any video games in the past six months.
15. Nunchuk: The Nintendo Wii joystick that plugs into the Wii remote and is commonly used with sports video games to assist with game simulation of body movements such as right and left arms in boxing.
16. PGA of America: The Professional Golfers' Association in America dedicated to promoting the game of golf. This group of golf professionals are experts in golf management as well as golf instruction and is the largest sports organization in the world (PGA.com, 2007).
17. Pitch shot: A partial full swing that is intended for a ball to travel further than a shot used just off the edge of the green but not as far as a full swing.
18. Tiger Woods PGA Tour 08: A video game released August 28, 2007 designed for PlayStation 3, XBOX 360, Wii, PS2, PC, PSP, NDS, and the Mac (EA Sports, 2007).
19. Video game: A piece of software such as Tiger Woods PGA Tour 08, DDR, Where in the World is Carmen San Diego?, or Guitar Hero that runs on an operating system.
20. Video game only: Instruction, practice and feedback given directly to students in a teacher student environment with the use of video games.

21. Wiimote: The nickname gamers have given the Wii wireless remote control and is used as the golf club in Wii video games.
22. Whiff: Any golf swing that is intended to make contact with a golf ball but the ball is missed.

Delimitations

1. The participants in this study were male and female students enrolled in fourth, fifth, and sixth grades at an elementary school in north central Florida.
2. The verbal instruction and feedback in the face-to-face learning situation was given by the researcher.
3. The verbal instruction and feedback in the video game environment was given by the researcher.
4. The golf video game used was Tiger Woods PGA Tour 08.
5. The golf performance was measured by accuracy and distance using the Benson Golf Test (1963), using a 5-iron (Collins & Hodges, 1978).
6. Golf knowledge was measured by the number of correct responses given on the Modified Golf Knowledge Test.
7. The educational instruction time was five 45-minute class periods.

Assumptions

1. All participants in the study were honest as well as truthful and accurate when they responded to all questions to the best of their ability.
2. All participants were able to attend all training sessions and given the same content in each treatment group.
3. The researcher was impartial during the Benson Golf Test (1963) scoring process and was accurate in recording all data.

4. The researcher covered the same content during each class period.

Justification

The results of this study contribute to the current research trends in edugaming and edutainment. The *America's Digital Schools* (2006) report cited 27,898 school districts that were using portable gaming devices and it was estimated that the number of portable gaming devices used in the classroom would grow to 148,451 units by 2011 (Renwick, 2006). Tabula Digita CEO Ntiedo Etuk reported that video games incorporated into teaching have more learning engagement that contributes to achievement and more time on task ("Interest in Gaming," 2007). Furthermore the Federation of American Scientists believe that digital games offer attributes important for learning like clear goals, a monitored learning process and increased motivation which helps students to stay on task ("Play Video Games," 2007). Even though the incorporation of video games into educational programs is transforming the classroom (Leonard, 2008), there is a limited amount of research in this area because it is still a new concept to many. The research on including video games or other forms of technology into physical education programs is even more finite. Still, there is evidence that physical education teachers want to use technology in their classes (Bennett-Walker, 2006; LaMaster, 1998).

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter presents an inclusive overview of related research organized into three sections. The first part examines electronic and non-electronic simulations as well as video games, in educational settings. The second section will cover the use of multimedia in physical education programs and the current trend of using video games. Finally, the last section will examine effective golf instruction in physical education.

Simulators

Generally simulations refer to an intricate performance test conducted in authentic or real-to-life environment (Cleveland & Thornton, 1990; Thornton & Byham, 1982). The earliest known performance-based testing dates back to 2200 B.C. with civil service examinations in China (Cleveland & Thornton, 1990; DuBoise, 1970). Even though performance-based tests were studied and examined through the 20th century, it was not until the 1950s that AT&T developed a long-range Management Progress Study to determine the characteristics which lead to a successful manager (Cleveland & Thornton, 1990). It was the success of this study that helped institute the use of simulations nationwide. In the early 1980s, more than 50% of business organizations in the United States incorporated simulations or management games into company training (Cleveland & Thornton, 1990; Faria, 1987).

Since then, simulations have made their way into schools, enabling teachers to give students a chance to experience various real-to-life situations. For example, in a classroom simulation on market exchange and wealth distribution, students have the opportunity to benefit in experiential learning because the student now takes on personal meaning from the activity. This allows the student to remember the concepts taught by

personal application as well as the memory of the experience (Williams, 1993). This exemplifies that properly administered classroom simulations can be useful for educators when covering complex topics (Cotton, Ahmadi, & Esselborn, 1997).

Classroom and business training simulations have expanded to computer simulations because it was deemed more cost effective (Rifkin, 1994; J. Vogel, D. Vogel, et al., 2006). Also, some researchers believe that the development of projects such as the “Games to Teach Project,” a collaborative work between Microsoft and MIT’s Comparative Media Studies Program, is evidence that computer programs can be more effective in teaching (Jenkins, 2002; J. Vogel, D. Vogel, et al., 2006). In addition to software-based computer simulations, there are also online simulations. Rather than just using the simulation in the classroom, students can continue to learn outside the classroom with the educator still having the ability to track student performance and provide feedback on specific skills (Di Meglio, 2008). Nonetheless, the evidence showed that simulations are a proven way to teach skills and working knowledge to students (Salas & Cannon-Bowers, 2001; Vogel, Greenwood-Eriksen, et al., 2006).

Simulations in sports activities have been used for centuries. Most of the time athletes spend practicing their sport, they are simulating the actual activity they will be performing. In tennis, pressure training simulates the emotions the tennis player should feel during match play (Wardlaw, 2000). In baseball, a batting simulator emulates the pitcher throwing and the ball approaching (Scott & Gray, 2007). In golf, a practice swing simulates the full swing. In basketball, performing shooting movements simulates a free throw shot (Ploszay, Gentner, & Skinner, 2006). Even mental toughness can be practiced by simulating external and internal distractions at sporting events by imagining large crowds cheering and negative self-talk (Dale, 1997).

In the recent decade, simulators have enhanced the teaching of certified outcome based college level athletic training programs. Students in these athletic training programs must be able to demonstrate various skills prior to graduation. With the potential risk of students and educators being exposed to blood-borne pathogens during clinical training, simulations have been able to make practicing the required skills safer and more cost effective (Middlemans & Ford, 2005). There are four main types of simulators used in this area which include computerized simulations, screen-based graphical simulations, mannequin-based simulations, and virtual reality trainers. Simulations in this field are very useful in assessing student learning and give instructors the ability to customize scenarios (Henning, Lesperance, & Harris, 2007). However, there is still a limited amount of research as it relates to the efficacy of athletic training computer software use in the classroom (Castle, 2000).

In a study conducted by Wiksten, Patterson, Antonio, De La Cruz and Buxton, (1998), 66 students enrolled in a college athletic training program were recruited to participate in a study that used a computer program created to teach athletic training learning competencies through skill assessment in an interactive athletic training educational curriculum (IATEC). Students were then placed into one of three groups: traditional instruction, IATEC group, or the control group. The results of the study revealed that the traditional lecture group improved the most in cognitive knowledge and that while the IATEC model was effective students did not enjoy learning with the IATEC model. One disadvantage of the IATEC model was the use of a 2-dimensional computerized tool. However, it was noted by the researchers that the results of this study were inconsistent with the Barker (1988), Buxton, Speitel, Holgen (1995), and Walkley and Kelly (1989) where the effectiveness of computer assisted instruction was as

efficient other forms of teaching. It is believed that the contradiction between the findings may have been caused by the fact that the participants in the traditional instruction section were familiar with the instructor and the instructor's method of instruction.

In another study conducted by Castle (2000), a computerized simulator was created to prepare students for the Written Simulation Section of the National Athletic Trainers' Association Board of Certification, Inc. (WS-NATABOC). Twelve accredited undergraduate athletic training programs supplied usable data sets for 41 participants. The results showed that the computerized simulation was not an effective predictor of the WS-NATABOC. However, use of the computerized simulation could be used to expose students to the kinds of questions they may receive when taking the actual WS-NATABOC. Furthermore the attitudes of the students participating in the study indicated that they enjoyed the computerized simulation as opposed to the written simulation.

Computer-based simulators are also useful in studying traffic models to design road layout as well as traffic lights. More recently, driving simulators are being used for training and instruction especially for professional drivers of buses, emergency vehicles, and trucks (Maroto, Delso, Cabanellas, & Felez, 2006). Because of the expense to create and operate driving simulators, most basic driver education courses are done on-road. Reed and Green (1999) believe that there are three primary reasons why driving simulators are effective and should be used: safety, equipment cost, and experimental control. Additionally, Reed and Green conclude that there is a positive correlation between on-the-road driving and driving simulators.

Games

According to Davis and Davis (2000), not all simulations are games and not all games are simulations. There are times when the differences between simulations and games can be difficult to define (Vogel, Greenwood-Ericksen, et al., 2006). However, Schmucker (1999) was able to create a taxonomy to aid in clarification. Additionally games can be classified into many categories and some even overlap. However, to be considered a game, an activity must be a physical or mental contest against another that requires participants to follow rules in order to reach a goal (Hogle, 1996).

Hogle (1996) concluded in researching the benefits of educational games that gaming in itself can motivate and interest learners. Furthermore, the retention of subject material can be improved and the skills of reasoning and higher order thinking are also increased. Vogel, Greenwood-Ericksen, et al. (2006) found that the transference of learning can be effective when learning games become simulations proving that simulations and games have been independently shown to be good teaching tools. Additionally, Jentsch and Bowers (1998) proved the validity of PC-based simulations in a 10-year review of literature. Their results showed a significant amount of learning from digital games can be applied to realistic situations (Vogel, Greenwood-Erickson et al., 2006). Gunter (1998) deduced similar conclusions in his research noting the performance correlations found between a flight simulator configured aircraft carrier and landing performing testing tasks using Atari video games for training. Tkacz (1998) also had congruent results in a study on the effect a video game had on the effectiveness on a map and terrain course. Also, Van Eck's (2000) conclusion in a study on the transference of math skills using an instructional game simulation conducted on computers support these findings.

Video Games

Egenfeldt-Nielsen (2005) states militaries have been experimenting with game simulators since the 18th century. The United States military is the leader when it comes to using video games for training (Ciavarro, 2005). The benefits or detriments found in U.S. military experience with simulators has not, for the most part, been transferable to other sectors because results of most military research has been restricted (Ciavarro, 2005; Prensky, 2005).

Schools have been using electronic game simulations since 1974 when the Minnesota Educational Computing Consortium (MECC) released its first version of “Oregon Trail” (Coventry, 2007). Students playing this game take on the role of a family leaving from Missouri in 1848 going to Willamette Valley in Oregon by covered wagon. Student participants play this game on a computer and must make a series of decisions ranging from buying or hunting for food, crossing rivers, dealing with illness and bad weather conditions. Smart decisions in this game award points and allow the student to complete their trip to Oregon (Chiodo & Flaim, 1993).

In 1985, BrøderBund released the first version of its educational game *Where in the World is Carmen San Diego?* (Abandonia, n.d.). This computer simulation paved the way for the adventure educational games (Ciavarro, 2005). In the 1990s, George Lucas founded Lucas Learning and added to the classroom video game educational simulations with the intent to furnish K-12 classrooms with instructional materials that are technology-based so that learning can be more fun, engaging, and challenging for students (Lucas Learning, 2007).

One of Lucas Learning’s top competitors is LeapFrog Enterprises, Inc. founded in 1995 by a San Francisco lawyer. Answers.com (2008) reports that LeapFrog is the fourth

largest toy company that designs and sells interactive learning toys such as iQuest, Turbo Twist, LeapPad talking books, and the LeapStart Learning Table. LeapFrog also has other interactive products suited for children in preschool through middle school. Many of the products sold by LeapFrog are available for purchase in stores like Wal-mart and Target. In addition to brick and mortar stores, LeapFrog also makes many of their products available through their website.

The LeapFrog Schoolhouse division also has products for individual learning to early literacy available for in school programs (LeapFrog Schoolhouse.com, 2008). According to LeapFrog's website, there are 19 efficacy studies that each cites positive learning improvements as a result of using their Schoolhouse products. Also, LeapFrog self-reports that these studies were designed to meet the guidelines of the U.S. Department of Education's What Works Clearinghouse (LeapFrog Schoolhouse.com, 2008). Some of the LeapFrog products currently in use in schools have been supplemented through the use of federal and state grants as well as matching grants from LeapFrog.

While Leap Frog's products are currently being used in educational programs throughout the United States as well as in homes, another company, VTech, has been designing electronic learning products (ELP) for children since 1976. This Hong Kong-based company develops video games that feature learning for ages 0-9 and is also one of the world's largest suppliers of phones (VTech.com, 2008). In a British government-funded study, 24 families with three- and four-year-old children were tracked for 15 months to investigate how the use of ELP affects basic learning. The results showed that high-tech learning devices did not prove to be more effective than traditional learning (Ward, 2006).

In 2005, the West Virginia Board of Education developed a curriculum around Dance Dance Revolution (DDR) in which 20 public schools were involved in a pilot test. The results were similar to the initial at-home study where participants showed increased blood flow, an increase in aerobic capacity, an improved arterial response, and a lack of weight gain (O'Hanlon, 2007). The state is also planning to have DDR machines in all 753 public schools in the state for students that want to engage in cardiovascular activity ("Kids in West Virginia," 2007). In Illinois, PE4life, a nonprofit organization, sponsored a DDR program for a junior high school which helped the school's student body population drop their obesity rate 11%. The program director of PE4life believes that simulators like DDR teach activities that can be used throughout life (Lee, 2008).

Nintendo has taken an active role in the development and release of high tech educational video game toys. In June 2006, Nintendo released Big Brain Academy in the United States (Gamershell.com, 2008). This educational software is actually a series of mini games which are meant to exercise the brain. Similarly, the Brain Age products also released by Nintendo in 2006, were developed by Professor Ryuta Kawashima, a prominent Japanese neuroscientist, as a way to help keep the brain active (CNN.com/technology, 2007). Nintendo's most recent productivity product, "Flash Focus: Vision Training in Minutes a Day," was released on October 15, 2007. This product has been designed for everyone to play fun and fast activities that challenge the eyes (Nintendo.com, 2007).

Educational Games and Learning

According to Zyda (2007), the video game industry is expected to produce \$60 billion in revenue in 2007. However, the games industry is still not interested in building an educational infrastructure. During the birth period of edutainment, from 2000 to 2004,

lawsuits prevented “game industry executives from attending conferences where the topic of games for education might be headlined” (Zyda, 2007, p. 28). Although the gaming industry did not take part in the creation of educational games, research has shown that playing video games can trigger the release of dopamine in the brain which leads to increased retention of game-presented educational material (Mayo, 2007).

Lightspan was created with the assistance of educators following national educational standards in which lessons seem like “adventures” in math, reading and language arts (Tracy, 2001). Din and Caleo (2000) studied 47 students in two kindergarten classes from an urban public school to see if Sony Playstation’s *Lightspan* and 40 games related to kindergarten learning helped students retain more information. Once the classes were divided into the experimental and control groups, the students in the experimental group received a *Lightspan* and CDs to use at home during the semester. The results of the study showed that even though both groups improved at math during the trial period, the experimental group did not do significantly better. However, the experimental group did improve significantly in the spelling and reading areas.

Similar results were found in a study conducted by Baranowski et al. (2003) when a middle school science class was divided into a control and experimental group. The experimental group played a game called “Supercharged” during most class time and also received lectures and handout. The control group with the same teacher was taught the course material through lectures, experiments, observations, and teacher demonstrations. While the control group improved their knowledge by 15%, the experimental group improved their knowledge by 28%. Girls in the control group improved their test scores by 5% and the girls in the experimental group improved their scores by 23% (Mayo, 2007).

The Federation of American Scientists believes that video games have the potential to assist with knowledge retention, thinking skill and develop workforce skills (“Play Video Games,” 2007). According to Gee (2003, 2004, 2005) learning can occur with the play of a good video game. However, “good” games must incorporate principles such as interaction and risk taking. Deubel (2006) believes similar elements are necessary for digital game based learning (DGBL). Regardless, there is no set of criteria that can determine which video game is best because if a player cannot understand how to play the game, they will not play the game (Gee, 2003).

Gamers

Gamers in the 21st century include students in schools, employees in the workforce and is even growing to include part of the senior population (“Video Games to Help,” 2007). The video game market is not a “niche” market place any longer (Carstens & Beck, 2005). Educators must take into account that these changes in tastes in the population have an effect in schools as well. According to Prensky’s (2005) article dealing with this topic, a student was quoted as saying, “School didn’t teach me to read- I learned from my games” (p. 9).

Besides video games affecting the way people think, they are changing the way gamers interact with each other. Consumers of video games are now having video-game parties; for example, Wii parties and “Guitar Hero” parties are becoming popular in bars, homes and restaurants (Bulik, 2007). Other interactive games to follow will be Wii’s “Boogie,” a dance game, and Music Television’s with EA “Rock Band” where players make their own band with guitar, vocals, and drums (Bulik, 2007).

Negative Perceptions of Video Games

Even though video games are becoming a more social pastime, a common argument against adolescents playing video games is that it takes away time from educational activities. Cummings and Vandewater (2007) found that of the 534 teens surveyed during the 2002-2003 school year only 36% played video games and of those that played 80% were male. “Female gamers spent an average of 44 minutes playing on the weekdays and one hour and four minutes playing on the weekend...Male gamers spent an average of 58 minutes playing on the weekdays and one hour and 37 minutes” on the weekends (p. 684). It was also noted that girls who played video games during the week tend to spend less time on homework than girls who do not play video games while boys who play video games during the week seem to spend less time reading. However, this study did not link video game play to academic or social outcomes. Additionally this study was not conclusive enough to infer that teens who play video games spend less time reading and completing homework.

The National Center for Children Exposed to Violence (2003) reports that two- to seven-year-olds play video games for eight minutes a day, eight- to 13-year-old children spend about 32 minutes a day, and youth ages 13 to 18 play video games for about 20 minutes a day (Kaiser Family Foundation, 2002). This time is significantly less than the reported time youth spend watching television. Children ages two to 17 generally spend 19 hours, 40 minutes a week watching television for an average of 1,023 hours per year (National Center, 2000). However, more than two-thirds of all children ages two to 18 live in a home with a video game system (Kaiser Family Foundation, 2002).

