THE EFFECTS OF VIDEO MODELING AND VIDEO FEEDBACK ON OBJECT CONTROL SKILLS FOR INDIVIDUALS WITH AUTISM SPECTRUM DISORDER

By

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ABSTRACT

THE EFFECTS OF VIDEO MODELING AND VIDEO FEEDBACK ON OBJECT CONTROL SKILLS FOR INDIVIDUALS WITH AUTISM SPECTRUM DISORDER

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The purpose of this study was to analyze the impact of video modeling combined with immediate video feedback on the performance of object control skills used in the game of basketball for students with autism spectrum disorder (ASD). Two male students aged 12 and 13, who had a previous diagnosis of ASD and attended a middle school in Northern California were recruited for this study. A multiple baseline across behaviors single case design was used to determine the impact of the interventions on the performance of the basketball skills. Results from this study suggest that the combined use of video modeling and video feedback have a positive effect on object control skills for individuals with ASD. Researchers moving forward should extend the interventions focus on a combination of skills and other combinations of video-based instruction and associated disabilities.

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CHAPTER ONE

Introduction

Autism spectrum disorder (ASD) is a neurodevelopment disorder that impacts at various levels the social and communication development of individuals, while also causing persistent and repetitive movements (Frith & Happe, 2005). Additionally, researchers have reported that individuals with ASD demonstrate motor skill deficits when compared to their typically developing peers (Berkeley et al., 2001; Lloyd et al., 2011; Pan et al., 2009). Due to these limitations individuals with ASD may not have the same opportunities to enjoy the benefits of an active lifestyle as they mature and instead resort to sedentary behaviors that can negatively impact their long-term health (MacDonald et al., 2011). The Individuals with Disability Education Act (IDEA; 2004) mandates that all children receive free and appropriate education and are provided with the least restrictive learning environment. Additionally, IDEA (2004) mandates that all teachers use evidence-based practices (EBPs) when working with students including those with ASD. Adolescents with ASD have shown to benefit from visual cues, such as video-based instruction across to improve social skills (Apple, Billingsley, & Schwartz, 2005; Detar & Vernon, 2020; Hodgon, 1995) vocational skills (English et al., 2017) and physical activity (Case & Yun, 2005). Despite video modeling being an evidence-based practice to teach social and behavioral skills, there is limited research to suggest that video modeling is an effective teaching strategy to improve motor skills for those with

ASD (Case & Yun, 2018). Video modeling as a type of video-based instruction was identified as an EBP in 2004 by the National Professional Development Center on Autism Spectrum Disorder (NPDC).

Video modeling involves observing others perform a skill through a video representation as opposed to a live demonstration (Bellini & Akulian, 2007). Video feedback involves showing an individual performing the skill a video clip of his or her own performance (Donovan, 2020) Video feedback (VBF) is another form of video-based instruction that has also been shown to have positive results in the learning and performance of exercise and object control skills for amateur athletes (Maryam et al., 2008 & Reo et al., 2004). Research indicates that similar studies with the combined use video modeling and video feedback as an intervention help to improve skill performance more quickly than regular practice and coaching alone for amateur athletes (Boyer et al., 2009). However little research has used these combined interventions on those with ASD. Reinforcement is also one of twenty-seven evidence-based practices for individuals with ASD (Sam, A. Et al. 2020). Verbal praise through the use of computer-based video models has been shown to be effective in teaching fine and gross motor skills for individuals with ASD (Mechling & Swindle, 2012).

CHAPTER TWO

Literature Review

<u>Autism Spectrum Disorder</u>

Autism spectrum disorder (ASD) is a developmental disability that can cause a wide range of challenges in social interaction, the ability to communicate ideas and feelings, imagination, and the establishment of relationships with others (*Educating Children With Autism*, 2001). The *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5)* defines ASD as the occurrence of persistent impairments in social interaction and the presence of restricted, repetitive patterns of behaviors, interests, or activities (CDC, 2014). Autism Spectrum Disorder is present from birth or early in development. There is an estimated 5,437,988 (2.21%) of adults in the United States diagnosed with ASD (CDC, 2014). The state with the greatest number of individuals with ASD is California with an estimated 701,669 individuals diagnosed (CDC.GOV).

There is rising prevalence in individuals diagnosed with autism (Kim YS., et al., 2011). Men are four times more likely to be diagnosed with ASD than women, however research findings have suggested that unfamiliarity with the clinical presentation of autism in females have played a leading role in how it is contextualized (Kočovská E., et. al, 2012). The prevalence rate of individuals with disabilities is about 1 in 6 children (17%), as reported by parents (Zablotsky B., et al. 2019). The prevalence rates for individuals with ASD have increased from 6.7 (one in 150) per 1,000 children to 18.5 (one in 54) over time (Maenner MJ, et al. 2021). There is approximately 1 in 68 (14.6 per one thousand) school-aged children who have been identified with ASD (CDC.GOV). Over the past 15-17 years, the prevalence rate of ASD has increased by 684%, or 43% per year on average (Cardinal, DN, et al. 2020). Due to the rising diagnosis of autism, it is important to better understand how to help individuals access the same recourses as their typically developing peers.

Physical Activity within Population.

According to the CDC, children and adolescents ages 6 through 17 should participate in 60 minutes or more of moderate to vigorous physical activity a day (CDC. GOV). Health statistics reveal that youth diagnosed with ASD are 40% more likely to be obese than their typically developing (TD) peers (Curtin et al., 2010). Research shows that individuals with ASD demonstrate lower physical fitness scores when compared to their TD peers (Pan et al., 2016). There are numerous health benefits to participating in regular physical activity during teenage years and adulthood (Ortega, et al., 2008). Low cardiorespiratory and muscular fitness levels are indicators of cardiovascular disease which is one of the leading causes of death in the United States (Ortega, et al., 2008). Previous research indicates that there are long term health benefits to physical activity and its role in preventing diseases such as, CHD, Type 2 diabetes, mellitus, dementia, and NCD (Reiner, et al., 2013). The education system plays a significant role in identifying children with low physical activity levels and encouraging positive behaviors such as, being active for 60 minutes a day (Ortega, et al., 2008).

