The Effects of Video Modeling on Teaching Physical Activities to Individuals with Significant disabilities

Thesis

Presented in Partial Fulfillment of the Requirements for the Degree of Masters of Arts in the Graduate School of The Ohio State University

By
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Abstract

The purpose of this study was to examine the effectiveness of video modeling as an intervention for teaching three different physical activities to four adolescents with significant disabilities. The study implemented a multiple baseline across three physical activities design through which experimental control was demonstrated. In addition to video modeling, positive reinforcement; verbal, gestural, and visual cues; and a live demonstration were implemented. The results of the study varied across participants. Two participants acquired the physical activities through video modeling. One participant required in-vivo training because she was unresponsive to video modeling. The fourth participant was making progress, but she was unexpectedly withdrawn from school, so her participation ended before she had acquired the skill.
Acknowledgements

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Vita

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Fields of Study

Major Field: Education
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Chapter 1: Introduction

Childhood obesity is a serious health issue in the United States (Holcomb, Pufpaff, & McIntosh, 2009; Spruijt-Metz, 2011). Children and teens who are obese are more likely to experience physiological health issues as adults (Ashby, Haboush, Kindig, Phebus, & Zaikine-Montgomery 2011; Beighle, Pangrazi, Vack, & Vehige, 2003; Holcomb et al., 2009; Gaus, Simpson, & Swicegood, 2006; Spruijt-Metz, 2011; Yetter, 2009) and are more prone to encounter psychological and social problems (Daniels, 2009; Holcomb et al., 2009; Silverstone & Teatums, 2011; Yetter, 2009).

Among some of the physiological issues associated with obesity are a higher risk of developing cardiovascular diseases, type II diabetes (Yetter, 2009), sleep apnea (Daniels, 2009), high cholesterol, hypertension (Spruijt-Metz, 2011) stroke, gallbladder disease, and respiratory problems (Ashby et al., 2011). Ashby et al. (2011) noted that in 2009, roughly 33% of children between the ages of 2 and 5 years old in the U.S. were overweight and 12% were considered obese. According to Silverstone and Teatum (2011), "since 1980 (www.cdc.gov/), obesity has doubled in children, tripled in teenagers, and two-thirds of the adult population is overweight" (p. 37). Physiological issues are not the only challenge that children and teens who are obese face. They are also more prone to experience social stigmatization, bullying, low self-esteem, social problems (Holcomb et al., 2009), and poor academic performance (Yetter, 2009). Bell
and Morgan (2000) noted that children who are obese are less liked and less preferred as friends by their non-obese peers.

Although typically developing children and teens who are obese are faced with many challenges (e.g., physiological, psychological, and social issues), children and teens with significant disabilities may be faced with additional challenges (Holcomb et al., 2009). When compared to peers without disabilities, children and teens with significant disabilities may be at a higher risk for obesity due to various predisposing factors, including genetics, prescription medications, and behavior deficits or excesses (Baur, De, & Small, 2008; Holcomb et al., 2009; Li, Lin, Wu, & Yen, 2005). For example, children and teens diagnosed with Prader-Willi Syndrome suffer from compulsive overeating as a result of an ill-functioning hypothalamus, which is responsible for regulating satiation and hunger (Holcomb et al., 2009). Another factor for obesity may be prescription medications often taken by children and teens with disabilities, such as anti-epileptics and anti-psychotics that can cause weight gain (Baur et al., 2008). According to the Center for Disease Control and Prevention (CDC, 2008) children and teens with disabilities between the ages of 2 and 17 are 38% more likely to be obese compared to their same-age peers without disabilities.

Prevention of obesity in children and teens, both with and without significant disabilities, is directly related to engagement in physical activity and healthy diets (Beighle et al., 2003; Yetter, 2009). Teaching behaviors associated with various physical activities during childhood has been shown to carry over into adulthood (Beighle et al., 2003) and to improve several aspects of an individual’s life. As a result of the benefits,
studies have taught physical exercise to improve the lives of children and teens with significant disabilities. Studies have shown that physical exercise can lead to a decrease in challenging behavior (Cannella-Malone, Tullis, & Kazee, 2011), body weight, self-stimulatory behaviors, stereotypic behaviors (Elliott, Dobbin, Rose, & Soper, 1994), an increase in on-task behavior (Lancioni & O'Reilly, 1998), and an enhanced self-perceptions of emotional well-being (Gulliford & Lamb, 2011).