Despite these reports, Vandewater, Shim and Caplovitz (2004) studied the links between television and electronic game use in relation to childhood obesity. Although

the results showed television watching habits were not related to a child's weight, video games were linked to overweight children. It was discovered that children that weigh more played moderate amounts of video games while children that weighed less played little to no video games. In a similar study, conducted in Switzerland, results also linked the use of electronic games to childhood obesity (Stettler, Singer, & Suter, 2004). However, in this study, television use also contributed to overweight children. The link between television and adiposity is documented more frequently than the link between electronic games and obesity because television viewing occupies more of a child's activity time (Hesketh, Wake, Graham, & Waters, 2007).

At the Games for Change Festival, panelists noted that the negative perception of video games makes people believe that educational learning games may not exist (Davies, 2008). The negative perception of video games is generally correlated with violence and video games. Furthermore, most research is dedicated to violent video game exposure (Anderson, Funk, & Griffiths, 2004). It is important to note that there are studies such as the one conducted by Gentile (2004) that confirms adolescences that play video games with high levels of violence are more likely to fight and argue. However, it should also be noted that not all video games are violent.

Still some believe that including edugaming in the classroom is a reckless decision based on conclusions of poor logic (Stager, 2007). Stager, senior editor of *District Administration Magazine*, believes that video games incorporated into curricula are too primitive and bore students. Moreover it would be too expensive to incorporate school curricula into a video game to make it current. However, Professors Charsky and Mims (2008) believe integrating commercial video games in regular classroom activity can enhance learning experiences. Yet they warn educators to have alternate assignments

available for students and parents who are not comfortable with the idea of video games in the classroom. Explaining the purpose of the video game to parents and administration can also disperse the notion that the students are “just playing video games.”

Technology in Physical Education

When technology is used in education it is commonly referred to as a teaching tool and is the term often used for things such as audio, video and digital media as well as models and projected and non-projected visuals (Lever-Duffy, McDonald, & Mizell, 2005; Okojie, Orlinsock, & Okojie-Boulder, 2006). The newer technologies have changed the functions of a basic classroom (Mishra & Koehler, 2006). High tech classrooms not only have televisions, VCRs, DVD players, and overhead projectors, but many also have computer controlled lighting systems as well as SMART technology or interactive white boards. In physical education the use of technology such as heart rate monitors and instructional videos gives students an opportunity to develop knowledge while working in a physical education environment (Townsend & Gurvitch, 2002).

The idea of incorporating technology into the physical education classroom is not new. In fact, technology has been integrated into physical education classes since the 1970s (Townsend & Gurvitch, 2002). Technology used in the 1970s incorporated physical education with watching videos. Another medium used to reach more students during that time was graphing physical performance (Bennett-Walker, 2006). Even with the latest technologies available to teachers and schools, both of these early forms of technology are still in use in physical education classrooms.

Video Games as Technology in Physical Education

Exergaming is a combination of video games with exercise and is becoming more popular at YMCAs and other gyms in the United States. Many of these machines are

adult sized and require use of arms, abs, and legs. One such exergames is the game “Bike Pro” which is a stationary bike that awards points for the harder the player pedals (Dreher, 2005). The GameCycle is another system where the gaming challenge facilitates exercise. This cycle, compatible with the Nintendo GameCube, is an upper-body exercise game (“Exercise to Video Games,” 2005). In addition to these two cycling games being used in fitness centers, DDR has been made into a 30-minute circuit workout for gyms as well as physical education programs (Dreher, 2005).

The origins of exergaming can be traced to 1989 with the release of the Power Pad for the Nintendo Entertainment System. Gamers could participate in events such as the long jump and hurdles in the game “World Class Track Meet” (“Let’s Get Physical,” 2007). In 1998, Konami released DDR. Because the game is so physically demanding, physical education programs are using it as a means to teach and exergame their students.

Gallaway and Lauson (2006) reported that a kinesiology professor at Pennsylvania State University took 60 teens to a local YMCA to play DDR. The teen heart rates were recorded and it was noted that some were up to 144 beats per minute. A study from the University of Wisconsin reported that adults playing DDR can burn as many calories playing the game for a half-hour as jogging or walking very fast (McGinnis, 2008). Sell, Lillie, and Taylor (2008), found that experienced players either met or surpassed moderate-intensity in physical activity. DDR not only employs physical skills but also reinforces reading skills during the game. Players take dance directions by reading the screen. The game also has appeal for musical learners, since the entire game is set to music. The DDR trend continues to grow in popularity as West Virginia adds 765 DDR units into their public schools statewide while Arkansas, Missouri, and Hawaii each have at least one school district that owns a unit of DDR (Gallaway & Lauson,

2006). High levels of enjoyment have been found by DDR players of all ability levels (Sell et al., 2008). Further, those that enjoy playing DDR have been found to continue playing the game.

In addition to DDR, Cybex Trazer is being marketed to K-12 schools as well as colleges and universities. When playing this game, students wear an infrared transmitter belt that allows participants to appear on the television screen as an animated character and can be modified to fit the needs of the user. Sony also released “Eyeto” in 2003. In this game participants star in a video game by the use of a USB camera placed on top of the television. The Eyeto is compatible with a kung-fu game also released by Sony. In 2005 Sony joined Nike Motionworks to release Eyeto Kinetic, a personalized exercise program with some martial arts and meditation activities (Hayes & Silberman, 2007).

There have also been reports that the Nintendo Wii can be a beneficial exercise for gamers that play the sports games. One such report is of a 25-year-old gamer who lost nine pounds and three and a half inches around the waist after six weeks of playing Wii sports everyday for 30 minutes (Baumann, 2007). In New York City, an upscale hotel, Le Parker Meriden, just introduced a Wii workout at their fitness club for hotel guests as well as New York City residents (“Geeks Get Fit,” 2008). Retirement homes have also been using the Wii and have been able to get the senior residents to play virtual sports on the Wii (“Video Games to Help,” 2007). Some younger players may hit a thousand tennis balls during the time of play on the Wii, much more than anyone would on a tennis court because strength and endurance are not limiting factors. However, doctors warn that poor form can lead to strain on shoulders, elbow and wrists and cause pain in muscles, ligaments, and tendons (Stahl, 2008).

At the 56th annual meeting of the American College of Sports Medicine., two different studies were presented that incorporated the use of the Nintendo Wii (“Do Interactive Video,” 2009). In these studies both older adults and college-aged students were asked to play the Wii while their heart rates were monitored. The games played included Wii Boxing, Wii Tennis, Wii Fit, and Wii Bowling. The groups that used the Wii Boxing and Wii Bowling both showed increased heart rates, but only the Wii Bowling group heart rate increased significantly.

Some schools in the United Kingdom, Virginia, Tennessee, and Texas have already started incorporating the use of the Nintendo Wii in the physical education classes (“Using Gaming,” 2009). In Worcestershire, England, five schools have started to use the Wii to combat the problem of children who consistently miss physical education classes. In these classes they played tennis, bowling, golf, and baseball on the Wii. One school in Arlington, Virginia, introduced Wii bowling, golf, tennis, and baseball into their physical education curriculum in the fall of 2009. The school in Tennessee dedicated 15 minutes of its physical education classes to dancing, boxing, and swimming on the Nintendo Wii. In Texas one elementary school incorporated the Nintendo Wii play into the curriculum to engage more students in physical activity and to improve scores on annual fitness tests.

In order to play sports games on the Wii to and exercise, users must stand and control the game by using the Wiimote or the Nunchuks. In Tiger Woods PGA Tour 08, users must set up before swinging and also point the Wiimote at the ground. When the player’s arms move, an accelerometer in the Wiimote measures changes in voltage and immediately calculates the distance the ball would have traveled based on the golf swing (Aaronson, 2007). The wireless remote then sends the data of the movement to the game

console and compares the swing to the database of possible movements. The infrared light on the Wiimote hits a sensor strip placed by the user above or below the television and the game console registers the remote's exact position, allowing the Wii to know exactly where the user is aimed.

Gamespot.com (2007) reported that the following sports have games available on the Nintendo Wii: baseball, basketball, bowling, boxing, fishing, football, golf, hockey, hunting, soccer, table tennis, tennis, and wrestling. There are also a number of alternative sports games available such as skateboarding, surfing, horseback riding, snowboarding and in 2008, a skiing game was released. Also released in 2008 was Nintendo's Wii Fit, a game that combines fitness and fun at home (Nintendo.com, 2008). In this game, players step onto a balance board to "weigh-in" and then stand on the balance board for game play (Bonisteel, 2008). Once the initial set-up process is complete, an on-screen personal trainer leads players through fitness routines or games. Players can choose strength training, aerobics, balance games, or yoga (Nintendo.com, 2008). With the wide variety of sports video games available, physical educators in Florida may soon be able to teach sports like snowboarding through the use of video games.

In addition to sports video games providing good cardiovascular exercise, some video games may also be instrumental in teaching rules, strategy, and techniques of sports. National Football League Texan rookie Amobi Okoye learned to play football by playing a "Madden NFL" video game given to him by his high school defensive coach (Jenkins, 2007). His coach says that it was the easiest way to teach the sport. By playing the game Okoye was able to learn about first downs, penalties, and touchdowns.

While some physical educators may be against using video games in their classes, some educators have noted that video games tend to decrease the wait time and enable

students to stay engaged in the activity (Hayes & Silberman, 2007; Siedentop & Tannehill, 2000; Trout & Christie, 2007). Trout and Christie also suggest that video games not only be used in class but with after-school programs, for team practice, or even during lunch hours. According to Partridge, Blair, and Leidman (2007), exergaming can be a good way to incorporate physical activity in schools. However, with the price of gaming consoles ranging from \$249 to \$19,000 a unit and with the phenomenon being so new, it is understandable why more physical education programs have not included gaming in their curriculum. However, educators should realize that outside funding such as grants from nonprofit organizations may be available to help offset the costs of gaming consoles and equipment.

Although there are a number of video games that are being marketed to physical education programs, schools have been slow to add them to their curriculum. The cost of adding the technology could be limiting the access to students. The lack of research in this area could also be another reason for video games not being widely incorporated into physical education programs at this time. Papastergiou (2009), Hayes and Silberman (2007), and Trout and Christie (2007) agree there is a lack of empirical studies that show the outcomes of video games in physical education programs. School authorities may need further proof of the benefit of the new technology available before committing to the trend.

Golf in Physical Education

The Professional Golfers' Association (PGA) of America along with its grass roots program, Play Golf America, is dedicated to promoting golf to people of all skill levels and ages (Play Golf America, 2008). Each year, PGA professionals expose more than 500,000 children to the game of golf through programs such as First Swing, Golf in

Schools and Kids on Course (The PGA of America, 2004). Golf in physical education curricula can become a mainstay of a Lifetime Skills Unit (LeMerise & Stryjecki, 1998). Even though golf can be played at various ages, when teaching golf to elementary children, it supports the learning of locomotor as well as stability skills thereby enhancing physical education programs (Curtner-Smith, 1996).

In elementary education, it has been suggested that golf remain simple (LeMerise & Stryjecki, 1998). Children seemed to get excited when thinking of putting in the gymnasium because they can easily relate to miniature golf. Teaching easier skills like putting first makes it easier to build new skills sequentially and new skills can be continuously developed. Furthermore, elementary students are ready to learn about games that have principles of playing, strategies and tactics. Because teaching golf can improve hand-eye coordination as well as general motor learning, golf should also be taught in secondary as well as higher education.

Unfortunately, the benefits of teaching golf skills along with concepts such as integrity and sportsmanship are not utilized to their fullest potential. Four different studies examine golf as it relates to a physical education curriculum (Alder, 1976; Castelli & Dawkins, 2002; Greenwood & Stillwell, 2001; Hildebrand & Johnson, 2001). One study looks at reasons why golf is not incorporated in a physical education curricula, two other studies examine students' interests in learning golf in physical education, and the fourth study reflects on infusing golf into a curriculum.

Alder (1976) reported the availability of golf in secondary schools in 1966 as compared to 1974 using figures from the National Golf Foundation and data collected by AAHPER's Lifetime Sports Education Project. Of the secondary schools that responded to the 1966 survey, it was reported that 17% of girls and 26% of boys received golf

instruction in school. Of the secondary schools that responded to the 1974 survey, 62% of girls and 62% of boys received golf instruction. In both studies the secondary schools that reported not having golf programs cited lack of facilities as a major problem. Those schools that did incorporate golf in their curriculum used athletic fields, gymnasiums and classrooms, common areas almost all schools have.

The second reason for not offering golf was a lack of equipment and potential costs of supplying equipment (Alder, 1976). Most secondary schools that did offer golf supplied their own equipment; however, a few schools made students purchase their own. Golf balls also seemed to be a problem because educators complained that golf balls damaged school property, became damaged, or were lost or stolen.

Surprisingly only 16% of schools not offering golf cited lack of teacher experience (Alder, 1976). The National Golf Foundation offers a service of teaching golf workshops that are available anywhere in the United States. Additionally, it is likely that golf professionals in many communities would volunteer their time as a guest speaker in physical education classes. The time spent volunteering to teach golf in physical education programs counts toward the PGA's member service requirement (MSR), a requirement that must be fulfilled by all PGA members except those with A3, A5, or Life member retired status (PGA Pacific Northwest Section, 2000).

The 1966 survey did not study higher education but the 1974 survey did (Alder, 1976). Of the schools surveyed, almost every college or university offered golf in some form. Golf activities at the surveyed schools were primarily taught on athletic fields, gymnasiums and classrooms. A few schools utilized actual golf courses and driving ranges. The university also usually supplied equipment. Problems with golf ball retention were similar to those of primary and secondary schools.

Another reason some schools may not offer golf is that physical educators think that there is a lack of student interest. According to students that were surveyed in a middle school program and a collegiate program, there is student interest. In the study conducted by Greenwood and Stillwell (2001), student input in physical education is often overlooked. Usually the activities that are taught in physical education tend to be the simplest and easiest to teach and the least expensive for the administrator. Furthermore, these activities can lead to students being exposed to programs that seem repetitive, ineffective and challenge free. Greenwood and Stillwell (2001) used a 23-item checklist that was administered to 751 middle school students. While a majority of the students in the study indicated a strong interest for sports like basketball, soccer, and volleyball, golf was not an item included in the worst 10 sports to play. In fact, most of the males and females surveyed were undecided about their feelings for playing golf.

Hildebrand and Johnson (2001) studied the reasons students chose to take college physical activity classes. Eight hundred twelve college undergraduates were surveyed. The top reasons for taking physical education were for enjoyment and because of interest in the activity. The activity with the largest enrollment was golf and it ranked as a class where skill development was most important. Even though golf requires a high degree of skill, the researchers concluded that students would rather take a class like golf and judge their own level of success than be compared to how they performed against others.

When comparing the findings with the Hildebrand and Johnson (2001) study and the Greenwood and Stillwell (2001) study, it is easy to see that golf seems to be more popular in higher education. One reason for this could be that older students have more common knowledge of golf than younger students. Another reason might be that college

students may be more interested in lifetime activities because of the long term social and fitness value of learning to play golf.

Actual golf course exposure has also been cited to invoke a better appreciation for the game (Castelli & Dawkins, 2002). A middle school physical education teacher in South Carolina, administered a survey to students to find out their interests in activities. Since golf rated highest in the 8th grade class, a comprehensive golf unit was developed that began with a makeshift driving range and concluded with a field trip to a golf course. In the golf education unit, the teacher also included journal writing, quizzes, observation, and professional feedback from a PGA member. After taking a field trip to the golf course, the teacher concluded that seeing the “real” golf course motivated the students to want to do better. As a result, students enjoyed the last days of the hitting unit because they had experienced hitting balls on an actual driving range and could see how their improved golf skills could be applied.

Currently, the PGA has become more dedicated to introducing golf into educational settings. In order to maintain a Class “A” status, the PGA mandates that a member complete community service hours. Golf professionals that help to grow the game can earn up to four hours a day of community service hours that are applicable to the 36-hour requirement to maintain their status (PGA Links, 2004). Many golf professionals are choosing to fill these requirements by working with K-12 physical education programs.

Summary

Workplace simulations date back as far as 2200 B.C. with the Chinese civil service examinations but it was not until the 1950s when the effectiveness of test simulations was studied (Cleveland & Thorton, 1990; DuBoise, 1970). After proven success of

simulations in the workplace, educational institutions began to following suit by giving educators new tools to cover complex topics (Cotton, Ahmadi, & Esselborn, 1997).

Eventually simulations began to appear in electronic format in computer programs since it was more cost effective (Rifkin, 1994; J. Vogel, D. Vogel, et al., 2006).

Some simulations have taken on the configuration of a video game and have proved to be successful since a significant amount of learning can take place (Vogel, Greenwood-Erickson et al., 2006). Schools have been using electronic game simulations since 1974 when the Minnesota Educational Computing Consortium (MECC) released its first version of “Oregon Trail” (Coventry, 2007). Video game simulations can also be found in the physical education classroom. Exergaming in physical education classrooms has documented expansion in four states including West Virginia, Arkansas, Missouri and Hawaii (Gallaway & Lauson, 2006). Even with the exergaming growth, a majority of schools have not incorporated this technology into their physical education program. The lack of inclusion may be attributed to the cost of the equipment or the lack of empirical studies proving the benefits of exergaming (Hayes & Silberman, 2007; Trout & Christie, 2007).

Golf can be played at various ages and can be useful in teaching locomotor skills; therefore, teaching a golf unit can enhance a physical education class (Curtner-Smith, 1996). However, many physical education programs do not offer golf for a number of reasons including lack of facilities, lack of equipment, and lack of teacher experience (Alder, 1976). Yet another reason golf may not be offered in physical education is the perception that students are not interested in the game. Greenwood and Stillwell (2001) determined that most students were undecided about their feelings for playing golf. Therefore, it only seems natural that a section on golf be included when teaching physical

education with technology since a computer or video game is an effective teaching tool. Such a tool could assist physical educators when there is a lack of facilities, equipment, and teacher expertise.

CHAPTER III

METHODOLOGY

The purpose of this study was to determine if golf video games can assist physical educators in teaching elementary school aged students how to play golf. Specifically, this study tested which mode of instruction was best for teaching golf in physical education: golf instructor only, golf instructor and video game, or video game only. Pretest and posttest data was collected for distance, accuracy, and knowledge. This chapter includes a description of (a) research design, (b) participants, (c) instrumentation, (d) procedures, and (e) data analysis.