There are different methods to identifying individuals with low physical activity levels. Adapted Physical Education is one of the ways that individuals with disabilities are provided services for more individualized instruction. Adapted physical education services include planning instruction and assessing individuals based on gross motor skill development (APENS.ORG). Assessments are standard based and involve assessing gross motor and object control skills. Some examples are the TGMD-3, BOT-2, and other teacher made assessments. This study will include a standard-based assessment tool used in *Everyone Can* (Kelly et al., 2020). Previous finding indicate that Adapted Physical Educators spend more time working on skills like staying engaged in motor skill development and physical activity and fitness activities (Jewett, 1989).

Research indicates that individuals with autism demonstrate motor skill deficits and delays when compared to their typically developing peers (Berkeley et al., 2001; Lloyd et al., 2011; Pan et al., 2009). Adolescents with ASD may be limited by deficits in motor skills to adopt an active lifestyle as they mature and there is an increasing concern on how sedentary lifestyles can impact long-term health for individuals with ASD (MacDonald et al., 2011). Youth with autism spectrum disorder are a group at risk for being overweight and obese. Previous data collected from the 2011-2012 National Survey of Children's Health (NSCH) have shown that obesity rates among individuals with autism (age 10-17) is 17 to 23%, while the prevalence rates for obesity among typically developing peers is approximately 15%. (Gillette et al., 2015). More recent data collected from the 2016 NSCH analysis of weight results have suggested that this number is remaining constant with 23.05% obese individuals with autism and 14.9%, among obese typically developing youth. Understanding the populations at risk can benefit those who collaborate with these individuals and allocate resources and provide better strategies (Skinner et al., 2016).

Motor Skill Development

Researchers have found that adolescents with autism demonstrate *poor* or *very poor* TGMD performances based on their locomotor and object control skills (Berkely, Zittel, Pitney & Nichols, 2001; Mache & Todd, 2016) Movement impairments are common with those with ASD compared to their typically developing peers (Green et al., 2009). One of the questions is whether these motor impairments are a result of delays or deficits in learning. Research suggests that movement skills of children with ASD are a result of deficits in addition to delays (Staples & Reid, 2010). If the case is that individuals with ASD are experiencing delays in motor performance, then they should be supported at a younger age and provided increased opportunities with guided practice to help learning (Staples & Reid, 2010). For instruction to be effective, it should need to be individualized to each student. Instructional strategies should focus on individuals preferred methods of communication so they can be successful (Staples et al. 2006).

Social Learning Theory

Modeling as a means of observational learning was introduced 40 years ago by Albert Bandura and his seminal work on social learning theory (Bandura, 1977). Bandura’s work revealed that children learn a variety of skills through the observation of other people performing those skills, rather than through personal experience (Bandura, 1977). Bandura’s theory states that there are four elements needed for modeling:

attention, retention, reproduction, and motivation. One vital component of Bandura's social learning theory is individuals are more likely to imitate a model if that are like themselves in some way (Bellini & Akullian, 2007). Bandura also recommends using a video model who is similar to the participants age, gender, and ability level for increased motivation. Video modeling is an intervention that focuses on observational learning and can teach a variety of skills and meet the educational needs of children with ASD (Delano, 2007).

Video Based Instruction

Individuals with ASD have shown to benefit from visual cues, such as video-based instruction across a number of different behaviors (Kagohara, 2010). Individuals with Autism fall under a particular subgroup of "visual learners" who understand tasks more easily when they are presented in a way that can be seen visually as opposed to it solely being verbal. Utilizing visual teaching strategies to mediate communication with individuals who are visuals learners, helps to build on their strengths and increases comprehension of tasks significantly (Hodgon, 1995). Research reported through the case of forty-four studies, reveal that there is general positive and conclusive evidence to support video-based instruction as a means of teaching a range of adaptive behaviors for children with ASD (Kagohara, 2009). According to the National Professional Development Center, Video based instruction has been identified as an Evidence Based Practice for children, youth, and young adults with ASD (NPDC, 2015. Odom et al., 2014). Although there is evidence to support the use of video based instruction, more research should observe the different methods that it can be administered for learning.

Video Modeling.

Video modeling, as an intervention, involves the leaner visually observing a model demonstrating a task through a video and then the learner imitating the behavior of the model (Bellini & Akullian, 2007). Video modeling has been identified as one of twenty-seven evidence-based practices shown to have positive results in behaviors for individuals with ASD (AFIRM, 2019). Video based models have been a tool to teach a wide variety of sport skill acquisitions and motor behaviors for many years (Franks & Maile, 1991). Individuals with ASD have varied from typically developing peers and individuals with extensive needs in previous video modeling research (Shipley, Lutzkey, Taubman, 2002). As previously mentioned, individuals with ASD typically exhibit social, communicational, and motivational deficits compared to their typically developing peers (CDC, 2014). These associated features can make children with ASD a challenging population to teach skills and behaviors (Shipley, Lutzkey, Taubman, 2002). Video modeling has been shown to be an effective teaching method due to its abilities to counteract the effects of *stimulus overselectivity*, which is defined as “an attentional deficit that involves the failure to utilize all of the important cues in an educational setting” (Koegel et al., 1989). Through this method, individuals with ASD are better able to focus on relevant stimuli which can lead to increasing independent skills which can be beneficial due to its it is natural reinforcements (Shipley, Lutzkey, Taubman, 2002).

Research suggest that Children with ASD or moderate intellectual disability improve upon fine and gross motor skills when receiving computer-based video models. Other studies have also shown that video modeling could be an effective method for teaching individuals with ASD skills evaluated in the Test of Gross Motor Skills-3 (TGMD-3) assessment (Case & Yun, 2018).