Several studies have shown a decrease in challenging behavior through the use of physical exercise (e.g., Lancioni & O’Reilly, 1998). For example, Cannella-Malone et al. (2011) examined the effects of aerobic exercise on decreasing aggressive behavior in four children with developmental disabilities. During intervention, the participants engaged in a variety of aerobic exercises for 20 min each morning, followed by 1 to 5 min aerobic activities at the beginning of each hour until their lunch period. Following the participants’ lunch, the program was repeated until the end of the school day (i.e., 20 min of exercise after lunch, followed by 1 to 5 min of exercise at the beginning of each hour). The participants’ aggressive behaviors decreased in rate from an average of 7.1 occurrences to an average of 1.1 occurrences per day after intervention, demonstrating the positive effects of aerobic exercise. In a related study, Lancioni and O’Reilly (1998) demonstrated that the self-injurious behavior of three adults with profound disabilities decreased in both frequency and duration after they engaged in a variety of gross-motor exercises. The authors noted that physical exercise was most effective at decreasing challenging behavior when it was performed several times in a day, though the reduction was observable after engaging in short periods of physical exercise.
Although physical exercise has been shown to improve the quality of life for children and teens who are obese, there are several factors that contribute to the lack of engagement in physical exercise for children and teens with significant disabilities. Lancioni and O'Reilly (1998) found that individuals with significant disabilities live extremely sedentary lives, which contributes to a lack of involvement in physical activity resulting in obesity. Cannella-Malone et al. (2011) noted potential contributions to this sedentary lifestyle, which include lower developmental levels, little initiative, and a lack of independence. According to Lancioni and O'Reilly, one reason that may account for their sedentary lifestyle is a lack of motivation to exercise. Although one of the motivators for typically developing individuals to exercise may be their awareness of the benefits and importance of engaging in exercise, individuals with significant disabilities may not have this same awareness and therefore may not intellectually understand the benefits of exercise. Individuals with significant disabilities typically do not choose the physical exercises they are presented with and have little understanding of the exercise demand that is placed on them (Lancioni & O'Reilly, 1998). Another factor contributing to children and adults with significant disabilities engaging in less physical activity is that they have been shown to demonstrate a lack of compliance in engaging in physical activity (Hutzler, Roth, & Vashdi, 2008). This lack of compliance may be due to not understanding why such a demand has been placed on them. This has been an identified challenge in researching individuals with significant disabilities with respect to physical activity. Additionally, children with significant disabilities may lack motor functioning and physical fitness, making interventions difficult to implement (Holcomb et al., 2009).
A final factor in the inactivity of children and adults with significant disabilities is that they have demonstrated difficulty in retaining and generalizing motor skills they have been taught (Porretta & Yang, 1999).

Based on the demonstrated challenges for engaging children and teens with significant disabilities in exercise, research has focused on different methods to explicitly teach different physical activities. Porretta and Yang (1999) implemented a modified four-step cognitive strategy for teaching six adolescents with mild mental retardation three motor skills: (a) basketball free throws, (b) overhand softball throws, and (c) dart throws. Data were collected using a five-point scoring system. For example, a score of five was recorded if a participant made a basket without striking the backboard or rim. The four-step strategy was implemented during the intervention phase and the participants were trained using the strategy, which included (a) ready, (b) look, (c) do, and (d) score. In addition, the four-step strategy was displayed on a poster board with the scoring criteria. The first step was for the participants to get ready to perform the target behavior, and the second step trained the participants to focus on the relevant visual cue of the task. Following the intervention phase, the authors implemented maintenance and generalization phases. The results of the four-step strategy demonstrated increased improvements for all of the participants during the training phase. However, the authors noted a decrease in the results during the maintenance phase when reminders of the strategy were withdrawn. The decrease was attributed to the participants requiring more time during the training phase. It was noted, however, when reinforcement was
introduced during the maintenance phase, the participant’s performance increased. Lastly, results were similar during the generalization phase (in a different setting).