Research Design

For this study, a quasi-experimental design was used for the pretest and posttest because it was not possible to randomly place participants into one of the three treatment groups due to class times and student availability. The independent variables were the treatment of the Tiger Woods PGA Tour 08 video game and the treatment of the mode of instruction by physical education teacher. The dependent variables were distance, accuracy and golf knowledge.

Participants

Approval for this study was granted by The University of Southern Mississippi Institutional Review Board (see Appendix A). The 46 participants in this study included 14 male and 32 female students from grades 4-6 attending an elementary school in north central Florida. The participants in this study were purposefully selected by the researcher to accommodate the time available for the study in the school year and the school's daily class schedule. Groupings in this study were done by convenience for the researcher, the participants, and the faculty at the school so that the daily routines of the

school could remain consistent. The students in the study remained in the same physical education classes that they were assigned to at the beginning of the school year. There were 15 fourth graders, 16 fifth graders, and 15 sixth graders in this study.

Instrumentation

Two different instruments, the Modified Golf Knowledge Test and the Benson Golf Test (1963), were used in the collection of data for this study. Both instruments were used for the pretest and posttest.

Modified Golf Knowledge Test

The instrument used to measure golf knowledge for this study was based on a test first developed by Waglow and Rehling in 1953 titled “Golf Knowledge Test” (Clarke, 1967). The original 100-question, true-false test was developed to judge golf knowledge of golf students in a required physical education program class at the University of Florida (See Appendix B). The circular validity of The Golf Knowledge Test was confirmed by the use of respected texts used in developing the test (Clarke & Clarke, 1987).

The original test was adjusted for the purpose of this study to be age appropriate for the participants in this study. Of the 100 original true-false questions, 17 of those questions have been used and slightly reworded for the Modified Golf Knowledge Test (See Appendix C). The questions chosen to be used on the Modified Golf Knowledge Test were selected because they were the shortest, applicable to golf’s current terminology, covered basic golf terminology, and reflected terminology used in the Tiger Woods PGA Tour 08 video game. Additionally, three questions were added which cover basic golf vocabulary and terms regularly used in golf.

After the golf knowledge test was modified, a panel of experts was asked to

review the test to evaluate content validity. Of the experts, two are currently employed at elementary schools, one teaches language arts to a fifth grade class and has a masters in education and the other one teaches physical education and has a doctorate in human performance. The other two experts used in this study are PGA golf professionals that conduct a junior golf camp every summer; one has been a member of the PGA of America for over 50 years. The feedback given by the experts recommended reading the test to the participants, not having any open-ended questions, shortening the directions, including two additional demographics questions about race as well as asking students to self-report scholastic achievement. The panel also recommended that questions 5, 6, 15, 16, and 18 on the true-false portion of the test be reworded.

In addition to the true-false questions on the test, participants were also given a five question demographic inquiry on age, grade level, ethnicity/race, gender, and the type of grades they earn in school. Participants were asked to identify their level of golfing ability as either experienced or beginner by estimating the number of rounds of golf played. Further, participants were asked to identify their video game experience as gamer or novice by estimating the number of times that they have played video games in the past six months as well as the number of times they have played golf video games in the past six months.

Benson Golf Test

The Benson Golf Test (1963) was used to measure physical golf performance of the participants. This test was created to measure full golf swing with a five-iron in terms of distance and accuracy of each ball hit (Adams, 2000; Collins & Hodges, 1978). The multiple correlation scores between actual golf scores with flight and distance deviation was .94 (Adams, 2000; Collins & Hodges, 1978). The reliability coefficients

for distance was .90 and for deviation of direction .70 (Collins & Hodges, 1978).

The designated hitting area for the test was 150 by 100 yards in which students hit behind a designated line (Collins & Hodges, 1978). A straight line down the middle of the hitting area was marked with flags placed every 10 yards, 150 yards out in front of the hitting area. Nine deviation flags were placed five yards apart on both sides of the flagged line down the middle at both 150 and 70 yards and were numbered from one to nine (See Appendix D). Participants were given the opportunity to hit 20 shots consecutively. All attempts to make contact with the ball counted toward the 20 shots.

The study's data was collected by the primary researcher. The data was then recorded onto a score sheet developed specifically for the test and adapted from the Adams (2000) score sheet (See Appendix E). The researcher has three years of teaching golf on the university level and five years of experience teaching golf at youth golf camps. Additionally the researcher has over 27 years of competitive golf experience including four years of varsity women's golf experience at the University of Florida and was ranked fourth in the state of Florida in amateur rankings at the time this study was conducted.

The lesson plans for this study were developed based on the learning skill sets available on the Tiger Woods PGA Tour 08 video game (See Appendixes F-H). Since the study took place in the state of Florida, the lesson plans follow the state of Florida's suggestions for lesson plan development ("Accommodations and Modifications," 2000). To ensure reliability, the students in each treatment group were taught the same content. The content covered in the treatment also reflected the content covered on the Golf Knowledge test.

Pilot Testing

A pilot study was conducted to determine content validity for the Modified Golf Knowledge Test. The pilot study was conducted at a school in west central Florida that has a similar population make-up to that of the school being used in the study. Once approval was granted from the school principal, students in one fifth grade class were given assent and consent forms to complete (Appendixes I-J). Then the test was given to the 16 students that returned the forms. The test was administered by their regular teacher since the Modified Golf Knowledge Test is a paper and pencil test. The knowledge test was scored by the researcher. As a result of the pilot test, one typographical and two grammatical change were made.

A pilot test was also conducted for the Benson Golf Test to calculate time per participant for each trial as well as to practice scoring. The pilot test consisted of three inexperienced golfers who have never played a round on the golf course. One of the participants was in fourth grade and the other two participants were adults. The average time for completion of the test was a little over 8 minutes. The average score for yardage hit was 47.4 yards and the average accuracy score was 3.33 deviations. Because of the length of time required to complete the test for each individual, the researcher decided to limit the number of practice shots from five to three in order to be able to complete the test for each group of eight students during one class period.

The first two lessons were also pilot tested with the same fourth grade participant that piloted the Benson Golf Test. The participant did have experience playing video games on the Nintendo Wii but had never played Tiger Woods PGA Tour 08.” The participant seemed to understand the golf terminology portion of the lesson and only had a short adjustment period using the Wii for golf. The participant did have a little trouble

completing one skill shot but eventually progressed to the next level. The second lesson went much smoother and even though the participant was not able to master the skill, the lesson was still completed. Overall, the participant seemed to really enjoy learning on the Nintendo Wii.

Procedures

Prior to administering the written and golf skills pretest, a parental consent and participant assent form were sent home with the students prior to testing (See Appendices K-L). Participants were told that they would be accepted for the study on a first-come, first-serve basis and that the first eight in their class to turn in their assent forms would be used in the study. Once the students submitted their assent forms, the procedures of the study were explained by the researcher. The participants were then given consent forms to sign.

All students that completed both forms were given the written pretest, the Modified Golf Knowledge Test. At the next class meeting participants were given the Benson Golf Test (1963). Prior to testing participants had the directions of the test read to them as a group. The directions were also re-read to each participant before each 20-shot trial started (See Appendix D). Students were allowed to ask questions if they did not understand the directions. Additionally, the participants were informed that no help would be given in the form of golf instruction during that class period.

Participants in this study were grouped by their physical education class. Each class was assigned a treatment group or mode of instruction after both pretests were completed. The three treatment groups started with 16 students. The treatment groups were divided in half so that no more than eight students worked with the researcher at one time. This was reflective of eight students being drawn from each class based on class

day, class time, and grade. Physical education classes at the test school are divided by class time or grade as well as the day of the week as shown in Table 1.

Table 1

Student and Class Schedule by Day and Times

	Monday	Tuesday	Wednesday	Thursday
Grade 6 8:35 AM	8 students Half & Half	8 students Face-to-face	8 students Half & Half	8 students Face-to-face
Grade 4 11:20 AM	8 students Video Game	8 students Half & Half	8 students Video Game	8 students Half & Half
Grade 5 1:15 PM	8 students Video Game	8 students Face-to-face	8 students Video Game	8 students Face-to-face

Group 1, the first treatment group in the study, were students exposed to face-to-face golf instruction. Group 2, the second treatment group in the study, were students in the half and half group. These students were exposed to face-to-face golf instruction for half of the class meeting time and exposed to Tiger Woods PGA Tour 08 golf video game on the Nintendo Wii the other half of the time. The third treatment group, Group 3 or the video game only group, exposed the participants only to the Tiger Woods PGA Tour 08 golf video game on the Nintendo Wii.

For the first class meeting, treatment groups were given an introduction to the game of golf including the full swing, alignment, putting, and specialty shots such as a draw, a fade, and a partial swing. In the second class, the participants were taught a 50 yard pitch shot. Class Three consisted of students working on iron shots and Class Four was learning to hit woods. In Class Five students in the face-to-face group played a mock nine hole round of golf with hula-hoops set up as greens while the video game and

half and half group played nine holes on the Tiger Woods PGA Tour 08 video game. The class learning schedule is depicted in Table 2.

Table 2

Treatment Groups Learning Schedule

	Group 1 Face-to-face	Group 2 Face-to-face and Video Game	Group 3 Video Game
Class 1	Full Swing, alignment, putting, specialty shots, partial swing- FACE-TO-FACE	Full Swing, alignment, putting, specialty shots, partial swing- VIDEO GAME	Full Swing, alignment, putting, specialty shots, partial swing- VIDEO GAME
Class 2	50 yard pitch shot- FACE-TO-FACE	50 yard pitch shot- VIDEO GAME & FACE-TO-FACE	50 yard pitch shot- VIDEO GAME
Class 3	Iron shots- FACE-TO-FACE	Iron shots- VIDEO GAME & FACE-TO-FACE	Iron shots- VIDEO GAME
Class 4	Woods- FACE-TO-FACE	Woods- FACE-TO-FACE	Woods- VIDEO GAME
Class 5	Mock round of golf- FACE-TO-FACE	Mock round of golf- VIDEO GAME	Mock round of golf- VIDEO GAME

Since Group 2 spent half of their learning time on the video game and half with the teacher, the group's learning time was split by class period. During two class periods the group worked with both the video game and the teacher. Group 2 played the video game in Class One, half of Class Two, half of Class Three and all of Class Six. Teaching was done in the face-to-face format in half of Class Two, Three, and all of Class Four. All groups were taught by the primary researcher to ensure consistency.

After the treatment was complete, both the Modified Golf Knowledge Test and

the Benson Golf Test (1963) were re-administered. The same testing procedures were used as in the pretest. The test scores from the written test and the gain scores from the skills test on distance and accuracy were used to determine the amount of improvement for each group.

In order ensure the validity of data collected, make-up lessons were given prior to the administration of posttests. Students who missed one class period were allowed to attend the make-up session and they were given the lesson they missed. Students who missed more than one class period were eliminated from the study unless they were able to make up the lesson the next day with a different physical education class but covering the same material in the same method they missed. Additionally, there were two days reserved for posttest make ups; however, those times were not needed.

Data Analysis

The first research question asked, “Which group of students showed the greatest improvement in distance at the end of five 45-minute instructional periods: students that are taught how to play golf playing Tiger Woods PGA Tour 08’, students that receive only face-to-face instruction, or students that play Tiger Woods PGA Tour 08’ and receive face-to-face instruction?” An analysis of covariance (ANCOVA) was used to respond to this question to determine significant differences between modes of instruction and distance gained. In order to examine multiple comparisons between each of the groups studied a pairwise comparison test was also conducted.

For the second research question asked, “Which group of students showed the greatest improvement in accuracy at the end of five 45-minute instructional periods: students that are taught how to play golf playing Tiger Woods PGA Tour 08, students that receive only face-to-face instruction, or students that play Tiger Woods PGA Tour

08' and receive face-to-face instruction?" An analysis of covariance (ANCOVA) was used to respond to this question to determine significant differences between modes of instruction and improved accuracy. In order to examine multiple comparisons between each of the groups studied, a pairwise comparison test was conducted.

The third research question asked, "Which group of students showed the greatest improvement in golf knowledge at the end of five 45-minute instructional periods: students that are taught how to play golf playing Tiger Woods PGA Tour 08, students that receive only face-to-face instruction, or students that play Tiger Woods PGA Tour 08' and receive face-to-face instruction?" An analysis of covariance (ANCOVA) was used to respond to this question to determine significant differences between modes of instruction and golf knowledge test improvement. In order to examine multiple comparisons between each of the groups studied, a pairwise comparison test was conducted.

CHAPTER IV

RESULTS

This chapter depicts the data collected during the execution of the study. The findings of this study are described and presented in this chapter in the following sections: (a) demographic data and (b) research question data.

Demographic Data

The Modified Golf Knowledge Test and the Benson Golf Test were conducted prior to administering the treatment. Of the original 48 participants that entered the study, two students decided to discontinue participation after the pretest was conducted and four additional students had incomplete data. In addition to the first 20 questions on Modified Golf Knowledge Test dealing with golf, the next eight questions asked students to self-report their gender, age, grade level, school grades, ethnicity, video game experience, golf video game experience, and golf experience. Question 21 asked students to identify their gender. Of the 46 participants, 32 (70%) were females and 14 (30%) were males. The half and half group was predominantly made up of female participants with 12 (80%) compared to males with 3 (20%). Table 3 shows the gender of the participants.

Table 3

Gender of Participants

Gender	Video game only		Half and half		Face-to-face		Totals	
	<i>N</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Male	6	40.0	3	20.0	5	31.2	14	30.4
Female	9	60.0	12	80.0	11	68.8	32	69.6

Question 22 asked participants their age as of the day the study began. Table 4 shows that the video game only group was predominantly made up of 11-year-olds with 8 (53%) and 10-year-olds (five - 33%) and the half and half group consisted of mostly 10-year-olds (seven - 47%) and 12-year-olds (five - 33%) while the face-to-face group had the bulk of 12-year-olds with 8 (50%).

The next item on the Modified Golf Knowledge Test, Question 23, asked students to identify their grade level in school. The results of this question as it relates to grade level were consistent with the results of the previous question as it relates to age. The video game only group had 7 (47%) fourth graders and 8 (53%) fifth graders while the half and half group had 8 (53%) fourth graders and 7 (47%) sixth graders whereas the face-to-face group had 8 (50%) fifth graders and 8 (50%) sixth graders as illustrated in Table 4.

Table 4

Age and Grade Level of Participants

	Video game only		Half and half		Face-to-face	
	<i>n</i>	%	<i>N</i>	%	<i>N</i>	%
<i>Age</i>						
9	1	6.7	1	6.7	0	0
10	5	33.3	7	46.7	3	18.8
11	8	53.3	0	0	4	25
12	1	6.7	5	33.3	8	50
13	0	0	2	13.3	1	6.2
<i>Grade</i>						
4	7	46.7	8	53.3	0	0
5	8	53.3	0	0	8	50.0
6	0	0	7	46.7	8	50.0

Participants were then asked to self-report their classroom performance in school on Question 24. The school grades of the participants are displayed in Table 5. First, it should be noted that 41 (89 %) students in this study, self-reported that they had B average or better in their classes. Even though these grades may be a little inflated, it is not a surprise since participants in this study were chosen on the basis of who returned their assent forms first. Nonetheless, the groups seemed to be consistent with their responses with the face-to-face group accounting for the largest number of A students at seven (44%), the video game only group, and the half and half group had more B+ students with both reporting five (33%). The video game only group and the face-to-

face group both reported having five B students in each group and only the face-to-face group reported having two (13%) C+ students. While all three groups reported having one C student each, none of the groups had D or F students.

Table 5

School Grades

Grade	Video game only		Half and half		Face-to-face	
	<i>n</i>	%	<i>N</i>	%	<i>n</i>	%
A	4	26.7	6	40.0	7	43.8
B+	5	33.3	5	33.3	1	6.2
B	5	33.3	3	20.0	5	31.3
C+	0	0	0	0	2	12.5
C	1	6.7	1	6.7	1	6.2

Table 6 summarizes the ethnicity of the participants. It should be noted that these responses were self-reported by the participants in Question 25 on the Modified Golf Knowledge Test. Several participants were not sure of their race so while the numbers are accurate in terms of reporting, the numbers may not be exact in terms of responses. However, all three groups reported that they were predominantly Caucasian with the half and half group reporting 40%, the video game only group reporting 53%, and the face-to-face group reporting 63%.

Table 6

Ethnicity

Race	Video game only		Half and half		Face-to-face	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Native American	1	6.7	4	26.7	0	0
African American	0	0	0	0	1	6.2
Hispanic	1	6.7	0	0	2	12.5
Two or more races	5	33.3	5	33.3	3	18.8
Caucasian	8	53.3	6	40.0	10	62.5

Questions 26-28 asked participants to specify their video game, golf video game, and golf experience. When asked how many times participants had played video games in the past six months, the video game only group, the half and half group, and the face-to-face group seemed to have similar amounts of experience with most students playing 10 to 100 times. However, when asked how many times participants have played golf video games in the past six months, about 70% in each of the three group had played 0 to 5 times and one participant in each group played over 100 times.

Finally, when asked about golf experience, participants were asked to self-report how many rounds of golf they had played in their lifetime. A few participants were confused about what counted as a round of golf and, therefore, a few responses may be skewed. Nonetheless, over 40% of participants in each group had never played a round of golf. Table 7 displays the participants' experiences with video games, golf video games and golf.

Table 7

Video Games, Golf Video Games, and Golf Experience

	Video game only		Half and half		Face-to-face	
Video games played in last 6 months						
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
None	2	13.3	0	0	2	12.5
1-5 times	2	13.3	4	26.7	2	12.5
10-100 times	7	46.7	6	40.0	10	62.5
100+	4	26.7	5	33.3	2	12.5
Golf video games played in last 6 months						
	<i>n</i>	%	<i>n</i>	%	<i>N</i>	%
None	4	26.7	8	53.3	5	31.3
1-5 times	7	46.7	4	26.7	6	37.5
10-100 times	3	20.0	2	13.3	4	25.0
100+	1	6.6	1	6.7	1	6.2
Golf experience						
	<i>n</i>	%	<i>n</i>	%	<i>N</i>	%
None	9	60.0	6	40.0	11	68.8
1-5 times	2	13.3	4	26.7	3	18.8
10-100 times	4	26.7	4	26.7	2	12.4
100+	0	0	1	6.6	0	0

Research Question Data

In order to test the three research questions, the Modified Golf Knowledge Test and the Benson Golf Test were given to the participants as a posttest to measure against pretest scores. Question One asked, “Which group of students showed the greatest improvement in distance at the end of five 45-minute instructional periods: students that are taught how to play golf playing Tiger Woods PGA Tour 08, students that only receive face-to-face instruction, or students that play Tiger Woods PGA Tour 08’ and receive face-to-face instruction?” To answer this question, mean pretest and posttest scores from the distance portion from the Benson Golf Test were calculated. Even though all 20 attempts to make contact with the ball were counted during testing, the scores for whiffs were not part of the calculations for the mean scores. These figures are displayed in Table 8. The results of the analysis of covariance (ANCOVA) showed there was no statistically significant difference between distances gains between the three modes of instruction; the video game only group, the half and half group, and the face-to-face group, $F(2,38) = .014, p = .986, \eta^2 = .001$.