Although there is research showing that video modeling can be an effective strategy for individuals with ASD and their TD peers, previous research has also shown insignificant results. In a study examining the effects of the combined use of video modeling and video feedback on the learning of the tennis service by TD novices found no effect (Emmen et al., 1985). In another study comparing the use of verbal instruction and video tape replay (VM) methods on the overhand throw; found no significant differences between the two methods (Kernodle et al., 2001). Research has also examined the effects of visual aids (eg., video modeling) in comparison to verbal feedback only, on acquisition of tennis skills (eg., backhand and forehand serves) and found no statistically significant results, however they did find that video tape replay had merit and should be studied further to determine results (Miller & Gabbard, 1988).

Video Self Modeling.

Video Self Modeling (VSM) is a type of video modeling procedure which involves allowing the learner to observe themselves performing the task or adaptive behavior successfully (Dowrick, 1999). VSM was first introduced as an effective practice in the early 1970s (Creer & Miklich, 1970). Bandura has supported VSM in his social learning theory due to it providing the ability for an individual to observe themselves and to strengthen beliefs in one’s own capabilities (Bandura, 1997). The use of video self modeling requires a lot of time due to the editing that takes place only displaying positive behaviors or performance. This could be a reason why the research on this topic has been slow because of the technology and skills needed to develop the videos (Buggy & Ogle, 2012). Research on this topic has been emerging due to technological advances creating a more affordable and accessible ways of video editing (Buggy & Ogle, 2012). Study's utilizing a multiple baseline design across participants with VSM have shown to increase social initiations (Buggey et al., 2009) response to questions (Buggey et al., 1999) and functional skills (Cihak & Shrader, 2009) for individuals with ASD. Other studies with typically developing youth have used VSM and found positive results in balance-beam performance (Winfrey & Weeks, 1993) and volley ball setting and passing (Zetou et al., 2008). Although VSM has been shown to be effective for a variety of skills, more research should be done on its effectiveness in gross motor skills for those with ASD.

Video Feedback.

Video feedback (VFB) involves having the learner's performance filmed for a specific target behavior and then having the instructor and learner both review the footage together (English et al., 2017). VFB was introduced at Stanford University in the 1960s as a method for teaching soon after video recording was introduced (Allen, 1966). Confidence is a contributing aspect of video playback (VFB) due to the psychology of showing only positive results in teacher education (Fuller & Manning, 1973). In a multiple baseline design, VFB was shown to improve social skills (eg., total questions, conversational pauses, non preservative discussion, conversational reciprocity, and perceived confidence) for young adults with ASD (Detar & Vernon, 2020). VFB has also demonstrated its effectiveness in key professional skills to improve verbal, non-verbal, and paralingual aspects of communication (Fukkink G et al., 2010). Research has found that VM in conjunction with VFB has positive results for those with ASD in teaching vocational skills (English et al., 2017). Previous research suggests using video modeling (VM) as a multi-component intervention with VFB can be effective although it has not typically been used and there is limited research in its use (Anderson et al., 2016). The combination of VM and VFB has been shown to reduce practice time for individuals practicing a difficult to learn gross motor skill (eg., Gymnastics) for typically developing peers (Boyer et al., 2009). When compared to verbal feedback, video feedback demonstrated better results in object control skills. For example, results from a study showed that individuals with a video feedback intervention outperformed a group receiving verbal feedback in the skill of learning to a hammer and discus (Maryam et al., 2008). Although VFB has been shown to have positive results for a variety of skills, further research should examine which approaches are more effective, so that it could be applied to skills training for professionals (Fukkink G et al., 2010).

<u>Video Prompting.</u>

Another form of VBI, video prompting (VP), involves having the learner view a task being performed in a series of video clips, step by step, with opportunities to complete each step-in sequence before moving onto the next video clip (e.g., Mechling et al., 2009). In an alternating-treatments design comparing the use of video modeling and video prompting, the study found that VM was more effective and efficient in teaching on task behaviors for adolescents with autism spectrum disorder (Thomas et al., 2020). In another study comparing the effects of VM and VP, they found that VP was more effective in functional skills than VM, however the data suggests that the type of task and student characteristics play a role in its effectiveness (Mechling et al., 2014). Video prompting has been shown to be an effective intervention in teaching daily living skills to children with ASD (Domire & Wolfe, 2014).

Purpose

The purpose of this study is to analyze the effectiveness of combining video modeling with immediate video feedback on the development of object control skills used in basketball for individuals with autism spectrum disorder. We predict that the combined use of video modeling and immediate video feedback will have a positive effect on the development of object control skills for individuals with ASD.

CHAPTER THREE

Methods

Participant and Setting Description

Two male students aged 12 and 13, who have been diagnosed with ASD and attend a middle school in Northern California were recruited for this study. Participants were recruited based on having a prior diagnosis of ASD, able to follow directions (e.g., come watch the video), and demonstrate a low ability to successfully perform a variety of gross motor skills (e.g., run, jump, kick, catch). Although both participants do not receive adapted physical education or physical therapy services, they both present challenges in gross and object control skills. Both participants were selected from a physical education classroom where the primary researcher is completing his student teaching for a single subject credential in physical education. The intervention took place in a standard basketball gymnasium that the school provided.

Dependent Variable

The dependent variable for this study is the percentage of essential elements performed for three separate gross motor skills. All essential elements were taken from the *Everyone Can Assessment* (Kelly et al., 2020).

Independent Variable

The independent variable for this study is video modeling and video feedback on the essential elements of the three separate object control skills identified for each participant. The three separate skills were identified by choosing the three lowest scores in an assessment of object control skills (eg., catch, chest pass, set shot, hand dribble, & bounce pass).

Equipment

An iPad Pro was used to provide all video modeling of each object control skill to both participants. The researcher used *myDartfish Express for IOS* (Version 7.3.50620) along with a tri pod stand 10 ft from each participant to record all movement performances. When providing the video model for the student the primary researcher came to the participant and asked them to watch the video and focus on the highlighted portions of the movement.

Two digital video cameras for recording the individual's performance were used within this study. The first video camera, iPhone 12 Pro, was placed 10 ft (3.048 m) directly in front of each participant. The second video camera, iPad Pro was placed 10 ft (3.048 m) directly in front of the participant to provide a visual demonstration of the skill being demonstrated. The video modeling included demonstrations of the target skills being observed directly in front and 10ft away from the models.