In another study, Dunn, Houston-Wilson, Mars, and McCubbin (1997) tested the effects of using untrained and trained peer tutors to teach six children with developmental, cognitive, and motor delays five discrete motor skills. These skills included (a) horizontal jump, (b) catch, (c) overhand throw, (d) forehand strike, and (e) sidearm strike. Peer tutors were trained to use cueing, feedback, and a task analysis for teaching the target behaviors. Data were collected on the percentage of correct or incorrect movements performed for each target behavior, as well as the peer tutors’ implementation of the training procedures. The experimental design consisted of two groups. The first group received intervention first with untrained tutors then trained tutors, whereas the second group received intervention only with trained tutors. The results of the study demonstrated that the trained peer tutors were effective in teaching students with disabilities when compared to the untrained peer tutors. This was noted by the higher levels of performance in the students with disabilities.

Given the evidence that individuals with significant disabilities can be taught various physical activities using reinforcement and prompting strategies, it is possible that video modeling could be used to teach these same skills. Video modeling has been shown to be an effective method for teaching a variety of skill sets to children and teens with significant disabilities (Akullian & Bellini, 2007; Gies, 2012).

Using video modeling, an activity is videotaped with an individual performing a skill. The participant watches the pre-recorded video (i.e., observation), after which he or
she is given the opportunity to complete the activity they just watched (Akullian & Bellini, 2007). Video modeling has been effective in teaching affective behavior (Couloura, Gena, & Kymissis, 2005), imitation skills (Kleeberger & Mirenda, 2010) reciprocal pretend play (Ahearn, MacDonald, Mansfield, Sacramone, & Wiltz, 2009), play skills (Hine & Wolery, 2006), social initiations (Keenan & Nikopoulous, 2004), perspective taking (Charlop-Christy et al., 2003), compliance (Barenz et al., 2004), motor behaviors, social skills, self-monitoring, athletic performance, emotional regulation, and functional skills (Akullian & Bellini, 2007) to individuals with severe disabilities.

Using video modeling to teach children and teens with significant disabilities may be beneficial for several reasons. First, the most relevant stimuli are presented, avoiding irrelevant stimuli that may distract individuals from learning (Akullian & Bellini, 2007; Charlop-Christy et al., 2003; Lutzker, Shipley-Benamou, & Taubman, 2002). For example, Keenan and Nikopoulous (2004) implemented video modeling when teaching social initiations and reciprocal play to three children with autism. Only the relevant stimuli were present in the video: (a) a peer model initiating play with the experimenter by saying, “Let’s play,” and then (b) the peer model and experimenter playing with a specific toy. After watching the entire video, the participant and the experimenter entered a separate room that had the same toy used in the video (i.e., presenting the most relevant stimuli) and the participant was given the opportunity to initiate play with the experimenter. Results demonstrated that after viewing the video model, all three participants increased social initiations and duration of play with the experimenter.
A second benefit of video modeling is that it incorporates simple language (Lutzker, Shipley-Benamou, & Taubman, 2002). Charlop-Christy et al. (2003) used video modeling to teach perspective-taking to three children diagnosed with autism. One of the perspective-taking tasks incorporated a bowl that appeared to have candy, but really contained a pencil. After presenting the bowl, the experimenter asked the participant two perspective-taking questions: (a) What did the participant think was in the bowl? and (b) What might someone else think was in the bowl? The videotape recorded an adult completing this task correctly by focusing the camera on the most relevant visual cues and having the adult describe in roughly one sentence, using simple language, how to correctly complete the task. Upon completion of viewing each step in the video, the experimenter asked the participants perspective-taking questions and reinforced correct answers. The results demonstrated that all three participants mastered the tasks presented during the study.

A third benefit of video modeling is that it does not require social interactions with others. Akullian and Bellini (2007) noted anxiety and distress may be seen when teaching individuals with autism socially-related behaviors that require interaction with others. This can significantly impair their ability to learn and attend to the desired behavior. Through the use of video modeling, it may be possible to reduce levels of distress and anxiety associated with social interactions by first viewing the video. For example, Ahearn et al. (2009) taught reciprocal pretend play to two children with autism. The study incorporated two typically developing peers to act as the participants’ play partners. The videos consisted of two adults using scripted verbalizations while playing
with toys together. The typically developing peer partner and participant first viewed the video model twice and then were verbally instructed to play with the toy upon completion of viewing the video. There was no requirement of interaction between the participants and their peer partners while watching the video model.