Table 8

Average Distance in Yards

	Pretest			Posttest			Adjusted Mean
	<i>n</i>	Mean	Std. Deviation	<i>n</i>	Mean	Std. Deviation	
Video game only	15	16.33	9.03	14	15.21	12.88	15.24
Half and half	15	13.93	4.49	13	14.22	4.49	15.60
Face-to-face	15	17.01	8.74	15	16.98	12.93	15.76

Note. Minimum std. deviation = 0; Maximum std. deviation = 150.

Research Question Two asked, “Which group of students showed the greatest improvement in accuracy at the end of five 45-minute instructional periods: students that are taught how to play golf playing Tiger Woods PGA Tour 08, students that only receive face-to-face instruction, or students that play Tiger Woods PGA Tour 08 and receive face-to-face instruction?” This question was answered by calculating the mean pretest and posttest scores from the accuracy portion of the Benson Golf Test without counting whiffs. The results of the ANCOVA showed there was no statistically significant difference in the accuracy deviation scores between the three modes of instruction; video game only group, the half and half group, and the face-to-face group, $F(2,38) = 1.029$, $p = .367$, $\eta^2 = .051$. Even though there was no significant difference between the groups, there was a small difference in accuracy improvement between the video game only group and the half and half group. These differences in means scores are displayed in Table 9.

Table 9

Average Accuracy Five Yard Deviation Scores

	Pretest			Posttest			Adjusted Mean
	<i>n</i>	Mean	Std. Deviation	<i>n</i>	Mean	Std. Deviation	
Video game only	15	2.18	0.77	14	3.67	5.06	3.52
Half and half	15	1.56	0.62	13	1.45	0.48	1.56
Face-to-face	15	1.77	0.99	15	2.32	0.79	2.36

Note: Minimum std. deviation = 0; Maximum std. deviation = 9.

The third research question asked “Which group of students showed the greatest improvement in golf knowledge at the end of five 45-minute instructional periods: students that are taught how to play golf playing Tiger Woods PGA Tour 08, students that only receive face-to-face instruction, or students that play Tiger Woods PGA Tour 08 and receive face-to-face instruction?” In order to answer this question the mean pretest and posttest scores from the Modified Golf Knowledge Test were calculated and are displayed in Table 10. The results of the ANCOVA showed there was no statistically significant difference in the knowledge scores between the three modes of instruction; video game only group, the half and half group, and the face-to-face group, $F(2,40) = 2.27, p = .116, \eta^2 = .102$.

Table 10

Average Test Scores

	Pretest			Posttest			Adjusted Mean
	<i>n</i>	Mean	Std. Deviation	<i>n</i>	Mean	Std. Deviation	
Video game only	15	0.57	0.11	14	0.55	0.14	.55
Half and half	15	0.53	0.08	14	0.58	0.1	.58
Face-to-face	16	0.55	0.11	16	0.63	0.1	.63

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

This chapter is divided into the following sections: (a) summary of study, (b) findings and conclusions, (c) limitations, (d) recommendations for practice, and (e) suggestions for future research.

Summary

With the increasing use of technology in the classroom there should be no surprise that virtual reality or video games are used to aid teaching, especially since both have become a part of our culture (Slowikowski Sydnor, 1993; Sydnor, 2001). Teachers are becoming more aware of and creatively incorporating technology into the learning environment to enhance teaching (McKenzie & Croom, 1994; Townsend & Gurvitch, 2002). For example, at the University of Central Florida Teaching Academy, college students experience practice teaching in a classroom through the use of a simulator. In this virtual classroom students are displayed on a large screen sitting at their desks. Practice teachers can move around to different points and interact with different students. The virtual classroom setting was designed for student teachers to experience stereotypical behavior problems seen in students. Instructors at the Teaching Academy compare this virtual learning experience to that of students that go through airplane pilot training (Herdon, 2008).

In West Virginia public schools, school officials feel that by incorporating video game dance simulators in the physical education classroom, exercises provided by the game will help curb obesity (“Study Shows Video,” 2008). Students in these programs also experience learning through technology in physical education programs with the video game, Dance Dance Revolution (DDR). While the integration of the video games

will not replace other physical education activities, this virtual learning environment provides children an alternative method of being more active (“Kids in West Virginia,” 2007). Games played on different console platforms such as PlayStation, X-Box, and Nintendo opened the doors for computer simulations, play, and education (Pesce, 2000; Sydnor, 2001). Popular simulations that have emerged in the form of exergaming also have been incorporated into classrooms and fitness facilities including the use of the Cybex Trazer, Sony’s Eye Toy, and Nintendo Wii sports games. In addition to cycling games such as Bike Pro and Game Cycle, DDR has been incorporated into a 30-minute circuit workout for fitness centers (Dreher, 2005).

The purpose of this study was to determine if golf video games can assist physical educators in teaching elementary school age students how to play golf. Specifically, this study tested which mode of instruction was best for teaching golf in physical education: golf instructor only, golf instructor and video game, or video game only. Since the incorporation of video games in physical education is a relatively new concept, there is little to no empirical data available to support the use of this concept in the classroom (Trout & Christie, 2007).

The data for this study was gathered by collecting data on distance, accuracy, and knowledge. In order to determine which mode of instruction was most effective, fourth, fifth, and sixth graders at an elementary school in north central Florida were given the Modified Golf Knowledge Test and the Benson Golf Test as both the pretests and posttests in this study. Once the pretests were given and the data was collected, a five class treatment period began. After the instruction time was completed, data was collected again from both of the posttests. An analysis of covariance (ANCOVA) was

then used to determine the differences in the pretest and posttest scores according to distance, accuracy, and golf knowledge.

Findings and Conclusions

Research Question #1: “Which group of students showed the greatest improvement in distance at the end of five 45-minute instructional periods: students that are taught how to play golf playing Tiger Woods PGA Tour 08’, students that only receive face-to-face instruction, or students that play Tiger Woods PGA Tour 08’ and receive face-to-face instruction?” The results of the analysis of covariance (ANCOVA) for this research question showed that there was no statistically significant difference between modes of instruction; face-to-face, video game only, or combined learning situation when investigating distance improvement. When examining means for these groups, the only group that showed improvement was the half and half group. Even though the other two groups did not show improvement in average distance gained, their performance did not decline substantially. The face-to-face group lost a total of .03 of a yard as a group and the video game only group lost 1.12 yards as a group.

Research Question #2: “Which group of students showed the greatest improvement in accuracy at the end of five 45-minute instructional periods: students that are taught how to play golf playing Tiger Woods PGA Tour 08, students that only receive face-to-face instruction, or students that play Tiger Woods PGA Tour 08’ and receive face-to-face instruction?” The results of the analysis of covariance (ANCOVA) for this research question showed that there was no statistically significant difference between modes of instruction; face-to-face, video game only, or combined learning situation when investigating accuracy improvement. However, there was a difference between the half and half group and the other two groups. The half and half group was the only group that

showed improvement in accuracy. While the other two groups did not show improvement in accuracy, the difference between the post- and pre- test group scores were minor. The video game only group had a 1.49 yardage difference in accuracy and the face-to-face group had a .55 yardage difference in accuracy.

One of the reasons that there may not have been significant difference in distance gains and accuracy is that students may not have been practicing proper technique the entire time. It is possible that the participants' comprehension did not reflect understanding, meaning that the students were more in tune with following directions than grasping the golf skills (Stork & Sanders, 2002). Such improper practice could cause a lack of achievement (Ashy, Lee, & Landin, 1989). While students were given plenty of practice trials prior to the posttest, quality in this case may have been more important than quantity. Moreover, the participants may have been engaged in mindless repetition, appearing to be on-task, but really not paying attention because the skill being taught may have seemed too difficult or boring (Stork & Sanders, 2002). Students tend to lose focus and the benefits of practice are lost when tasks are redundant (Magill & Hall, 1990).

Still it is possible that the students in this study may not have had enough repetitive practice. It is also possible that they may focus on the product rather than the process. Students in the videogame only group did not receive corrective feedback on process. Much of the learning that takes place in physical education is achieved by repetition and review (Rink, 2009). Learning is assessed by the observation of consistent performance over time. Although learning motor skills is a long-term process, physical education units are often designed and taught in relatively short units such as the instructional unit in this study. Moreover, practice is most effective for activities like

golf that involve the use of motor skills. Since learning a physical activity is a change in behavior, learning over time produces effective movements. If a student has experienced learning, going back to an activity at a later time is the best way to assess changes.

Because the students' performances were not observed repeatedly across time, distance and accuracy changes were measured as performance scores rather than learning scores. Also, group scores were for statistical analysis rather than changes in individual students. "Performance – not capability for moving – is measured as a function of trials" (Schmidt & Lee, 1999). It is difficult to measure what a participant is capable of doing; therefore, scores are measured by a change in performance. Additionally, learning and performance curves vary greatly from person to person and averaging group scores may hide differences in learning improvements (Schmidt & Lee, 1999).

Research Question #3: "Which group of students showed the greatest improvement in golf knowledge at the end of five 45-minute instructional periods: students that are taught how to play golf playing Tiger Woods PGA Tour 08', students that only receive face-to-face instruction, or students that play Tiger Woods PGA Tour 08' and receive face-to-face instruction?" The results of the analysis of covariance (ANCOVA) for this research question showed that there was no statistically significant difference between modes of instruction; face-to-face, video game only, or half and half learning situation when investigating knowledge improvement. While statistically there was no significant difference between the knowledge gains between these groups, there was a difference between the face-to-face group and the other two groups. However, when testing for knowledge, the face-to-face group and the half and half group were the only two groups that showed improvement. The face-to-face group improved by 8% and

the half and half group improved by 5%, while the video game only group's tests scores were lower as a whole by 2%.

It is interesting that the half and half group is the only group that showed improvement in distance, accuracy, and knowledge. However, it may be that the video game only group and face-to-face group did not improve because performance gains can sometimes be more difficult to track as levels of performance increase (Adams, 2000; Schmidt & Lee, 1999). On the other hand, there may not have been enough time for improvements to occur. Because the length of the unit could be considered "short," the data may have yielded different results if a follow-up study was conducted to check the maintenance of golf skills.

Since the study was confined to five class periods of instruction over four weeks, the length of treatment may have limited the opportunity for students to make significant improvements. Lund and Tannehill (2005) believe that short units will provide students appropriate time to make gains in any activity. While the ideal length of a physical education instruction unit can vary from three to nine weeks, motor learning studies conclude that short units make it difficult for students to learn (Mohnsen, 2008; Schmidt & Wrisberg, 2000). However, most basic motor skills require a minimum of 120 minutes of learning time for children to reach a basic level of ability. Units generally become longer by grade as students' understanding and attention spans increase (Mohnsen, 2008). Still most elementary physical education programs meet between 30 to 45 minutes from one to three days per week (Lund & Tannehill, 2005).

The results of this study are consistent with Adams (2000) where there was no statistically significant difference between face-to-face instruction and computer-based instruction when teaching golf. It is possible that the results were similar because a

variety of teaching modes were employed in both studies. Both studies incorporated teaching golf in person and teaching golf using technology. Using various teaching modes in physical education can make units more interesting for students (Griffey & Housner, 2007). Furthermore, different teaching strategies can reach more students since learning occurs differently for everyone (Rink, 2009).

Kyriacou and Wilkins (1993) believe one of the ten features of effective teaching includes the use of various teaching materials like videos, books and technology. Furthermore, to accommodate all learning styles such as visual, intuitive, sequential, and aural, a variety of teaching methods can be employed by the instructor (Brown-Syed, Adkins, & Tsai, 2005; Moore, 2007). When the instructor is able to match up the learning style with the instructional style it can result in effective learning (Coker, 2009). Instructional methods that are taken one step further by incorporating electronic games into active teaching will allow the students to experience discovery and play that is usually followed by learning (Schrand, 2008). Using technology in physical education can give students an opportunity to develop knowledge while working in a physical environment (Townsend & Gurvitch, 2002). Rather than promote passively playing sports video games from the couch, physical education teachers could be instructing on how to enter the game itself (Sydnor, 2001; Virilio, 1997).

While there are negative perceptions and a limited amount of research concerning video game play and its effect on childhood obesity, there seems to be a plethora of research that links violent video games to aggression in real life. This study is different in that it explores the mode of instruction which incorporates interactive participation in a golf video game. The research conducted by Vandewater, Shim and Caplovitz (2004) did not indicate the difference in children's weight of those that played active video games

and those that played sedentary video games. Even though this study did not examine the health benefits of playing Tiger Woods PGA Tour 08 on the Nintendo Wii, the nature of the game and the use of the Nunchuk forced students to be active and physical.

Furthermore, while there is a wealth of research that links violence to video games such as Gentile (2004) and Anderson et al. (2004), this study avoided the use of violence. The video game used in this study was based completely on golf, a game widely known as “a gentleman’s game.”

Limitations

There are multiple limitations in this study that should be considered prior to conducting similar studies. The major limitation for this study was the sample size. Participants that were selected for the study were chosen due to their availability for the time frame in this study. Only the first eight students in each of the six classes to return their assent forms were selected for participation. Additionally, the sample size of participants was restricted due to the study being conducted at the end of the school year, the school’s physical education program schedule, and the student-to-teacher ratio being limited to eight to one for the participants’ safety. Besides the safety of the students learning golf, the safety of the other students in physical education classes at the same time was also a concern. Even though the physical education fields at the school were adequate, with the regular classes engaged in normal class activity, it would have been impractical to have more than a couple students hitting on the field at one time. Errant shots may have traveled into play areas in use.

The second limitation of this study was duration during which data was collected and treatment occurred. The length of class time during the treatment was limited to five 45-minute class periods. Additionally the study was confined to the last four weeks of

the 2007-2008 school year. Also, due to the time and space restrictions, there were aspects of the golf game that were not taught. However, if golf is going to be taught in other K-12 schools, similar time and space restrictions would most likely be present.

Another limitation in this study was the Benson Golf Test (1963). This test only tested the ability of the participant on a five-iron, not other aspects of the game. Further the directions for scoring this test did not accurately account for whiffs or measuring. In this study whiffs were counted as one shot during the test but they were not part of the calculations of mean scores. These scores for whiffs were not calculated in order to more accurately report distance and accuracy scores. Moreover, distance and accuracy measurement scores were scored and recorded only by the researcher from the start line. Scoring from the start line and not having anyone in the field to verify the scores could bring into question the accuracy of the results. Also since accuracy was measured in five yard deviations on a scale of zero to nine, translating the deviations to yards, a meaningful golf measurement is more challenging for the reader.

Still another limitation of this study was that students may not have elected to participate in this study because they did not want to miss their regular physical education class. Two of the students that left the study early told the researcher that they wanted to be with their other friends during physical education. Another note to make is that those participants that remained in this study may not have taken the Benson Golf Test (1963) and the Modified Golf Knowledge Test seriously and intentionally sabotaged their own results. It is possible that they did not want to do better on the tests than their friends for a fear of ridicule. These participants may have felt that it was not “cool” to do well.

Last, this study was also limited to only one type of video game console. There is no current research as to which type of joystick or video game console has the highest

correlation with learning. The Nintendo Wii was selected for this study because its joystick or “nunchuk” has the closest “match between the content and experience of gameplay” (Appleman, 2007).

Recommendations for Practice

One recommendation is that if a physical educator does not feel knowledgeable enough to teach golf, he or she should contact a local golf professional, a golf association, or incorporate technology to assist in regular instruction. With an additional instructor present such as a professional golf instructor, a circuit could be set up where students move from one task to another. One of those circuits could include a technology stop where students play golf on the Wii. Additionally, physical education instructors could incorporate technology such as sports on the Wii during class times with inclement weather.

Another recommendation for practice is that physical educators should include basic golf instruction in a sports unit during the school year. Students in this study volunteered to learn how to play golf. They were not given anything in return for participating in the study and they were not told prior to the study that video games would be used during golf instruction. Students in this study signed up because they had an interest in learning golf. Further the results of this study may have been different if an entire physical education class was used rather than volunteers.

Last, the set-up of the Benson Golf Test should be modified to accommodate beginning golfers, such as counting just the 10 best shots out of 20 for distance. This may not only produce better data because scores are calculated for the best shots, but it would also help reduce testing pressure for participants. Another option is to only count shots that advance 10 yards or farther. This would assist with better accuracy data since shots

that do not advance very far tend to be more accurate than longer shots. Also, a policy on deciding how to handle whiffs should be decided prior to testing.

Recommendations for Future Research

The findings suggest several considerations for future research. First, this study should be repeated with a larger sample size and a longer treatment period. Because the size of the treatment groups were small, it was impossible to make proper comparisons. Also if the treatment period was longer, all the groups might have had different results.

Moreover, it would also have been interesting to broaden the concept of the study to investigate attitudes and perceptions toward the sport. A new study should survey the participants' likes and dislikes toward golf compared to other sports as well as their perceptions toward the different modes of instruction. Participants in the study seemed to enjoy learning golf for the most part. One student commented that they liked playing golf on the Wii better than in real life because it was easier to make contact with the ball on the Wii. Future research should examine the students' levels of enjoyment based on the style of teaching. In this case it may also be helpful to profile students' learning style based on Gardner's Multiple Intelligences (2006) during the pretest.

Any study wishing to measure golf skills using the Benson Golf Test (1963) should consider modifying the test prior to use. Additionally researchers should be aware that the Benson Golf Test actually measures a person's ability on a five-iron, not all areas of golf. Researchers should also consider the challenges with measuring accuracy and distance. Perhaps the best option would be to develop a new golf skills test that precisely measures accuracy, distances, and other parts of the game.