The iPad utilized a split screen with the *mydartfish* software on the left side of the screen, and the video recording of the participant performing the skill on the right side of the screen. After the participant performs the target skill, they walked to the iPad and the primary researcher will asked each participant to "Try to match the model on the left." Then they proceeded to view the left side of screen showing the expert model followed by their performance on the right side of the screen. Next the participants viewed the two video-clips side by side, while the primary researcher highlighted and freeze-frames at each component of the skill. There was positive reinforcement and feedback at each component of the skill for the participant to understand where to improve. The primary researcher then played both clips at normal speed. Each session lasted one minute. The participant then performed the target skill two to three times again before getting video feedback and video modeling again. The video model clip for each of the three skills were selected using a peer from their physical education classroom to support bandura's elements on motivation in Social Learning Theory (Bandura 1977). The materials also consisted of a regulation size 29.5" basketball.

Baseline Phase

Within the baseline phase each participant received direct instruction with a verbal command (e.g., kick the ball at the target) to perform the desired skill. All verbal commands were followed by a performance of that desired skill by the participants. Participants received ten trial opportunities for each desired skill during the baseline phase session. Once stable baseline data occurred, the intervention started for one of the targeted skills.

Design and Analysis

The effects of video modeling by experts and video feedback were evaluated in a multiple baseline design across behaviors for each participant. The baseline for this study was collected for the three targeted skills under general physical education settings. During the intervention phase the staggered introduction of video modeling and video feedback was implemented through a multiple baseline design across behaviors. The target skills were determined according to the *Everyone Can* (Kelly et al., 2010) assessment where the participant demonstrated the lowest performing scores. Follow up procedures were implemented to demonstrate an experimental effect one week after the intervention.

The outcome of this study may indicate that video modeling can be applied across a number of object control skills for individuals with ASD. This study is using a multiple baseline design to demonstrate that the video modeling and video feedback is a result of the participants change in scores. The experimental effects were replicated for each of the participants under the same inclusion criteria.

Visual Analysis

For this study, visual analysis was used to determine the effect of video modeling combined with video feedback on the performance of each object control skill for both participants. The visual analysis included three graphs representing the multiple baseline across behaviors results. The first graph provides a line to separate the baseline phase from the intervention. The second and third graphs will also provide a line to show where the interventions were used for those object control skills. Once the participants demonstrate scores that are consistently above 70 percent, the next skill will be introduced. Once all skills demonstrate stable data, the intervention will end. Their will be a follow up trial shown on the graphs as well.

Social Validity

Social validity is defined as the practicality of of the research being done and how it can be applied to future research and practices (Horner et al., 2005). For single subject research to have social validity, it needs to utilize a dependent variable with high social importance and demonstrate that the independent variables are practical for those who will be using the intervention and that it will hold its meaningfulness over time. This study will be using gross motor skill outcomes that are socially important for the individuals with ASD it will be assessing. Gross motor skills are socially important due to the way it can affect a student's long term physical activity. To assess the practicality of video modeling and video feedback social validity will be assessed following the study using questionnaires administered to the PE teacher, SPED teacher, and parents. The questionnaire will include a 5-point Likert-type scale to assess how much they liked the procedure, whether they would recommend it to others, how likely it is to use this in the future, and if it were effective in the participants skill development.

CHAPTER FOUR

Results

Results from the study are presented in figures 1 and 2. The purpose of this study was to examine the combined effects of video modeling and video feedback on object control skills for children with autism spectrum disorder (ASD).

Interobserver Agreement

Interobserver agreement is defined as having a statistic that addresses the fact that observers will sometimes agree or disagree with scoring simply by chance (Vierra & Garrett, 2005). For this study, interobserver agreement was considered and addressed by having two graduate assistants independently score the participants. Both assistants used the checklist provided by the primary researcher and scored participants based on the criteria used. The primary researcher filmed and uploaded the participants attempts. The checklist consisted of the essential elements of each skill based on the assessment used in *Everyone Can* (Kelly et al., 2020).

Performance Criteria

For the five object control skills being assessed in the initial assessment prior to the study, Participant 1 performed highest in the bounce pass (35%), and catch (41.66%). Participant one performed lowest in the essential elements in the chest pass (26.67%), hand dribble (8.33%), and set shot (28.33%). The baseline phase continued for the three lowest performing skills (i.e., chest pass, hand dribble, and set shot). Participant two performed highest in the chest pass (25.00%) and Catch (31.66%). Participant two performed lowest in the essential elements of bounce pass (6.67%), hand dribble (1.6%), and set shot (6.66%). The baseline phase continued for the three lowest performing skills (i.e., bounce pass, hand dribble, and set shot).

Table 1. Percentage of Essential Elements Performed in Baseline Phase for Each Participant

Participant	Chest Pass	Bounce Pass	Hand Dribble	Set Shot	Catch
1	26.67%	35%	8.33%	28.33%	41.66%
2	25%	6.67%	1.6%	6.66%	31.66%

Individual Results

Participant one.

Participant one was a 13-year-old male in the eighth grade diagnosed with ASD. This student does not qualify for adapted physical education or physical therapy services but does exhibit struggles with areas of gross motor and object control skills. Participant one showed increases in the chest pass, hand dribble and set shot. In the baseline phase participant 1 had a mean score for the chest pass (M = 28.75%) hand dribble (M = 35.71%) and set shot (M = 41.11%). After 4 sessions of of stable data during the baseline phase the intervention began for the chest pass. The mean score for the chest pass (M = 94.72) was a result of sessions 5 through 18. The follow up score for the chest pass (M = 86.67%) occurred on session 19, one week after session 18. After 8 sessions and stable data above the performance criteria for the chest pass being above 70%, the video prompting and video feedback intervention began for the hand dribble skills for participant one. For participant 1, the mean score for the hand dribble (*M* = 89.97%) was a result of sessions 9 through 18. The follow up score for the hand dribble (93.33%) occurred during session nineteen, one week after session eighteen. After 12 sessions and stable data above 70% for the chest pass and hand dribble, the intervention began for the set shot skill. For participant 1, his score on the set shot (*M* = 87.50%) was a result of the scores from session 13 through 18. The follow up score for the set shot (80.83%) occurred during session nineteen, one week after session eighteen.

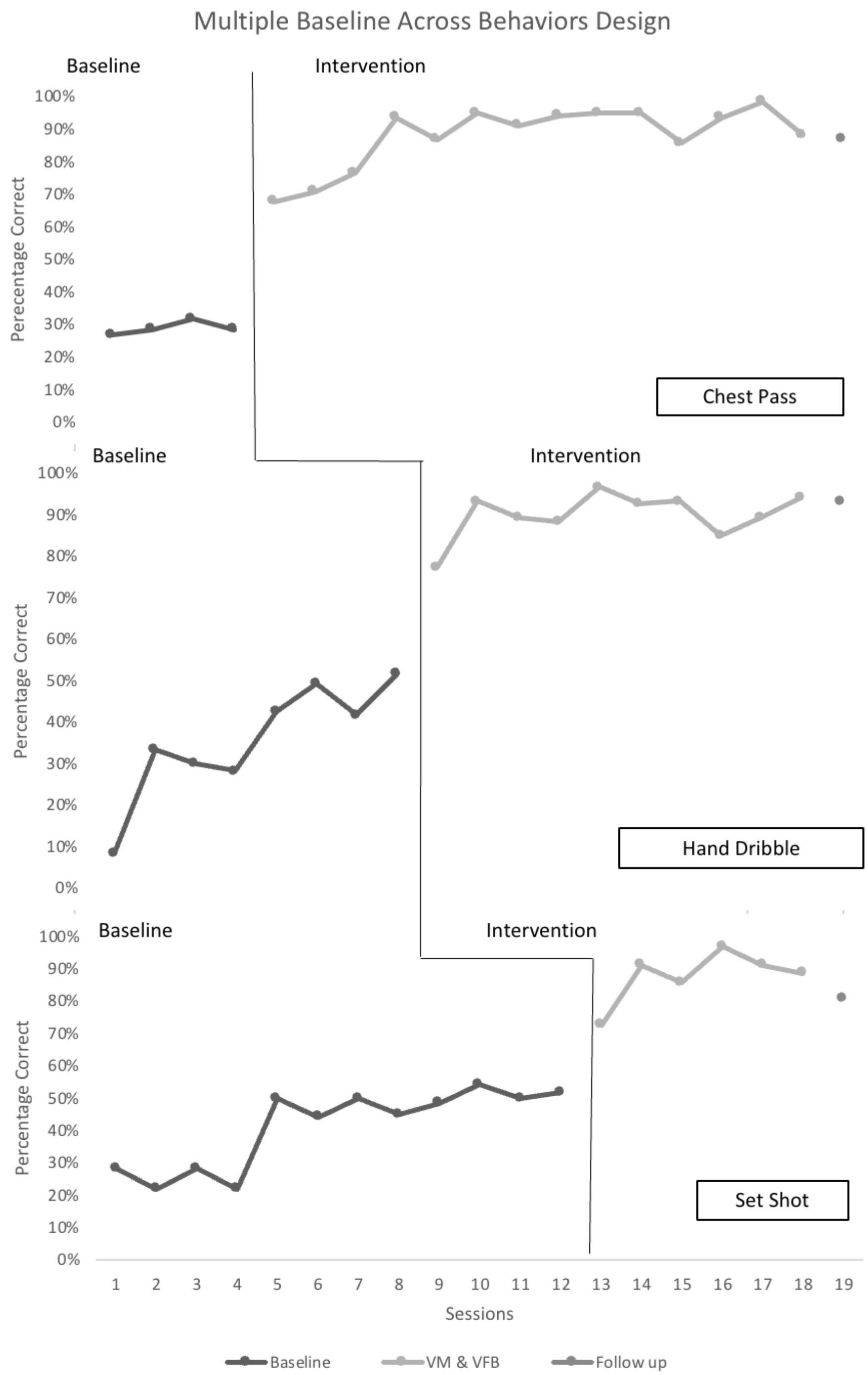

Figure 1 Effects of Video Modeling and Video Feedback on Object Control Skills for Participants

Participant two.

Participant two was a 12-year-old male in the seventh grade diagnosed with ASD. Participant two showed increases in the bounce pass, hand dribble, and set shot. During the baseline phase of the study the participant had a mean score for the bounce pass (*M* = 11.67%), hand dribble (*M* = 21.44%), and set shot (*M* = 20.90%). After 4 days of stable baseline data for the bounce pass, the video modeling and video feedback intervention began for the bounce pass. The mean score for the bounce pass (*M* = 96.85%) was a result of sessions 5 through 18. The follow up score for the bounce pass (99.17%) was taken one week after session eighteen. After 4 days of stable data above 70% for the bounce pass the hand dribble video modeling and video feedback intervention began. The intervention started on session nine and ended on session eighteen, with a mean score of 75.83%. The follow up score for the hand dribble (80%) was taken one week after session eighteen. After 4 days of stable data above 70% for the hand dribble, the intervention started for the set shot. Participant two started the intervention for the set shot in sessions 14 through 18, with a mean score of 80.50%. The follow up score for the set shot (85%) was taken one week after session eighteen.