Another recommendation for this study is to conduct the study using different video game console systems such as Sony PlayStation, Xbox 360 or with a personal

computer formatted game. The Sony PlayStation and Xbox 360 only allow the game players to push buttons on a gamepad rather than simulate a golf swing. Similarly the game on the personal computer would allow players to use keys on the keyboard or the mouse rather than a simulated golf swing. Even though all game consoles would expose participants to the same golf concepts, only the Wii requires physical activity. It would be interesting to see if there would be a difference or a correlation in learning between console formats.

Further, the study could also be expanded to include other sports such as bowling, tennis, basketball, and soccer. As the case may be, researchers may find a difference in treatment groups if using a different sport. Motor Skill learning may not be the same for video games such as basketball and soccer. Skills in the game are not similar to the real skill. Bowling, tennis, and golf on the Wii are somewhat similar to real skills. Even though the video simulations may be different from real skills, the video games expose players to real life game or sport terminology, rules, and strategies.

Using different sports may also make it easier to expand the investigation to determine the differences in heart rate levels playing video games versus real life. The difference in heart rate levels playing golf in real life and golf on the Wii may not be able to draw significant comparisons. Regardless of the sport played on the Wii, it would be interesting to study the heart rate levels of the participants. It is possible in some cases that the heart rates of participants may be higher when playing on the Wii than in real life.

Additionally, future research should examine the success of short physical education units. The results of this study may have been different if the participants were exposed to the treatment for a longer period of time. Another option would be to use

distributed practice for the unit. Recovering the unit again at a later date, would be exposing the students to a longer treatment period without forcing redundant repetition. According to Coker (2009), student learning is increased when practice sessions are frequent, short, and spaced out over time.

Last, rather than using a true or false format based test to measure golf knowledge, future research could include developing a multiple-choice test on golf knowledge for elementary school students. Even though the Modified Golf Knowledge Test was able to collect data for this study, some scholars may question the accuracy of the data since participants had a 50% chance of getting the answer correct. Currently there are no multiple-choice golf tests available for collecting data for research. However, whether the next study be multiple-choice or true-false, future researchers should remember to read the test to the participants since the purpose is to test knowledge, not reading skills.

To conclude, physical education instruction is evolving and starting to incorporate new technologies while focusing on wellness and exercise. Quality physical education teachers are trying different strategies to include activities that give students more learning choices while trying to teach the benefits of being physically active (Adelson, 2008). More commonly, physical education programs are incorporating technology such as CD/tape players, video/VCR, and use of the Internet for preparation (Bennett-Walker, 2006). However, some school systems are following the current trends and infusing interactive video games such as DDR into physical education classrooms. The results of this study indicate that the three modes of teaching were equal when testing for changes in performance with the use of the Benson Golf Test (1963) and the Modified Golf Knowledge Test. These results do not suggest that video games should replace physical

educators; moreover, some video games may complement the teaching of various aspects of games. Participants in this study showed similar skill performance regardless of methodology used in teaching; hence, video games should not be viewed as being anti-activity but instead a new type of learning tool.

APPENDIX A

IRB PERMISSION



 THE UNIVERSITY OF SOUTHERN MISSISSIPPI

Institutional Review Board

118 College Drive #5147
 Hattiesburg, MS 39406-0001
 Tel: 601.266.6820
 Fax: 601.266.5509
 www.usm.edu/irb

**HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE
 NOTICE OF COMMITTEE ACTION**

The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **28041402**

PROJECT TITLE: **The Impact Golf Video Games Have on Teaching Golf in Physical Education**

PROPOSED PROJECT DATES: **01/22/08 to 12/10/08**

PROJECT TYPE: **Dissertation or Thesis**

PRINCIPAL INVESTIGATORS: **Ann Pohira**

COLLEGE/DIVISION: **College of Health**

DEPARTMENT: **Human Performance & Recreation**

FUNDING AGENCY: **N/A**

HSPRC COMMITTEE ACTION: **Expedited Review Approval**

PERIOD OF APPROVAL: **04/28/08 to 04/27/09**

Lawrence A. Hosman

 Lawrence A. Hosman, Ph.D.
 HSPRC Chair

4-30-08

 Date

APPENDIX B

GOLF KNOWLEDGE TEST (Waglow & Rehling, 1953)

Golf Knowledge Test

Do not mark this test. Place your answers on the answer sheet and return both to the instructor. If the statement is false or partially so, encircle the "F" on the answer sheet. If the statement is wholly true, encircle the "T" on the answer sheet. (Right minus wrong).

Difficulty Rating ¹	Index of Discrimination ²	Need Revision	Answer	No.
90	43		F	1. Golf originated as a definite game about the 12th century.
88	14		F	2. In a closed stance the left foot is pulled back from the line of flight.
46	40		F	3. Queen Ann of Scotland was the first woman golfer of whom there is any mention.
44	-12	*	T	4. In the game of golf, bent grass is most commonly used on the putting greens.
87	0	*	T	5. The term "cadet" in the early history of golf meant someone who was learning the game.
43	11	*	F	6. A rigid left arm is necessary in driving.
84	66		T	7. In 1457 the Parliament of Scotland ruled against the playing of golf.
78	60		F	8. The stance for the chip shot is quite close.

A Golf Knowledge Test

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Difficulty Rating ¹	Index of Discrimination ²	Need Revision	Answer	No.
84	19		T	9. The first golf tournament of which there is any record was played at Preswick, Scotland, in 1860.
67	55		F	10. It is one of the caddie's jobs to see that all holes in a bunker are filled.
96	23	*	T	11. John G. Reid is known as the "Father of American Golf."
87	19		T	12. Number 1, 10 tee and 9, 18 green are always located near the clubhouse.
89	63		F	13. The amateur ruling body for golf in the United States is known as the American Association for Golf.
85	57		F	14. The spoon is in a set of golf clubs but is very seldom used.
94	57		T	15. The Professional Golfers Association is the ruling body for all professional tournaments.
66	25		F	16. In playing the pitch shot to the green, the ball is played with the club face closed.
63	51		F	17. The P.G.A. was formed in the year 1920.
65	-24	*	T	18. Gripping the golf club too tensely generally causes shanked shots.
21	-05	*	F	19. The first golf tournament held in the United States was staged at Newport, Rhode Island, in 1894.
78	28		T	20. In golf when you have a smothered shot, it is generally caused when the face of the club is closed too much at impact.
73	77		F	21. The early golf balls were made of feathers tightly stuffed into a crude rubber cover.
79	15		T	22. The most common reason for a person to slice is cutting across the ball at impact.
88	57		T	23. About 1925 manufacturers began to produce tempered steel shafts.
84	40		T	24. The pendulum and hinge are two basic methods of putting.
34	- 3	*	T	25. The Curtis Cup matches are for women only.
92	36		F	26. The three stances in golf are open, closed, and wide.
54	51		F	27. Harry Vardon, Ted Ray, and Francis Ouimet were three famous early golf professionals.
87	30		T	28. Over 95% of golfing authorities teach or use the overlapping grip.
85	32		T	29. A golfer can only legally carry 14 clubs.
71	03	*	T	30. The average golfer takes about 100 to 110 strokes for 18 holes.
87	57		F	31. A golf hole should be 4½ inches in diameter and sunk at least 6 inches deep.
54	43		F	32. The expression "two up" refers to medal play.
86	53		T	33. The course is known as the whole area in which play is permitted.
74	56		F	34. A driver is generally used on the fairway.

Difficulty Rating ¹	Index of Discrimination ²	Need Revision	Answer	No.
96	09	*	T	35. A golf ball is out of bounds when it comes to rest on ground on which play is prohibited.
91	43		T	36. The number 7, 8, and 9 irons are known as the short irons.
94	49	*	F	37. A ball is lost if it is not found within 6 minutes after search for it has begun.
66	17		T	38. In the game of golf two putts are par for a green.
94	30	*	T	39. "Rub of the Green" means that when a golf ball is in motion, it is stopped or deflected by any outside agency.
96	30	*	T	40. In golf for long shots the wooden or the low numbered irons are used.
92	49		F	41. Match and medal play are the same.
97	35	*	F	42. In executing a golf swing, the knees are straight and the grip is tense.
97	43	*	T	43. Honor is the right to play first from the tee.
73	34		F	44. The interlocking grip is the most widely used.
91	53		F	45. A "Birdie" is two under par.
75	24		F	46. The playing of two balls off the starting tee is never ethical.
17	09	*	F	47. A hazard is any bunker, trap, permanent water, ditch, sand, or woods.
82	-33	*	T	48. Four major divisions of a golf course are fair ways, greens, rough, and traps.
86	44		F	49. A "slice" is a shot which curves to the left of a right handed player.
85	48		T	50. Broyles Pelmons is the golf pro at the Gainesville Golf and Country Club.
74	13	*	T	51. The term "fore" is a signal to warn golfers that a ball has been driven in their direction.
83	57		T	52. A "Referee" is a person who is appointed by the Rules Committee.
90	53		F	53. An "eagle" is one over par.
77	60		T	54. You may brush across the line of your putt without penalty.
56	06	*	T	55. The person who authorizes you to begin play is known as the starter.
82	20		F	56. You cannot move your ball from an artificial obstruction without a one or two strokes penalty.
73	24		F	57. There are four tee markers on each side.
34	08	*	F	58. There is a one stroke penalty when you hit a ball from the tee into a water hazard.
71	38		F	59. A brassie is a No. 3 wood.
94	43	*	F	60. If the ball falls off the tee before you have taken your swing, you may replace it and there is a one stroke penalty.
93	49		T	61. Casual water is the temporary accumulation of water which is not recognized as a hazard on the course.
81	-01	*	F	62. When you hit a ball out of bounds, there is no penalty.

A Golf Knowledge Test

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Difficulty Rating ¹	Index of Discrimination ²	Need Revision	Answer	No.
24	20		F	63. The neck of a golf club is the point at which the shaft joins the head of the club.
84	24		F	64. When you miss the ball, there is no penalty.
91	53		T	65. To pull a ball means to hit the ball straight but to the left of the line of flight.
49	28		T	66. In medal play if you hit another player's ball on the putting green, there is a penalty of two strokes.
78	03	*	F	67. The shaft of a golf club is the handle.
75	32		T	68. If there is no one attending the pin and your ball strikes it, there is no penalty in match play.
37	-08	*	T	69. The sole of a golf club is commonly known as the flange.
54	20		F	70. There is one stroke penalty in medal play for smoothing the ground in the line of your putt.
87	54		F	71. The toe of a golf club is commonly known as the heel.
79	40		F	72. In medal play if the pin is unattended and you hit it from more than 20 yards away, there is a two stroke penalty.
88	30		T	73. Any forward motion of the club head made with the intent of striking the ball is a stroke.
100	0	*	T	74. A ball is deemed to have moved if it leaves its position and comes to rest in another place.
96	49	*	F	75. The preliminary action of moving the wrists is called the swing.
83	70		F	76. Service roads on a golf course are considered hazards.
63	34		F	77. The No. 5 iron is called the niblick.
70	37		F	78. A "Rub of the Green" occurs when a ball in motion is stopped by a tree or bush.
86	32		T	79. Whenever two players have the same number of strokes on a hole, it is considered a halved hole.
85	40		T	80. When you top the ball and knock it off the tee, it counts as a stroke and it must be played where it lies.
87	30		T	81. Whenever a person hits beyond his normal swing, it is called pressing.
92	30		F	82. When looking for a lost ball, players should not allow following players to play through.
93	30		T	83. A singles match in golf is one in which one player opposes another, each playing his own ball.
26	28		F	84. A player is entitled to the whole tee when making a shot.
89	09		T	85. When you swing and miss the ball in golf, it is called a whiff.
97	35	*	T	86. The location of a player's feet when addressing the ball is called the stance.
84	13	*	T	87. When the results of a hole have been reported, players should immediately leave the green.

Difficulty Rating ¹	Index of Discrimination ²	Need Revision	Answer	No.
93	35		T	88. A golf tee is a peg on which the ball is elevated.
74	44		F	89. It is legal to start playing on the third or fourth hole without going to the clubhouse first.
30	64		F	90. The maximum distance for a 5 par hole is 495 yards.
87	0	*	T	91. A player should always take the trouble to help his opponent look for a lost ball.
86	43		F	92. The shank of a golf club is that part which joins the toe of the club.
95	43	*	T	93. When a player is making a stroke, no one should move or make sounds such as talking or coughing.
64	47		F	94. Nassau is a system of scoring where one point is given for each nine and two points for the match.
96	49	*	T	95. Golf divots should be replaced even though you are in a hurry.
82	39		F	96. The plug of a golf club is located near the heel of the club.
84	23		T	97. On bright days players and caddies should stand so their shadows will not be in the line of play.
23	-13	*	T	98. The cleek is a No. 5 wood.
50	15		T	99. A single player has no priority in playing through.
89	53		T	100. The player farthest from the hole should always be allowed to play first.

¹The lower the rating the more difficult the question.

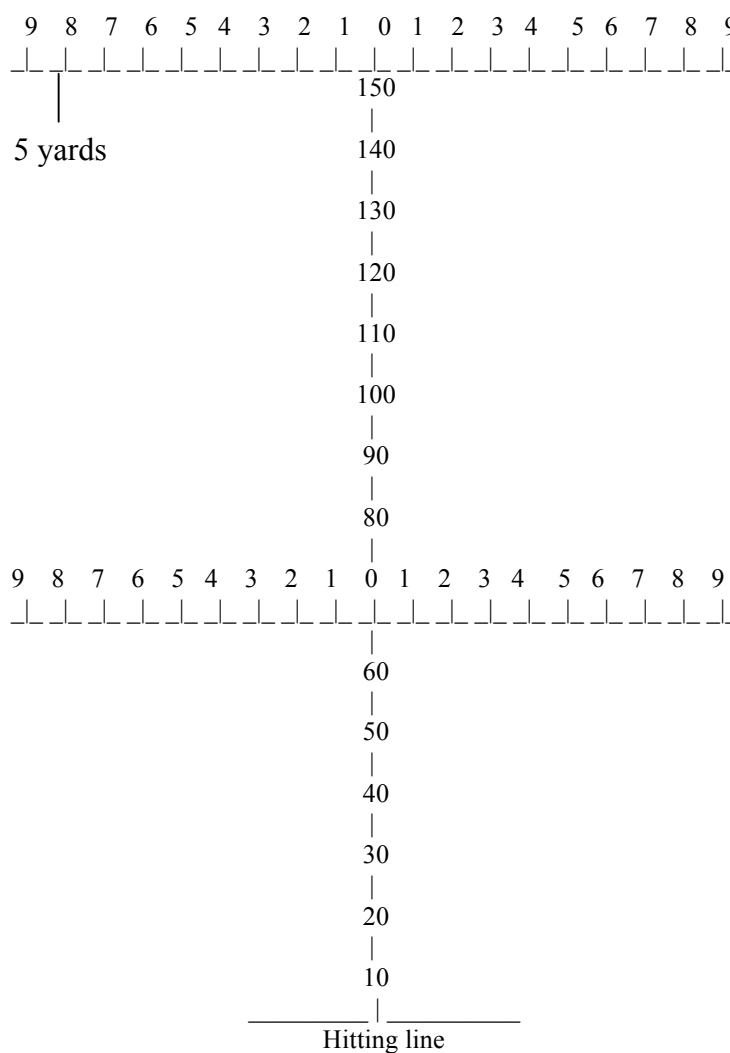
²The higher the index the more discriminatory the question.

- True False
17. When a player is making a stroke, no one should move or make sounds such as talking or laughing.
True False
18. You should rake the sand in a bunker after you walk out of it.
True False
19. The fairway is the area of short grass that surrounds the flagstick.
True False
20. The clubhead is the area on the golf club that makes contact with the ball during a golf swing.
True False
21. Are you male or female?
Male Female
22. How old are you?
8 9 10 11 12 13
23. What grade are you in?
4th 5th 6th
24. What kind of grades do you usually earn in school?
A's B's C's D's F's
25. How would you describe your ethnicity/ race?
American Indian or Alaska Native
Asian
Black or African American
Hispanic of any race
Native Hawaiian or Other Pacific Islander
Two or more races
White, Non-Hispanic
26. About how many times have you played video games in the past 6 months?
None 1-5times 10-100 times more than 100 times
27. About how many times have you played golf video games in the past 6 months?
None 1-5times 10-100 times more than 100 times
28. About how many times have you played golf on a golf course?
None 1-5times 10-100 times more than 100 times

Test Answers: 1.) True; 2.) True; 3.) True; 4.) False; 5.) True; 6.) False; 7.) True; 8.) False; 9.) False; 10.) True; 11.) False; 12.) True; 13.) False; 14.) False; 15.) False; 16.) False; 17.) True; 18.) True; 19.) False; 20.) True

APPENDIX D

BENSON GOLF TEST FIELD MARKINGS (Collins & Hodges, 1978)



Directions: Participants should try to hit the ball as far and as accurately as possible from behind the hitting line using the same club. Each participant will be given five practice shots immediately prior to testing and then must hit 20 balls consecutively for the test. The balls will be scored after each shot hit. No additional balls will be given for participants failing to make contact and the result will be “no-score” for each ball whiffed.

Scoring Method: The 20 distance and deviation scores are separately averaged, providing official results for distance and flight accuracy.

APPENDIX E

SCORE SHEET FOR BENSON GOLF TEST (Adams, 2000)

Score Sheet

Name _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	Ave	

Name _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	Ave	

Name _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	Ave	

Name _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	Ave	

Date _____ Time: _____ Grade: _____

APPENDIX F

FACE-TO-FACE LESSON PLANS

Lesson Plan- Class 1- Face-to-face

Teacher: Ann Pohira-Vieth
Unit Name: Golf

Subject/Class: Physical Education
Lesson Title: Introduction to Golf

Grade level expectation: 4th-6th grade

1. Write the Objective- The students will learn the parts of a golf club and the basics of a full golf swing, alignment, specialty shots, and putting. Students will be learning outside and will each be given a chance to hold a golf club. By the end of the class period students will successfully be able to make contact with the golf ball.

2. Introduce the Lesson- Ask the students if they know any famous golfers. Then ask if they know anyone that plays golf. Objective- Tell students they are going to learn about the game of golf. Start by showing the students a golf club and identifying the parts. Many parts of the golf club have similar names to other things you are familiar with, like the human body.