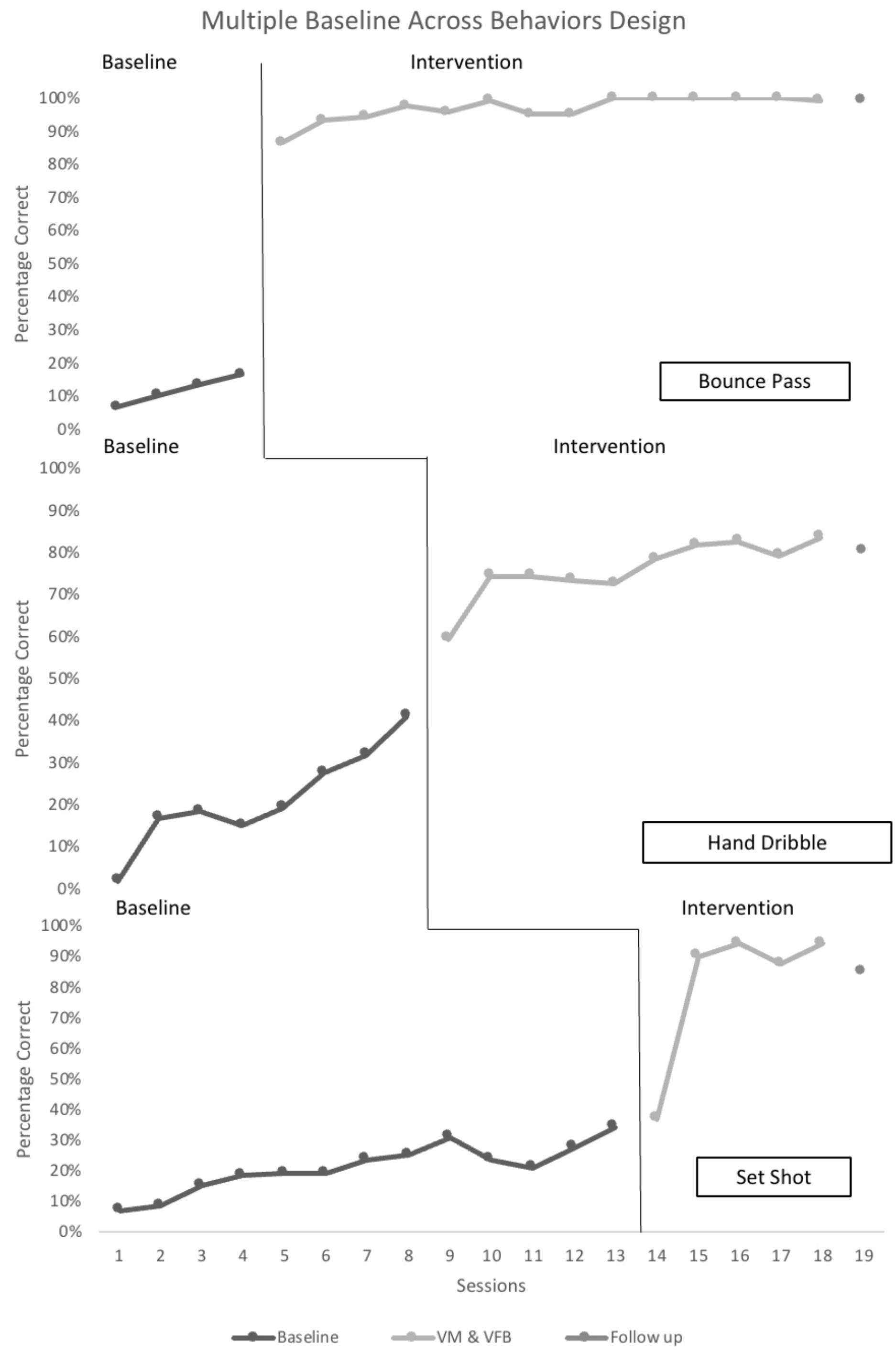

Figure 2. Effects of Video Modeling and Video Feedback on Object Control Skills for Participant 2

Social Validity

The social validity questionnaire results indicated that the Physical Education Teacher and Participants, thought the experience was enjoyable experience (*M* = 4.00), would recommend it to other teachers, coaches, and staff (*M* = 4.67), was useful and could be used in the future to help similar students in need (*M* = 5.00), and thought it improved performance (*M* = 4.67), and easy to follow (*M* = 4.33).

CHAPTER FIVE

Discussion

The purpose of this study was to examine the effects of the combined use of video modeling and immediate video feedback on object control skills used in basketball for individuals with autism spectrum disorder (ASD). We sought to extend research findings regarding the combined use of VM and VFB for those with ASD. Specifically, we attempted to find a cost-effective method of using these strategies on object control skills used in basketball. The results of this study indicate that the combined use of VM and immediate VFB have a positive effect on object control skills used in basketball for individuals with ASD. Based on Bandura's (1977) social learning theory, we predicted that this method of visual instruction was going to have a positive impact on both participants diagnosed with ASD. The hypothesis for this study was supported due to the mean scores increasing for each skill when comparing the baseline to follow up phases. Previous research has indicated that there are no significant differences between the use of video modeling when compared to verbal instruction methods (Miller et al., Emmen et al., Kernodle).

Future Research

This intervention took place during normal school physical education class times. This makes the study more applicable in its ability to generalize to school settings. Future research should consider the efficacy of training instructional aides, special education teachers, and other faculty to teach students alongside PE teachers to promote inclusion. Future research should also consider extending the use of video modeling and video feedback on a combination of other skills used in basketball and other sports alike. Although this study showed that it accelerated the outcomes of object control skills, this should also be investigated further to determine how much more effective VM and VFB are at accelerating results.

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APPENDICES

Appendix A: Checklist used for each participant

Participant one

Chest Pass: Successful (x) Unsuccessful (o)

# of attempts	Stands with feet shoulder-width apart/ Ball held at chest (hands on side of ball)	Pushes ball toward receiver	Weight shift step with either foot	Wrists snap at end of pass	Weight shift-step forward with either foot	Arms follow through
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Hand Dribble: Successful (x) Unsuccessful (o)

# of attempts	Ball held at waist/hips and knees slightly flexed/face in direction of travel	Pushes ball forcefully/ball rebounds in front on dribbling arm side	Absorb force, flex elbow and extends wrist	Uses fingers to dribble	Contacts rebounding ball at hip level	Continues dribbling ball three consecutive times
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Set Shot: Successful (x) Unsuccessful (o)

# of attempts	Knees and hips slightly flexed/ feet shoulder width apart/shooting foot slightly in front/eyes on target	Non shooting hand on side of ball/shooting hand behind and under ball	Raises ball to eye level on shooting side	Shooting wrist hyperextended/ elbow in	Wrist snap/ backspin	Shooting arm points at basket and follows through
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Participant two

Bounce Pass: Successful (x) Unsuccessful (o)

# of attempts	Stands with feet shoulder-width apart/ Ball held at chest (hands on side of ball)	Pushes ball toward floor	Weight shift step with either foot	Wrist snap at end of pass	Palms out thumbs down	Arms follow through well beyond release
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

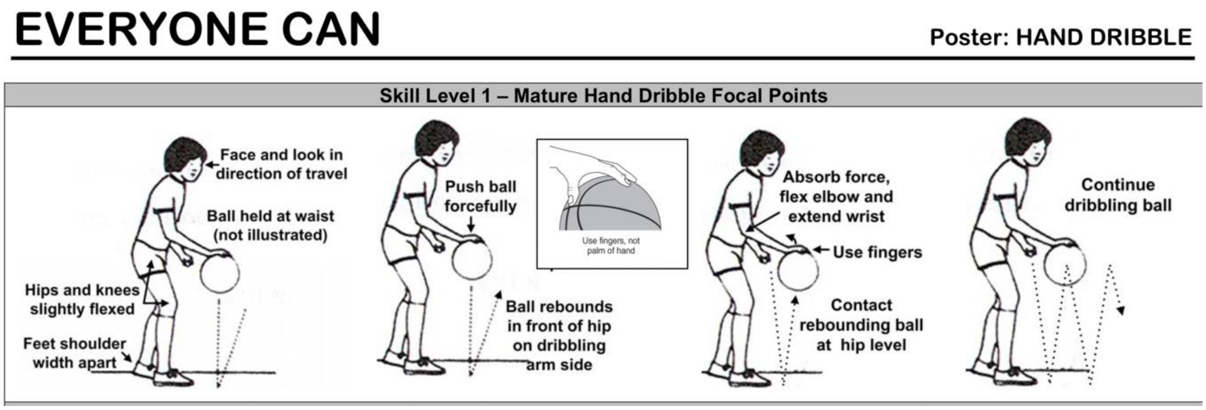
Hand Dribble: Successful (x) Unsuccessful (o)

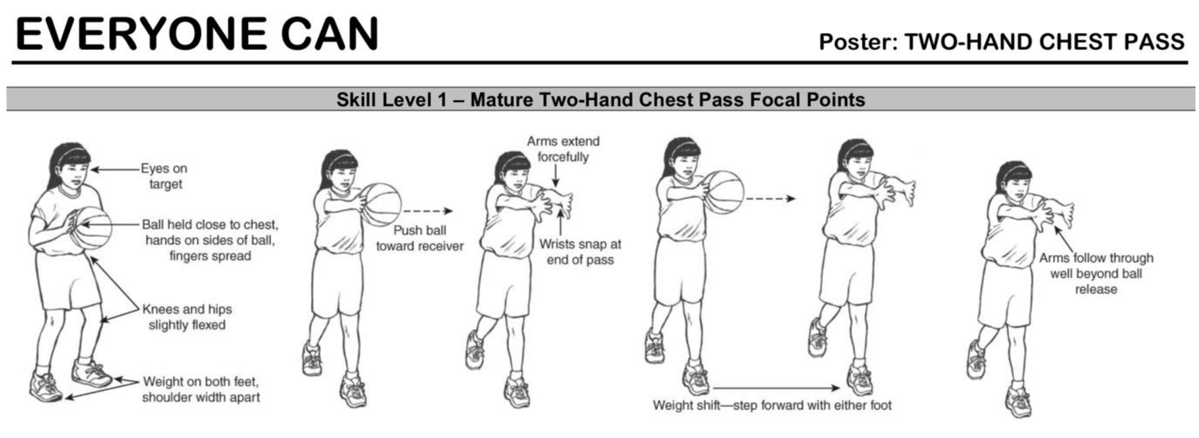
# of attempts	Ball held at waist/hips and knees slightly flexed/face in direction of travel	Pushes ball forcefully/ball rebounds in front on dribbling arm side	Absorb force, flex elbow and extends wrist	Uses fingers to dribble	Contacts rebounding ball at hip level	Continues dribbling ball three consecutive times
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Set Shot: Successful (x) Unsuccessful (o)

# of attempts	Knees and hips slightly flexed/ feet shoulder width apart	Non shooting hand on side of ball/shooting hand behind and under ball	Raise ball to eye level on shooting side	Shooting wrist hyperextended/ elbow in	Wrist snap/ backspin	Shooting arm points at basket and follows through
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Appendix B: Everyone Can focal points for skills