3. Present the Content- Explain to the students that golf is a game about respect and honesty. There are no referees to call penalties on players, players call penalties on themselves. Explain the meaning of golf etiquette. Three important parts of etiquette that must be followed are 1.) Leave the golf area as you found it; 2.) Do not walk in front of others when hitting; 3.) Do not talk or make noise while others are hitting or getting ready to hit

Learning Activities

- Show the students how to hold a golf club
- Show the students how to aim properly
- Let one student at a time hit- approximately 5 shots then rotate (rotate 3 times)
- Talk about specialty shots and their names- slice and fade; draw and hook; whiff
- Show students how to putt- give everyone 5 shots and then rotate

Only one student at a time will hold onto a golf club for safety. Students carrying golf clubs will carry the golf club by the club head. The whole class will work on this together.

4. Practice and Feedback-Students will be practicing their golf swing through guided practice with other students and the teacher. During the first rotation give feedback on every shot hit. During the second rotation, let the students hit and try to figure out their own mistakes. Before students start the third round of rotation, remind the students how to properly swing and guide them through the rotation.

5. Summarize the Lesson-Ask the students to name the parts of the golf club and the names of different specialty shots.
6. Assess Student Learning- The next class period review with students to see if they remember the different parts of a golf club and the names of specialty shots. Remind the students of proper golf etiquette.

Lesson Plan- Class 2- Face-to-face

Teacher: Ann Pohira -Vieth
Unit Name: Golf

Subject/Class: Physical Education
Lesson Title: Pitch shot

Grade level expectation: 4th-6th grade

1. Write the Objective- The students will learn about shorter shots on the golf course. Sometimes there are shots that are too short for a full swing but too far for a chip. These shots are called pitch shots. Teaching this shot before the full swing helps the student that may experience difficulty in making contact with the ball.
2. Introduce the Lesson- Ask the students how they liked their introduction to golf. Then ask if anyone thought it was hard. Objective- Tell students they are going to learn about golf's short shots called a pitch. Start by showing the students what the shot looks like. Explain to the students the different parts of the golf course and their names: Teeing ground, fairway, green, rough, bunkers, water hazards, and boundary lines.
3. Present the Content- Explain to students what a golf course looks like and where to find one. After explaining parts of the golf course, explain the difference between a chip shot and a pitch shot.

Learning Activities

- Remind the students how to hold a golf club
- Remind the students how to aim properly
- Let one student at a time hit at a close target about 10 yards away- approximately 5 shots then rotate (rotate 2 times)
- Play closest to the pin- Let students hit only 3 times and play against another student- the student closest to the pin after 3 shots wins- rotate so each student gets to play against another student

Only one student at a time will hold onto a golf club for safety. Students carrying golf clubs will carry the golf club by the club head. The whole class will work on this together.

4. Practice and Feedback-Students will be practicing their pitch shot through guided practice with other students and the teacher. During the first rotation give feedback on every shot hit. During the second rotation, let the students hit and try to figure out their own mistakes. Students will then be challenged by another student to a short game of closest to the pin.
5. Summarize the Lesson-Ask the students to name the parts of the golf course and the name of the shot they learned today.
6. Assess Student Learning- The next class period review with students to see if they remember the different parts of a course. Remind the students of proper golf etiquette.

Lesson Plan- Class 3- Face-to-face

Teacher: Ann Pohira-Vieth
Unit Name: Golf

Subject/Class: Physical Education
Lesson Title: Full Swing Irons

Grade level expectation: 4th-6th grade

1. Write the Objective- The students will continue to practice a full swing with a 7-iron and 5-iron. Students will be learning outside and will each be given time to practice.
2. Introduce the Lesson- Review proper grip techniques and stances. Objective- Talk about keeping score in golf and what shots count as well as the order of play. Explain the differences between stroke play and match play and the United States Golf Association and the Professional Golfers Association.
3. Present the Content- Begin with explaining terms such as par, bogey, birdie, and eagle. Then explain the differences between stroke play and match play and the United States Golf Association and the Professional Golfers Association.

Learning Activities

- Give students examples of someone's shots on a hole and ask for the score.
- Review grip techniques and alignment
- Let one student at a time hit- approximately 5 shots then rotate (rotate 4 times)
- Review specialty shots and their names- slice and fade; draw and hook; whiff

Only one student at a time will hold onto a golf club for safety. Students carrying golf clubs will carry the golf club by the club head. The whole class will work on this together.

4. Practice and Feedback-Students will be practicing their golf swing through guided practice with other students and the teacher. During the first rotation give feedback on every shot hit. During the second rotation, let the students hit and try to figure out their own mistakes. Before students start the third round of rotation, remind the students how to properly swing and guide them through the rotation. Allow students to practice without feedback on fourth rotation.
5. Summarize the Lesson-Ask the students to explain the difference between match play and stroke play. Review bogey, par, birdie, and eagle as well as the USGA and the PGA.
6. Assess Student Learning- The next class period review with students to see if they remember the different formats of play and alternate names for golf scores.

Lesson Plan- Class 4- Face-to-face

Teacher: Ann Pohira-Vieth
Unit Name: Golf

Subject/Class: Physical Education
Lesson Title: Full Swing Woods

Grade level expectation: 4th-6th grade

1. Write the Objective- The students will continue practicing a full swing with a wood. Students will be learning outside and will each be given time to practice.
2. Introduce the Lesson- Review proper grip techniques and stances. Objective- Practice full swing and explain the different names of golf clubs and the purpose of each club.
3. Present the Content- Begin with explaining how woods were given the name and their purpose. Talk about which golf clubs go farther and how many clubs are allowed to be in a golf bag. Show the students a golf tee and explain when it is used.

Learning Activities

- Review grip techniques and alignment
- Let one student at a time hit- approximately 5 shots then rotate (rotate 4 times)

Only one student at a time will hold onto a golf club for safety. Students carrying golf clubs will carry the golf club by the club head. The whole class will work on this together.

4. Practice and Feedback-Students will be practicing their golf swing through guided practice with other students and the teacher. During the first rotation give feedback on every shot hit. During the second rotation, let the students hit and try to figure out their own mistakes. Before students start the third round of rotation, remind the students how to properly swing and guide them through the rotation. Allow students to practice without feedback on fourth rotation.
5. Summarize the Lesson-Ask the students to explain the difference between golf clubs.
6. Assess Student Learning- The next class period review with students to see if they remember the difference between the types of golf clubs.

Lesson Plan- Class 5- Face-to-face

Teacher: Ann Pohira-Vieth
Unit Name: Golf

Subject/Class: Physical Education
Lesson Title: Playing the game

Grade level expectation: 4th-6th grade

1. Write the Objective- The students will continue practicing a full swing with all golf clubs and play set up golf holes in the field. Students will be learning outside and each student will play at least one hole.
2. Introduce the Lesson- Review keeping score and different formats of play. Objective- Put the golf skills learned to the test by playing golf holes set up in the field.
3. Present the Content- Begin by reviewing keeping score and explain what the terms twosome, threesome, foursome, and fivesome, as well as fore means.

Learning Activities

- Allow one student at a time to hit to set up targets.
(Targets will be large rings such as hula-hoop)
- Continue until everyone in the group has finished the hole
- Depending on time, allow students to play one to three holes

Only one student at a time will hold onto a golf club for safety. Students carrying golf clubs will carry the golf club by the club head. The whole class will work on this together.

4. Practice and Feedback-Students will be given feedback during the first hole. Feedback for holes two and three will be given after the holes are completed.
5. Summarize the Lesson-Ask the students to explain who had the lowest score.
6. Assess Student Learning- The next class period will be posttests.

APPENDIX G

VIDEO GAME LESSON PLANS

Lesson Plan- Class 1- Video Game

Teacher: Ann Pohira-Vieth
Unit Name: Golf

Subject/Class: Physical Education
Lesson Title: Introduction to Golf

Grade level expectation: 4th-6th grade

1. Write the Objective- The students will learn the parts of a golf club and the basics of a full golf swing, alignment, specialty shots, and putting. Students will be learning inside on the Nintendo Wii and will each be given a chance to practice some skills. By the end of the class period students will successfully be able to complete the video skills task.

2. Introduce the Lesson- Ask the students if they know any famous golfers. Then ask if they know anyone that plays golf. Objective- Tell students they are going to learn about the game of golf. Start by showing the students a golf club and identifying the parts. Many parts of the golf club have similar names to other things you are familiar with, like the human body.

3. Present the Content- Explain to the students that golf is a game about respect and honesty. There are no referees to call penalties on players, players call penalties on themselves. Explain the meaning of golf etiquette. Three important parts of etiquette that must be followed are 1.) Leave the golf area as you found it; 2.) Do not walk in front of others when hitting; 3.) Do not talk or make noise while others are hitting or getting ready to hit.

Learning Activities

- Show the students how to hold a golf club
- Show the students how to aim properly
- Let one student at a time complete the Tiger Woods tutorial
- Allow every student to complete the tutorial
 - Full swing with driver
 - Alignment with an iron
- (Specialty shots)
 - Draw
 - Fade
 - Short approach shot
 - Putting

Only one student at a time will be able to practice. The other students must watch when someone is playing.

4. Practice and Feedback-Students will be practicing their golf swing through guided practice with other students and the teacher. During the first try of each shot the teacher will give feedback on the shot. For the second or third attempt, allow the students to hit and try to figure out their own mistakes. If still unable to complete a shot in the tutorial give feedback and allow other students to help give feedback.

5. Summarize the Lesson-Ask the students to name the parts of the golf club and the names of different specialty shots.
6. Assess Student Learning- The next class period review with students to see if they remember the different parts of a golf club and the names of specialty shots. Remind the students of proper golf etiquette.

Lesson Plan- Class 2- Video Game

Teacher: Ann Pohira-Vieth
Unit Name: Golf

Subject/Class: Physical Education
Lesson Title: Pitch shot

Grade level expectation: 4th-6th grade

1. Write the Objective- The students will learn about shorter shots on the golf course. Sometimes there are shots that are too short for a full swing but too far for a chip. These shots are called pitch shots. Teaching this shot before the full swing helps the student that may experience difficulty in making contact with the ball. The students will learn this shot through the Tiger Woods video game playing the Tiger Challenge.
2. Introduce the Lesson- Ask the students how they liked their introduction to golf. Then ask if anyone thought it was hard. Objective- Tell students they are going to learn about golf's short shots called a pitch. Explain to the students the different parts of the golf course and their names: Teeing ground, fairway, green, rough, bunkers, water hazards, and boundary lines.
3. Present the Content- Explain to students what a golf course looks like and where to find one. After explaining parts of the golf course, explain the difference between a chip shot and a pitch shot.

Learning Activities

- Remind the students how to hold a golf club
- Remind the students how to aim properly
- Let one student at a time compete in the closest to the pin contest
 - Students will get to hit three shots against the video game
 - The player with the three closest shots beats the game
 - Students will rotate after three shots
 - The rotation should be three to four times

Only one student at a time will be able to practice. The other students must watch when someone is playing.

4. Practice and Feedback-Students will be practicing their pitch shot through guided practice with other students and the teacher. During the first rotation give feedback on every shot hit. During the second rotation, let the students hit and try to figure out their own mistakes. On the second and third rotations other students may also give feedback.
5. Summarize the Lesson-Ask the students to name the parts of the golf course and the name of the shot they learned today.
6. Assess Student Learning- The next class period review with students to see if they remember the different parts of a course. Remind the students of proper golf etiquette.

Lesson Plan- Class 3- Video Game

Teacher: Ann Pohira-Vieth
Unit Name: Golf

Subject/Class: Physical Education
Lesson Title: Full Swing Irons

Grade level expectation: 4th-6th grade

1. Write the Objective- The students will continue practicing a full swing. Students will be learning on the Nintendo Wii and will each be given time to practice.
2. Introduce the Lesson- Review proper grip techniques and stances. Objective- Talk about keeping score in golf and what shots count as well as the order of play. Explain the differences between stroke play and match play and the United States Golf Association and the Professional Golfers Association.
3. Present the Content- Begin with explaining terms such as par, bogey, birdie, and eagle. Then explain the differences between stroke play and match play and the United States Golf Association and the Professional Golfers Association.

Learning Activities

- Give students examples of someone's shots on a hole and ask for the score.
- Review grip techniques and alignment
- Students will play a mini game called Target
- Students are each given 20 balls to hit and can pick any target to hit at
- Points are awarded for each target hit and points are taken away for shots hit out of bounds or in the water
- Review specialty shots and their names- slice and fade; draw and hook; whiff

Only one student at a time will be able to practice. The other students must watch when someone is playing.

4. Practice and Feedback-Students will be practicing their golf swing through guided practice with other students and the teacher.
5. Summarize the Lesson-Ask the students to explain the difference between match play and stroke play. Review bogey, par, birdie, and eagle as well as the USGA and the PGA.
6. Assess Student Learning- The next class period review with students to see if they remember the different formats of play and alternate names for golf scores.

Lesson Plan- Class 4- Video Game

Teacher: Ann Pohira-Vieth
Unit Name: Golf

Subject/Class: Physical Education
Lesson Title: Full Swing Woods

Grade level expectation: 4th-6th grade

1. Write the Objective- The students will continue practicing a full swing with a wood. Students will be learning on the Nintendo Wii and will each be given time to practice.
2. Introduce the Lesson- Review proper grip techniques and stances. Objective- Practice full swing and explain the different names of golf clubs and the purpose of each club.
3. Present the Content- Begin with explaining how woods were given the name and their purpose. Talk about which golf clubs go farther and how many clubs are allowed to be in a golf bag. Show the students a golf tee and explain when it is used.

Learning Activities

- Review grip techniques and alignment
- Students will play the Long Drive Contest in the Tiger Challenge
- Each student will get to hit three drives
- Each drive must be longer than the game and be in the fairway

Only one student at a time will be able to practice. The other students must watch when someone is playing.

4. Practice and Feedback- Students will be practicing their golf swing through guided practice with other students and the teacher.
5. Summarize the Lesson-Ask the students to explain the difference between golf clubs.
6. Assess Student Learning- The next class period review with students to see if they remember the difference between the types of golf clubs.

Lesson Plan- Class 5- Video Game

Teacher: Ann Pohira-Vieth
Unit Name: Golf

Subject/Class: Physical Education
Lesson Title: Playing the game

Grade level expectation: 4th-6th grade

1. Write the Objective- The students will continue practicing a full swing with all golf clubs and play a round of Tiger Woods Golf on the Nintendo Wii.
2. Introduce the Lesson- Review keeping score and different formats of play. Objective- Put the golf skills learned to the test by playing golf.
3. Present the Content- Begin by reviewing keeping score and explain what the terms twosome, threesome, foursome, and fivesome, as well as fore means.
Learning Activities
 - Students will use the Play now version of Tiger Woods
 - Students will play in threesomes and alternate holes so that all six students in a group will play the same amount of holes
4. Practice and Feedback-Students will be given feedback during the first hole. Feedback for holes two, three, and four will be given after the holes are completed.
5. Summarize the Lesson-Ask the students to explain who had the lowest score.
6. Assess Student Learning- The next class period will be posttests.

APPENDIX H

VIDEO GAME AND FACE-TO-FACE LESSON PLANS

Lesson Plan- Class 1- Video Game and Face-to-face

Teacher: Ann Pohira-Vieth

Subject/Class: Physical Education

Unit Name: Golf

Lesson Title: Introduction to Golf- *Video Game*Grade level expectation: 4th-6th grade

1. Write the Objective- The students will learn the parts of a golf club and the basics of a full golf swing, alignment, specialty shots, and putting. Students will be learning inside on the Nintendo Wii and will each be given a chance to practice some skills. By the end of the class period students will successfully be able to complete the video skills task.

2. Introduce the Lesson- Ask the students if they know any famous golfers. Then ask if they know anyone that plays golf. Objective- Tell students they are going to learn about the game of golf. Start by showing the students a golf club and identifying the parts. Many parts of the golf club have similar names to other things you are familiar with, like the human body.

3. Present the Content- Explain to the students that golf is a game about respect and honesty. There are no referees to call penalties on players, players call penalties on themselves. Explain the meaning of golf etiquette. Three important parts of etiquette that must be followed are 1.) Leave the golf area as you found it; 2.) Do not walk in front of others when hitting; 3.) Do not talk or make noise while others are hitting or getting ready to hit.

Learning Activities

- Show the students how to hold a golf club
- Show the students how to aim properly
- Let one student at a time complete the Tiger Woods tutorial
- Allow every student to complete the tutorial
 - Full swing with driver
 - Alignment with an iron
- (Specialty shots)
 - Draw
 - Fade
 - Short approach shot
 - Putting

Only one student at a time will be able to practice. The other students must watch when someone is playing.

4. Practice and Feedback-Students will be practicing their golf swing through guided practice with other students and the teacher. During the first try of each shot the teacher will give feedback on the shot. For the second or third attempt, allow the students to hit

and try to figure out their own mistakes. If still unable to complete a shot in the tutorial give feedback and allow other students to help give feedback.

5. Summarize the Lesson-Ask the students to name the parts of the golf club and the names of different specialty shots.

6. Assess Student Learning- The next class period review with students to see if they remember the different parts of a golf club and the names of specialty shots. Remind the students of proper golf etiquette.

Lesson Plan- Class 2- Video Game and Face-to-face

Teacher: Ann Pohira-Vieth

Subject/Class: Physical Education

Unit Name: Golf

Lesson Title: Pitch shot- *Both Video Game and Face-to-face*Grade level expectation: 4th-6th grade

1. Write the Objective- The students will learn about shorter shots on the golf course. Sometimes there are shots that are too short for a full swing but too far for a chip. These shots are called pitch shots. Teaching this shot before the full swing helps student that may experience difficulty in making contact with the ball. The students will learn this shot through the Tiger Woods video game playing the Tiger Challenge and by physically practicing this shot outside.

2. Introduce the Lesson- Ask the students how they liked their introduction to golf. Then ask if anyone thought it was hard. Objective- Tell students they are going to learn about golf's short shots called a pitch. Start by showing the students what the shot looks like. Explain to the students the different parts of the golf course and their names: Teeing ground, fairway, green, rough, bunkers, water hazards, and boundary lines.

3. Present the Content- Explain to students what a golf course looks like and where to find one. After explaining parts of the golf course, explain the difference between a chip shot and a pitch shot.

Learning Activities

Remind the students how to hold a golf club

- Remind the students how to aim properly
- Let one student at a time compete in the closest to the pin contest
 - Students will get to hit three shots against the video game
 - The player with the three closest shots beats the game
 - Students will rotate after three shots
 - There will be only one rotation and then students will practice outside
- Let one student at a time hit at a close target about 10 yards away- approximately five shots then rotate (rotate one time)
- Play closest to the pin- Let students hit only three times and play against another student- the student closest to the pin after three shots wins- rotate so each student gets to play against another student.

Only one student at a time will hold onto a golf club for safety. Students carrying golf clubs will carry the golf club by the club head. The whole class will work on this together.

4. Practice and Feedback-Students will be practicing their pitch shot through guided practice with other students and the teacher. During the first rotation give feedback on every shot hit. During the second rotation, let the students hit and try to figure out their own mistakes. Students will then be challenged by another student to a short game of closest to the pin.

5. Summarize the Lesson-Ask the students to name the parts of the golf course and the name of the shot they learned today.

6. Assess Student Learning- The next class period review with students to see if they remember the different parts of a course. Remind the students of proper golf etiquette.

Lesson Plan- Class 3- Video Game and Face-to-face

Teacher: Ann Pohira-Vieth

Subject/Class: Physical Education

Unit Name: Golf

Lesson Title: Full Swing Irons- *Both Video Game and Face-to-face*

Grade level expectation: 4th-6th grade

1. Write the Objective- The students will continue practice a full swing with a 7-iron and 5-iron. Students will be learning on the Nintendo Wii as well as outside and will each be given time to practice both skills.
2. Introduce the Lesson- Review proper grip techniques and stances. Objective- Talk about keeping score in golf and what shots count as well as the order of play. Explain the differences between stroke play and match play and the United States Golf Association and the Professional Golfers Association.
3. Present the Content- Begin with explaining terms such as par, bogey, birdie, and eagle. Then explain the differences between stroke play and match play and the United States Golf Association and the Professional Golfers Association.

Learning Activities

- Give students examples of someone's shots on a hole and ask for the score.
- Review grip techniques and alignment
- Students will first play a mini game called Target on the Wii
- Students are each given three balls to hit and can pick any target, then rotate (two rotations)
- Points are awarded for each target hit and points are taken away for shots hit out of bounds or in the water
- Let one student at a time hit- approximately five shots then rotate (two rotations)
- Review specialty shots and their names- slice and fade; draw and hook; whiff

Only one student at a time will be able to practice on the Wii and only one student will hold onto a golf club for safety. Students carrying golf clubs will carry the golf club by the club head. The whole class will work on this together. Students not participating must watch.

4. Practice and Feedback-Students will be practicing their golf swing through guided practice with other students and the teacher. During the first rotation give feedback on every shot hit. During the second rotation, let the students hit and try to figure out their own mistakes.
5. Summarize the Lesson-Ask the students to explain the difference between match play and stroke play. Review bogey, par, birdie, and eagle as well as the USGA and the PGA.

6. Assess Student Learning- The next class period review with students to see if they remember the different formats of play and alternate names for golf scores.

Lesson Plan- Class 4- Video Game and Face-to-face

Teacher: Ann Pohira-Vieth

Subject/Class: Physical Education

Unit Name: Golf

Lesson Title: Full Swing Woods- *Face-to-face*

Grade level expectation: 4th-6th grade

1. Write the Objective- The students will continue practicing a full swing with a wood. Students will be learning outside and will each be given time to practice.
2. Introduce the Lesson- Review proper grip techniques and stances. Objective- Practice full swing and explain the different names of golf clubs and the purpose of each club.
3. Present the Content- Begin with explaining how woods were given the name and their purpose. Talk about which golf clubs go farther and how many clubs are allowed to be in a golf bag. Show the students a golf tee and explain when it is used.

Learning Activities

- Review grip techniques and alignment
- Let one student at a time hit- approximately five shots then rotate (rotate four times)

Only one student at a time will hold onto a golf club for safety. Students carrying golf clubs will carry the golf club by the club head. The whole class will work on this together.

4. Practice and Feedback-Students will be practicing their golf swing through guided practice with other students and the teacher. During the first rotation give feedback on every shot hit. During the second rotation, let the students hit and try to figure out their own mistakes. Before students start the third round of rotation, remind the students how to properly swing and guide them through the rotation. Allow students to practice without feedback on fourth rotation.
5. Summarize the Lesson-Ask the students to explain the difference between golf clubs.
6. Assess Student Learning- The next class period review with students to see if they remember the difference between the types of golf clubs.

Lesson Plan- Class 5- Video Game and Face-to-face

Teacher: Ann Pohira-Vieth

Subject/Class: Physical Education

Unit Name: Golf

Lesson Title: Playing the game- *Video Game*Grade level expectation: 4th-6th grade

1. Write the Objective- The students will continue practicing a full swing with all golf clubs and play a round of Tiger Woods Golf on the Nintendo Wii.
2. Introduce the Lesson- Review keeping score and different formats of play. Objective- Put the golf skills learned to the test by playing golf.
3. Present the Content- Begin by reviewing keeping score and explain what the terms twosome, threesome, foursome, and fivesome, as well as fore means.
Learning Activities
 - Students will use the Play now version of Tiger Woods
 - Students will play in threesomes and alternate holes so that all six students in a group will play the same amount of holes
4. Practice and Feedback-Students will be given feedback during the first hole. Feedback for holes two, three, and four will be given after the holes are completed.
5. Summarize the Lesson-Ask the students to explain who had the lowest score.
6. Assess Student Learning- The next class period will be posttests.

APPENDIX I

COVER LETTER FOR CONSENT AND ASSENT FORMS FOR PILOT STUDY

February 7, 2008

Dear Student:

My name is Ann Pohira-Vieth. I am a doctoral student at the University of Southern Mississippi. I am asking you to participate in a pilot study that will measure golf knowledge. This pilot study will be conducted during class time and will take about 10 minutes to complete.

I am asking you and your parents to read the attached consent form. Both you and your parents need to sign this form if you would like to participate in this pilot study. If you do not turn in this form you will not be allowed to participate in the pilot study.

If after you return the attached form with signatures, you may still decide not to participate in this pilot study. Just let your teacher know that you have changed your mind. Those students who do not return their forms or decide not to take part in the pilot study will be given another assignment while the pilot study takes place.

Your participation in the study will not affect your grades in any way. You will receive nothing for your participation. To protect your confidentiality, your name will not appear in any part of the study.

If you have any questions about this study, please feel free to call or Email me at (407) 620-7842 or pohira@hotmail.com.

Sincerely yours,

Ann Pohira-Vieth

APPENDIX J

CONSENT AND ASSENT FORM FOR PILOT STUDY

**THE UNIVERSITY OF SOUTHERN MISSISSIPPI
CONSENT AND ASSENT FORM
AUTHORIZATION TO PARTICIPATE IN RESEARCH PROJECT**

Consent is hereby given to participate in the pilot study titled: The modified golf knowledge test.

1. **Purpose:** The purpose of this pilot study is to investigate the reliability and validity of the modified golf test. Results from this pilot study will be used to determine the usefulness of this test. This test will then be used in another study to measure elementary school students' basic golf knowledge.
2. **Description of Study:** Participants in this pilot study will be asked to complete a short golf knowledge test. The test is primarily made up of true or false statements.
3. **Benefits:** Students participating in this pilot study will be tested on their basic golf knowledge and will be practicing reading comprehension.
4. **Risks:** There are no known risks by participating in this pilot study.
5. **Confidentiality:** The names of students will not be used in reporting the results of this study. The gender, age, and grade level of the participants may be used.
6. **Alternative Procedures:** Those who cannot or chose not to participate in this study will be given an alternative assignment and will not be penalized for not participating.
7. **Participant's Assurance:** Whereas no assurance can be made concerning results that may be obtained (since results from investigational studies cannot be predicted) the researcher will take every precaution consistent with the best scientific practice. Participation in this project is completely voluntary, and participants may withdraw from this study at any time without penalty, prejudice, or loss of benefits. Questions concerning the research should be directed to researcher, Ann Pohira-Vieth at (407)-620-7842. This project and this consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820. A copy of this form will be given to the participant.
8. **Signatures:** In conformance with the federal guidelines, the signature of the participant and parent or guardian must appear on all written consent documents. The University also requires that the date and the signature of the person explaining the study to the subject appear on the consent form

Signature of the Minor Research Participant

Date

Signature of Parent/Guardian

Date

Participant's Initials _____

Signature of the Person Explaining the Study

Date

APPENDIX K

COVER LETTER FOR CONSENT AND ASSENT FORMS FOR PRIMARY STUDY

January 10, 2008

Dear Student:

My name is Ann Pohira-Vieth. I am a doctoral student at the University of Southern Mississippi. I am asking you to participate in a project that examines the impact golf video games have on teaching golf in physical education. My project will be examining if video games make it easier for students to learn how to play sports.

I am asking you and your parents to read the attached consent form. Both you and your parents need to sign this form if you would like to participate in this study. If you do not turn this form in you will not be allowed to participate in the study. Additionally, you may quit this study at any time by letting you teacher know. Your participation in the study will not affect your grades in any way. You will receive nothing for your participation. To protect your confidentiality, your name will not appear in any part of the study.

If you have any questions about this study, please feel free to call or email me at (407) 620-7842 or pohira@hotmail.com.

Sincerely yours,

Ann Pohira-Vieth

APPENDIX L

CONSENT AND ASSENT FORM FOR PRIMARY STUDY

**THE UNIVERSITY OF SOUTHERN MISSISSIPPI
CONSENT AND ASSENT FORM
AUTHORIZATION TO PARTICIPATE IN RESEARCH PROJECT**

Consent is hereby given to participate in the study titled: The impact of golf video games on teaching golf in physical education

1. **Purpose:** The purpose of this study is to investigate whether golf video games are useful in teaching beginning golfers how to play golf. Recently there has been a trend to incorporate video games into physical activity classes and this study will determine whether or not sports video games would be a practical addition to these classes. Results from this study may be presented at national conferences or published in related educational journals.

2. **Description of Study:** Participants in this study will be tested twice on their general knowledge and ability to play golf. Participants in the study will learn how to play golf during five 45-minute time periods during the student's normal P.E. class meeting with the researcher once or twice a week.

3. **Benefits:** Students participating in this study will have the opportunity to learn how to play golf.

4. **Risks:** Participants that have epilepsy will not be allowed to participate in this study because of the potential of having a seizure during the play of a video game. Any additional risks that may coincide with this study would be physical due to the nature of the game of golf.

To ensure the safety of participants, this study will be conducted in small groups and with qualified supervision. The University of Southern Mississippi has no mechanism to provide compensation for participants who may incur injuries as a result of participating in research projects. If an injury does occur, such as someone getting hit by a golf ball or golf club, the school's risk management plan will be followed and the student will receive immediate emergency medical attention.

5. **Confidentiality:** The names of students will not be used in reporting the results of this study. The gender, age, and grade level of the participants may be used.

6. **Alternative Procedures:** Those who cannot or chose not to participate in this study will be given an alternative assignment and will not be penalized for not participating.

8. **Participant's Assurance:** Whereas no assurance can be made concerning results that may be obtained (since results from investigational studies cannot be predicted) the researcher will take every precaution consistent with the best scientific practice. Participation in this project is completely voluntary, and participants may withdraw from this study at any time without penalty, prejudice, or loss of benefits. Questions concerning the research should be directed to researcher, Ann Pohira-Vieth at (407)-620-7842. This project and this consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820. A copy of this form will be given to the participant.

REFERENCES

- Aaronson, L. (2007). The Wii's wild controller. *Popular Science*, 270(4), 62-63.
- Abandonia. (n.d.) *Where in the World is Carmen Sandiego*. Retrieved October 30, 2007, from <http://www.abandonia.com/en/games/13>
- Accommodations and Modifications for Students with Disabilities Project. (2000). *Teaching resources for Florida ESE*. Retrieved December 5, 2007, from Florida State University, Learning Systems Institute Web site: <http://www.cpt.fsu.edu/ese/in/desin/desmain.html>
- Adams, S.J. (2000). A comparison of computer-based and teacher-directed instruction on performance of the full golf swing. (Doctoral dissertation, Middle Tennessee State University, 2001). *Dissertation Abstracts International*, 61(07), 2642.
- Adelson, A. (2008, July 27). PE classes explore new frontiers. *Orlando Sentinel*, pp. C1, C9.
- Alder, J. D. (1976). Golf—A lifetime sport on the move. *Journal of Physical Education and Recreation*, 47(9), 24-25.
- America's Digital Schools. (2006). The Greaves Group, The Hayes Connection. (Available from MDR, 66 Armstrong Rd., Shelton, CT 06484)
- Anderson, C.A., Funk, J.B., & Griffiths, M.D. (2004). Contemporary issues in adolescent video game playing: Brief overview and introduction to the special issue. *Journal of Adolescence*, 27(1), 1-3.
- Answers.com. (2008). Hoover's Profile: LeapFrog Enterprises, Inc. Retrieved February 11, 2008, from <http://www.answers.com/topic/leapfrog-enterprises-inc?cat=bizfin>
- Appleman, R. L. (2007, November 14). Game controller research [Msg 005005].

Message posted to Games Research Network <https://listserv.uta.fi/cgi-bin/wa?A0=GAMESNETWORK>

- Ashy, M. H., Lee, A. M., & Landin, D. K. (1989). Relationship of practice using correct technique to achievement in a motor skill. *Journal of Teaching in Physical Education, 7*, 115-120.
- Baker, D., Prince, C., Shrestha, L., Oser, R., & Salas, E. (1993). Aviation computer games for crew resource management training. *International Journal of Aviation Psychology, 3*(2), 143-156.
- Baranowski, T., Baranowski, J., Cullen, K. W., Marsh, T., Islam, N., Zakeri, I., Honess-Morreale, L., & deMoor, C. (2003). Squire's quest!: Dietary outcome evaluation of a multimedia game. *American Journal of Preventive Medicine, 24*(1), 52-61.
- Barker, S.P. (1988). Comparison of effectiveness of interactive videodisc versus lecture-demonstration instruction. *Physical Therapy, 68*(5), 699-703.
- Baumann, M. (2007). Slimming down with Wii Sports. *Information Today, 24*(4), 47.
- Bennett-Walker, S. (2006). *Technology use among physical education teachers in Georgia public schools*. (Doctoral dissertation). Retrieved December 2, 2007, from ProQuest Digital Dissertations database. (Publication No. AAT 3257001).
- Benson, D.W. (1963, March). *Measuring golf ability through use of a number five-iron test*. Paper presented at the Annual California Association of Health, Physical Education and Recreation State Conference, Long Beach, CA.
- Bonisteel, S. (2008, May 22). Wii fit: Gonna make you sweat. FoxNews.com. Retrieved February 5, 2009, from <http://www.foxnews.com/story/0,2933,356887,00.html>
- Brown-Syed, C., Adkins, D., & Tsai, H. (2005). LIS student learning styles and web-

- based instruction methods. *Journal of Library & Information Services in Distance Learning*, 2(1), 5-26.
- Bulik, B. S. (2007). Chips, dip and Nintendo Wii. *Advertising Age*, 78(34), 4-23.
- Buxton, B.P., Speitel, T.W., & Holgen, K.A. (1995). Comparison of effectiveness of an interactive computer enhancement program versus textbooks for practical application of athletic training assessment skills. *Journal of Athletic Training*, 30(2), S-27.
- Carstens, A., & Beck, J. (2005). Get ready for the gamer generation. *TechTrends: Linking Research & Practice to Improve Learning*, 49(3), 22-25.
- Castelli, D., & Dawkins, M. (2002). Initiate, investigate, deliberate: A process of inquiry approach to meeting standards in a middle school golf unit. *Teaching Physical Education*, 13(5), 22-26.
- Castle, R. R. (2000). *The effectiveness of a computer program and other factors in predicting students' success on the written simulation section of the N.A.T.A.B.O.C., Inc. Certification Examination*. (Doctoral dissertation). Retrieved October 10, 2008, from ProQuest Digital Dissertations database. (Publication No. AAT 3000233).
- Charsky, D., & Mims, C. (2008). Integrating commercial off-the-shelf video games into school curriculums. *Tech Trends*, 52(5), 38-44.
- Chiodo, J. J., & Flaim, M. L. (1993). The link between computer simulations and social studies learning: Debriefing. *Social Studies*, 84(3), 119-121.
- Ciavarro, C. (2005). *The design, development and assessment of an educational sports-*

action video game: Implicitly changing player behaviour. (Master's thesis).

Retrieved December 2, 2007, from ProQuest Digital Dissertations database.

(Publication No. AAT MR23976).

Clarke, H.H. (1967). *Application of measurement to health and physical education* (4th ed.). Englewood Cliffs, NJ: Prentice Hall.

Clarke, H.H., & Clarke, D. H. (1987). *Application of measurement to health and physical education* (6th ed.). Englewood Cliffs, New Jersey: Prentice Hall Inc.

Cleveland, J.N., & Thornton, C.G. (1990). Use of simulations in management development: Reciprocity between science and practice. In K.R. Murphy & F.E. Saal (Eds.), *Psychology in organizations* (pp. 111-131). Hillsdale, NJ: Lawrence Erlbaum.

CNN.com/technology. (2007). Future cars will help seniors drive. Retrieved February 10, 2008, from <http://www3.cnn.com/2007/TECH/12/20/cars.for.seniors.ap/index.html>

Coker, C.A. (2009). *Motor learning & control for practitioners*. Scottsdale, AZ: Holcomb Hathaway.

Collins, D.R., & Hodges, P.B. (1978). *A comprehensive guide to sports skills tests and measurements*. Springfield, IL: Bannerstone House.

Coventry, J. (2007). Educating computing for the masses. SiliconUser.com. Retrieved October 25, 2007, from <http://web.archive.org/web/20070628002639/siliconuser.com/?q=node/12>

Cotton, S., Ahmadi, R.T., & Esselborn, R. A. (1997). Assessing simulation games for the classroom. *Assessment Update*, 9(3), 6-8.