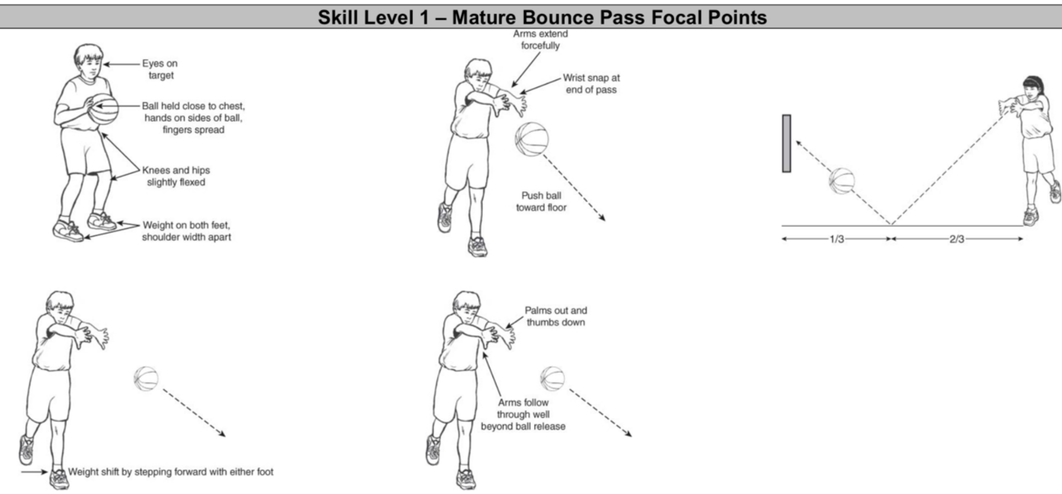




EVERYONE CAN

Poster: BOUNCE PASS

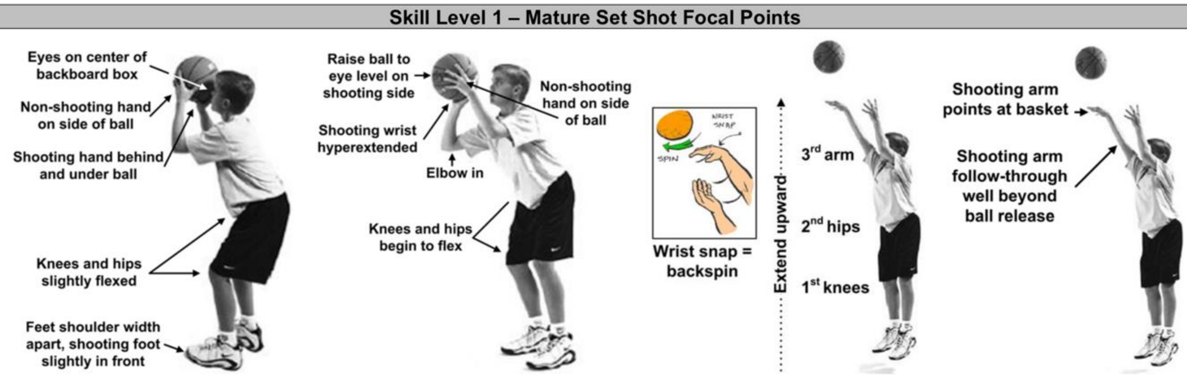
Skill Level 1 – Mature Bounce Pass Focal Points



EVERYONE CAN

Poster: SET SHOT

Skill Level 1 – Mature Set Shot Focal Points



Appendix C: PE teacher and participants survey

Social Validity Questionnaire

Name:

	Strongly Disagree 1	*Disagree 2*	*Neutral 3*	*Agree 4*	*Strongly Agree 5*
Overall, the intervention was an enjoyable experience					
I would recommend this type of procedure to other teachers, coaches, and faculty					
This procedure is something I can use in the future to help similar students in need					
This intervention helped the participants develop their object control skills					
This intervention was easy to follow					

Appendix D: Informed Consent for Social Validity Questionnaire

The Effects of Video Modeling and Immediate Video Feedback on the Development of Object Control Skills for Individuals with Autism Spectrum Disorder

You are invited to participate in a research study. My name is Miguel Pelayo, I am a master's student at Humboldt State University in the department of Kinesiology and Recreation Administration. The purpose of this study is to examine the effectiveness of combining video modeling with immediate video feedback on the development of object control skills. For this study, I am asking that you participate in a questionnaire in order to determine its overall efficacy.

There are no risks involved for yourself within this study. There are some possible benefits however, Parents, future physical educators and coaches may gain a better understanding of how to implement video modeling for individuals with ASD within a physical activity setting.

Your participation in this project is entirely voluntary. Even after you agree to participate, you may decide to stop participation at any time without penalty or loss of benefits to which you may otherwise be entitled. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission.

All data obtained from this study will be maintained in a safe, locked location, and will be destroyed 5 years after the study is completed. This consent form will be maintained in a locked location in the office of my advisor and will be destroyed 3 years after the study is completed. If you have any questions about the research at any time, please email me at map33@humboldt.edu or my advisor, Dr. David Adams at dha13@humboldt.edu.

If you have any concerns or questions about your rights as a participant, contact the Institutional Review Board for the Protection of Human Subjects at irb@humboldt.edu or (707) 826-5165.

Your signature below indicates that you have read and understand the information provided above. The online survey will be sent to you from my HSU email address (map33@humboldt.edu).

Signature   Date

__________________________   __________________________

Email address (Print)

____

Appendix E: Informed consent to parents of participants

The Effects of Video Modeling and Immediate Video Feedback on the Development of Object Control Skills for Individuals with Autism Spectrum Disorder

You are invited to participate in a research study for your child. My name is Miguel Pelayo, I am a master's student at Humboldt State University in the department of Kinesiology and Recreation Administration. The purpose of this study is to examine the effectiveness of combining video modeling with immediate video feedback on the development of object control skills.

Your child will be recruited for this study based on having a prior diagnosis of ASD, able to follow directions (e.g., come watch the video), and demonstrate a low ability to successfully perform a variety of object control skills (e.g., dribble, set shot, bounce pass, catch). The intervention will take place in the Smith River School Gymnasium, during normal Physical Education hours. Your child is expected to participate 3 days a week with 30-minute sessions over the course of 2 months. Video modeling and video feedback will be used through the use of an iPad device using the *myDartfish* software, in order to provide the models and the side-by-side video feedback of the performance.

Potential risks may include injury due to the performance of skills being examined. All precautions will be taken into consideration in order to mitigate the likelihood of any minor injuries in this study. There are some possible benefits, however. Parents, future physical educators, and coaches may gain a better understanding of how to implement video modeling for individuals with ASD within a physical activity setting.

Your child's participation in this project is entirely voluntary. Even after you agree to participate, you or your child may decide to stop participation at any time without penalty or loss of benefits to which you or your child may otherwise be entitled. Any information that is obtained in connection with this study and that can be identified with you, or your child will remain confidential and will be disclosed only with your permission.

All data obtained from this study will be maintained in a safe, locked location, and will be destroyed 5 years after the study is completed. This consent form will be maintained in a locked location in the office of my advisor and will be destroyed 3 years after the study is completed. If you have any questions about the research at any time, please email me at map33@humboldt.edu or my advisor, Dr. David Adams at dha13@humboldt.edu.

If you have any concerns or questions about your rights as a participant, contact the Institutional Review Board for the Protection of Human Subjects at irb@humboldt.edu or (707) 826-5165.

Your signature below indicates that you have read and understand the information provided above, and that you willingly agree to your child's participation in this study. The online survey will be sent to you from my HSU email address (map33@humboldt.edu).

Signature Date

__________________________ __________________________

Email address (Print) ____________________________

Your Child's Name ______________________________