Cummings, H. M., & Vandewater, E.A. (2007). Relation of adolescent video game play

- to time spent in other activities. *Archives of Pediatrics & Adolescent Medicine*, 161(7), 684-689.
- Curtner-Smith, M.D. (1996). Using games invention with elementary children—
Teaching for understanding: Tactical approaches to teaching games. *Journal of Physical Education, Recreation and Dance*, 67(3), 33-37.
- Czarnecki, K. (2007). The big three. *School Library Journal*, 53(8), 30-31.
- Dale, G. A. (1997). Dealing with distractions. *Coach & Athletic Director*, 66(9), 4-6.
- Davies, L. (2008). Gaming for social change. *Afterimage*, 36(1), 4.
- Davis, J.B., & Davis, A.B. (2000). *Managing your own learning*. San Francisco: Berrett-Koehler.
- Deubel, P. (2006). Game on! *T.H.E. Journal*, 33(6), 30-35.
- DDR Game.com (2007). Retrieved December 2, 2007, from
<http://www.ddrgame.com/info.html>
- Di Meglio, F. (2008, January 31). Virtual workplaces in the classroom. *Business Week Online*, p. 23. Retrieved April 2, 2008, from EBSCOhost database.
- Din, F., & Caleo, J. (2000, February). Playing computer games versus better learning. Paper presented at the Annual Conference of the Eastern Educational Research Association, Clearwater, FL. (ERIC Document Reproduction Service No. ED438905)
- Do interactive video games stimulate enough activity? (2009). *Journal of Physical Education, Recreation, & Dance*, 80(6), 3.
- Dreher, B. (2005). Video games that move you. *Health*, 19(8), 52.
- DuBois, P. (1970). *A history of psychological testing*. Boston: Allyn & Bacon.
- EA Sports. (2007). Tee off with Tiger Woods PGA Tour 08 as it hits retail stores today.

- Tiger 08 Recent News*. Retrieved November 29, 2007, from <http://www.easports.com/tigerwoods08/news.jsp>
- Egenfeldt-Nielsen, S. (2005). *Beyond edutainment: Exploring the educational potential of computer games*. Unpublished dissertation, IT-University of Copenhagen, Copenhagen.
- Electronic Arts Inc. (2006). *Tiger Woods PGA Tour 08*. [Video game]. Redwood City, CA: Electronic Arts Inc.
- Exercise to video games. (2005). *Sports 'n Spokes Magazine*, 31(3), 78.
- Faria, A.J. (1987). A survey of the use of business games in academia and business. *Simulation and Games*, 18, 192-206.
- Farrel, M.J., Arnold, P., Pettifer, S., Adams, J., Graham, T., & MacManamon, M. (2003). Transfer of route learning from virtual to real environments. *Journal of Experimental Psychology: Applied*, 9, 219-227.
- Gallaway, B., & Lauson, A. (2006). I can't dance without arrows: Getting active @ your library with video game programs. *Young Adult Library Services*, 4(4), 20-25.
- Gamershell.com. (2008). *Big Brain Academy released*. Retrieved October 5, 2008, from http://www.gamershell.com/news_30728.html
- Gamespot.com. (2007). Wii games. *CNET Networks entertainment*. Retrieved December 1, 2007, from <http://www.gamespot.com/games.html?type=games&platform=1031&tag=subnav;all>
- Gardner, H. (2006). *Multiple intelligences: New horizons*. New York: Basic Books.
- Gee, J. P. (2003). From video games, learning about learning. *Chronicle of Higher Education*, 49(41), B13.
- Gee, J. P. (2004). *Situated language and learning: A critique of traditional schooling*.

London: Routledge.

Gee, J. P. (2005). Good video games and good learning. *Phi Kappa Phi Forum*, 85(2), 33-37.

Geeks get fit with the Le Parker Meriden's Wii workout. (2008). HotelChatter.com.

Retrieved April 2, 2008, from <http://www.hotelchatter.com/story/2008/3/31/12>

4016/013/hotels/Geeks_Get_Fit_with_the_Le_Parker_Meridien_s_Wii_Workout

Gentile, D.A. (2004). The effects of violent game habits on adolescent hostility,

aggressive behaviors, and school performance. *Journal of Adolescence*, 27(1), 5-22.

Greenwood, M., & Stillwell, J. (2001). Activity preferences of middle school physical education students. *Physical Educator*, 58(1), 26-29.

Griffey, D.C., & Housner, L.D. (2007). *Designing effective instructional tasks for physical education and sports*. Champaign, IL: Human Kinetics.

Gunter, B. (1998). *The effects of video games on children: The myth unmasked*.

Sheffield, UK: Sheffield Academic Press.

Hayes, E., & Silberman, L. (2007). Incorporating video games into physical education.

Journal of Physical Education, Recreation & Dance, 78(3), 18-24.

Henning, J.M., Lesperance, M., & Harris, J.D. (2007). Developing computer simulations for student assessment. *Athletic Therapy Today*, 12(3), 23-26.

Herndon, K. (2008, April 10). Virtual students test mettle at academy. *Orlando*

Sentinel, p. H3.

Hesketh, K. Wake, M., Graham, M., & Waters, E. (2007). Stability of television viewing and electronic game/computer use in a prospective cohort study of

Australian children: relationship with body mass index. *The International*

Journal of Behavioral Nutrition and Physical Activity, 27(4), 71-85.

Hildebrand, K.M., & Johnson, D.J. (2001). Determinants of college physical activity

class enrollment: Implications for high school physical education. *Physical*

Educator, 58(1), 51-56.

Hogle, J. (1996). Considering games as cognitive tools: In search of effective

“edutainment.” Athens: University of Georgia, Department of Instructional

Technology. (ERIC Document Reproduction Service No. ED425737)

Hoye, S. (2007). Game plan. *Chronicle of Philanthropy*, 19(7), 40.

Interest in gaming grows with focus on competitiveness, engagement and critical

thinking. (2007). *Electronic Education Report*, 14(12), 1-3.

Jenkins, H. (2002, March 29). Game theory. *Technology Review*. Retrieved November

14, 2007, from <http://www.technologyreview.com/Energy/12784/>

Jenkins, L. (2007). No more kid stuff. *Sports Illustrated*, 107(15), 32-37.

Jentsch, F., & Bowers, C. A. (1998). Evidence for the validity of PC-based simulations

in studying aircrew coordination. *International Journal of Aviation Psychology*,

8(3), 243-260.

Kaiser Family Foundation. (2002). Children and video games. Retrieved February 6,

2008, from <http://www.kff.org/entmedia/3271-index.cfm>

Kids in West Virginia dance dance for health. (2007). *Active Living*, 16(1), 28.

Kyriacou, C., & Wilkins, M. (1993). The impact of the national curriculum on teaching

methods at a secondary school. *Educational Research*, 35(3), 270-276.

LaMaster, K. (1998). Technology: Attitudes, efficacy, and use by practicing physical

education teachers. *Journal of Physical Education, Recreation & Dance*, 69(6),

21-24.

- LeapFrog Schoolhouse.com (2008). Instructional programs for the classroom. Retrieved February 11, 2008, from <http://www.leapfrogschoolhouse.com/do/findpage?pageKey=solutions>
- Lee, B. (2008). Fun & games. *American Fitness*, 25(7), 66.
- LeMerise, M., & Stryjecki, K. (1998). A stroke of luck: Quick slick golf. *Teaching Elementary Physical Education*, 9(3), 19-22.
- Leonard, A. A. (2008). Video games in education: Why they should be used and how they are being used. *Theory Into Practice*, 47(3), 229-239.
- Let's get physical. (2007, March 10). *Economist*, pp. 6-8.
- Lever-Duffy, J., McDonald, J.B., & Mizell, A. P. (2005). Teaching and learning with technology. San Francisco: Pearson.
- Lintern G., Roscoe, N., Koonce, J.M., & Segal, L.D. (1990). Transfer of landing skills in beginning flight training. *Human Factors*, 32, 319-327.
- Lintern, G., Sheppard, D.J., Parker, D.L., & Yates, K.E. (1989). Simulator design and instructional features for air to ground attack: A transfer study. *Human Factors*, 27, 241-250.
- Long, C. (2007). Educators got game. *NEA Today*, 26(2), 42-43.
- Lucas Learning. (2007). Company mission. Retrieved November 28, 2007, from http://www.lucaslearning.com/aboutus/about_mission.htm
- Lund, J., & Tannehill, D. (2005). *Standards-based physical education curriculum development*. Sudbury, MA: Jones and Bartlett.
- Magill, R.A. & Hall, K.G. (1990). A review of the contextual interference effect in motor skill acquisition. *Human Movement Science*, 9, 241-289.
- Maroto, J., Delso, E., Cabanellas, M., & Felez, J. (2006). A microscopic model of urban

- traffic for implementation in driving simulators. *Proceedings of the Institution of Mechanical Engineers—Part D—Journal of Automobile Engineering*, 220(10), 1345-1361.
- Mayo, M. (2007). Games for science and engineering education. *Communications of the ACM*, 50(7), 30-35.
- McGinnis, M. (2008). *Burn calories like a kid*. *Prevention*, 60(3), 106.
- McKenzie, B., & Croom, A. (1994). Video and the physical education curriculum; Creative classroom application. *Physical Educator*, 51(3), 138-144.
- Middlemans, D. A., & Ford, M. L. (2005). Teaching high-risk clinical competencies: Simulations to protect students and models. *Athletic Therapy Today*, 10(1), 23-25.
- Mishra, P., & Koehler, M. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017-1054.
- Mohnsen, B.S. (2008). *Teaching middle school physical education: a standards-based approach for grades 5-8* (3rd ed.). Champaign, IL: Human Kinetics.
- Moore, M.G. (2007). *Handbook of distance education*. Mahwah, NJ: Lawrence Erlbaum.
- National Center for Children Exposed to Violence. (2003). Media violence. Retrieved February 6, 2008, from <http://www.ncccev.org/violence/media.html>
- Nintendo.com (2007). Flash focus: Vision training in minutes a day. Retrieved February 10, 2008, from <http://www.nintendo.com/games/detail/jzDLc7ECGsrBaBRV9Ujs06hEWV-wJsj7>
- Nintendo.com (2008). Wii Fit: How will it move you? Retrieved February 5, 2009, from <http://www.nintendo.com/wiifit/>

- Okojie, M., Olinzock, A., & Okojie-Boulder, T. (2006). The pedagogy of technology integration. *Journal of Technology Studies*, 32(2), 66-71.
- O'Hanlon, C. (2007). Gaming: Eat breakfast, drink milk, play Xbox. *THE Journal*, 34(4), 34-39.
- Papastergiou, M. (2009). Exploring the potential of computer and video games for health and physical education: A literature review. *Computers & Education*, 53(3), 603-622.
- Partridge, A., Blair, E., & Leidman, M. (2007). Promoting physical activity within the elementary school curriculum through simulations and games. In C. Crawford et al.(Eds.), *Proceedings of Society for Information Technology and Teacher Education International Conference*, Chesapeake, VA: AACE. (pp.1230-1235).
- Pesce, M. (2000). *The playful world: How technology is transforming our imagination*. New York: Ballantine.
- PGA.com. (2007). About the PGA of America. Retrieved December 1, 2007, from <http://www.pga.com/home/pgaofoamerica/about-the-pga.cfm>.
- PGA Links. (2004). Education. Member service requirements. Retrieved July 14, 2004, from <http://www.pgalinks.com/memberonly2/001/msr.cfm>
- The PGA of America. (2004). A leadership role in golf. The PGA and you. Retrieved July 14, 2004, from <http://careernet.pgalinks.com/helpwanted/empcenter/pgaandyou/aboutpga.cfm>
- PGA Pacific Northwest Section. (2000). Member services. Retrieved February 7, 2008, from <http://www.pnwpga.com/memberservices.htm>
- Play Golf America. (2008). Five-year report: 2004-2008. Palm Beach Gardens, FL: The PGA of America.

- Play video games; they're educational. (2007). *American School Board Journal*, 194(1), 45-47.
- Ploszay, A.J., Gentner, N.B., & Skinner, C.H. (2006). The effects of multisensory imagery in conjunction with physical movement rehearsal on golf putting performance. *Journal of Behavior Education*, 15(4), 247-255.
- Prensky, M. (2005). Listen to the natives. *Educational Leadership*, 63(4), 8-13.
- Reed, M.P., & Green, P.A. (1999). Comparison of driving performance on-road and in a low-cost simulator using a concurrent telephone. *Ergonomics*, 42(8), 1015-1038.
- Renwick, L. (2006). Tech trends. *District Administration*, 42(10), 40-44.
- Ricci, K., Salas E., & Cannon-Bowers, J. (1996). Do computer-based games facilitate knowledge acquisition and retention? *Military Psychology*, 8(4), 295-307.
- Rifkin, A. (1994). eText: An interactive environment for learning parallel programming. *ACM SIGCSE Bulletin*, 26(1), 281-285.
- Rink, J.E. (2009). *Designing the physical education curriculum: Prolonging active lifestyles*. New York: McGraw-Hill.
- Salas, E., & Cannon-Bowers, J. (2001). The science of training: A decade of progress. *Annual Review of Psychology*, 52, 471-490.
- Sanders, K., & Casamassina, M. (2006). US Wii price, launch date revealed: The news we've all been waiting for. IGN Entertainment Games. Retrieved November 20, 2007, from <http://wii.ign.com/articles/732/732669p1.html>
- Schmidt, R. A., & Lee, T. D. (1999). *Motor control and learning: A behavioral emphasis*. Champaign, IL: Human Kinetics.
- Schmidt, R.A., & Wrisberg, C.A. (2000). *Motor learning and performance: A problem-based learning approach*. Champaign, IL: Human Kinetics.

- Schmucker, K. (1999). *A taxonomy of simulation software*. Retrieved October 21, 2003, from <http://www.apple.com/education/LTReview/spring99/simulation>
- Schrand, T. (2008). Tapping into active learning and multiple intelligences with interactive media: A low-threshold classroom approach. *College Teaching, 56*(2), 78-84.
- Scott, S. A., & Gray, R. D. (2007). Specificity of practice in baseball batting. *Journal of Sport & Exercise Psychology, 29*, S126-S127.
- Siedentop, D., & Tannehill, D. (2000). *Developing teaching skills in physical education* (4th ed.). Mountain View, CA: Mayfield.
- Sell, K., Lillie, T., & Taylor, J. (2008). Energy expenditure during physically interactive video game playing in male college students with different playing experience. *Journal of American College Health, 56*(5), 505-512.
- Slowikowski Sydnor, S. (1993). The culture of Nintendo- Another look. *Play & Theory Research, 1*(1), 1-16.
- Stager, G. (2007). Edugaming—A bad idea for all ages. *District Administration, 43*(5), 80.
- Stahl, L. (2008). Prolonged Wii use can lead to injuries. AZCentral.com. Retrieved February 8, 2008, from <http://www.azcentral.com/ent/pop/articles/0125wiiinjuries0125.html>
- Stettler, N., Singer, T.M., & Suter, P.M. (2004). Electronic games and environmental factors associated with childhood obesity in Switzerland. *Obesity Research, 12*, 896-903.
- Stork, S., & Sanders, S.W. (2002). Why can't students just do as they're told! An

- exploration of incorrect responses. *Journal of Teaching in Physical Education*, 21(2), 202-228.
- Study shows video game improved health. (2008, March 16). *The New-Press*, p. A21.
- Sydnor, S. (2001). New times, physical education, and cyberspace. *Journal of Sport and Social Issues*, 25(4), 430-436.
- Tkacz, S. (1998). Learning map interpretation: Skill acquisition and underlying abilities. *Journal of Environmental Psychology*, 18, 237-249.
- Thornton, G. C., & Byham, W.C. (1982). *Assessment centers and managerial performance*. New York: Academic Press.
- Townsend, J., & Gurvitch, R. (2002). Integrating technology into physical education: Enhancing multiple intelligences. *Teaching Elementary Physical Education*, 13(2), 35-39.
- Tracy, K. (2001). Lightspan and Sony put video games in the classroom. *KidScreen Magazine*. Retrieved February 3, 2008, from <http://www.kidscreen.com/articles/magazine/20011001/lightspan.html>
- Trout, J., & Christie, B. (2007). Interactive video games in physical education. *Journal of Physical Education, Recreation & Dance*, 79(5), 29-34.
- USGA. (n.d.). Handicapping FAQs: Section 3 establishing a handicap index. *United States Golf Association*. Retrieved December 1, 2007, from http://www.usga.org/questions/faqs/handicap_answer.asp?FAQidx=3
- Using gaming equipment to teach (2009). *Curriculum Review*, 48(6), 10.
- Vandewater, E.A., Shim, M., & Caplovitz, A.G. (2004). Linking obesity and activity level with children's television and video game use. *Journal of Adolescence*, 27(1), 71-85.

- Van Eck, R.N., (2000). The effect of advisement and competition on transfer, advisor use and attitude toward mathematics using a computer-based simulation game. *Dissertation Abstracts International Section A: Humanities and Social Sciences*, 61, 146.
- Video games to help brain and body. (2007). *Consumer Reports on Health*, 19(9), 6.
- Virilio, P. (1997). *Open sky*. London: Verso.
- Vogel, J., Greenwood-Ericksen, A., Cannon-Bowers, J., & Bowers, C. (2006). Using virtual reality with and without gaming attributes for academic achievement. *Journal of Research on Technology in Education*, 39(1), 105-118.
- Vogel, J., Vogel, D., Cannon-Bowers, J., Bowers, C., Muse, K., & Wright, M. (2006). Computer gaming and interactive simulations for learning: A meta-analysis. *Journal of Educational Computing Research*, 34(3), 229-243.
- VTech.com (2008). Inside VTech. Retrieved February 11, 2008, from http://www.vtechkids.com/inside_vtech.cfm
- Waglow, I.F., & Rehling, C.H. (1953). A golf knowledge test. *Research Quarterly*, 24(4), 463-470.
- Walkley, J.W., & Kelly, L.E. (1989). The effectiveness of interactive videodisc qualitative assessment training program. *Research Quarterly for Exercise & Sport*, 60(3), 280-285.
- Ward, L. (2006). Hi-tech toys offer no educational gain, say researchers. *EducationGuardian.co.uk*. Retrieved February 11, 2008, from <http://education.guardian.co.uk/elearning/story/0,,1947376,00.html>
- Wardlaw, P. (2000). *Pressure tennis*. Champaign, IL: Human Kinetics.
- Wiksten, D.L., Patterson, P., Antonio, K., De La Cruz, D., & Buxton, B.P. (1998). The

effectiveness of an interactive computer program versus traditional lecture in athletic training education. *Journal of Athletic Training*, 33(3), 238-243.

Williams, R. (1993). Market exchange and wealth distribution: A classroom simulation. *Journal of Economic Education*, 24(4), 325-334.

Zyda, M. (2007). Creating a science of games. *Communications of the ACM*, 50(7), 26-29.