A fourth advantage of video modeling is that it may be considered a highly motivating activity for students with and without significant disabilities. This has been reported through anecdotal evidence and clinical experience (Akullian & Bellini, 2007). As a result, students with significant disabilities have shown an increased attention to the desired task (Akullian & Bellini, 2007).

A final advantage of video modeling is that it is considered an evidence-based practice (Carr, Halle, Horner, Mcgee, Odom, & Wolery, 2005). For example, Akullian and Bellini (2007) conducted a meta-analysis of video modeling and self-video modeling for children and adolescents with autism spectrum disorder. According to the authors, the 23 reviewed studies met the criteria to be considered an evidence-based practice (Carr et al., 2005). The criteria included (a) a diagnosis of ASD, (b) outcome measures that included behavioral functioning, social-communication, or functional skills, (c) assessed the effectiveness of video modeling or self-video modeling alone or in combination with other strategies, (d) utilized a single-subject design that demonstrated experimental control, (e) visual analysis of individual data, (f) articles published in peer-reviewed journals, (g) dichotomous dependent variables with more than three probes per data point, and (h) articles published in English (Akullian & Bellini, 2007).
According to Gillespie, Porretta, and Surburg (1999) video modeling and modeling are effective strategies in improving the acquisition of a physical skill in typically developing individuals. However, there is a lack of research and evidence regarding the acquisition of physical skills in individuals with significant disabilities (Gillespie, Porretta, & Sunberg, 1999). In researching this topic, we were only able to identify three studies that implemented the use of video in teaching the acquisition of a physical activity. In the first study, Dove and Dowrick (1980) implemented the use of self-video modeling to improve swimming skills in three children with spina bifida. The authors videotaped children in water performing 35 target behaviors. For example, one of the skills included videotaping children moving from an adult and swimming independently 1 m to a bar located in the pool. After videotaping the students' performance, the authors edited the films by only including the children performing each target behavior, while excluding the instructor and any signs of distress on the children (e.g., crying, fearful faces). Each self-video was 2 min. The children and author viewed the self-video model approximately three times a week, and on the third session the child was observed swimming and performing the desired behavior. Results demonstrated a moderate increase in the swimming performance of all three children.

In the second study, Gies (2012) used video prompting to teach seven teenagers with high functioning autism choreography to a popular line dance. The author videotaped herself performing 10 steps without the music but included simple language. During baseline, the participants were asked to perform the dance. If the participants did not engage within 30 s, the session was terminated. During intervention, the participant
was shown the first video and then asked to perform the step. After the participants met
the criteria for the first video, the second video was shown. Chunking of the videos was
implemented once the participant performed two or more of the videos correctly across
three consecutive blocks. Error correction included self-corrections, re-watching the
video, a live demonstration, and corrective verbal feedback. In addition, participants were
provided with positive praise after correctly performing the steps. The results
demonstrated that 6 out of 7 participants correctly performed the dance.

Lastly, Gillespie, Porretta, and Surburg (1999) studied the effects of four
instructional methods on the acquisition of throwing ball to 32 adolescents with moderate
mental retardation. The participants were randomly placed in one of the four instructional
methods: (a) videotape (VT), (b) imagery (IM), (c) videotape and imagery (VI), and (d)
verbal directions (VD). Data were collected on the accuracy of the throw to the bulls eye
placed directly across from the participant. In the VT group, participants watched the
video of a same-age peer throwing a ball while the instructor verbally noted four relevant
features. After viewing the video, the participants were asked to throw the ball. In the IM
group, participants were first asked to close their eyes and imagine themselves throwing
the ball to the target. Next, they were verbally guided by the instructor. Finally, they were
given the ball to throw to the target. The VI group was a combination of the first two
methods. The participants viewed the tape while the instructor noted the salient features
in the video and then using the same procedures for the IM group, guided the students.
Lastly, in the VD group, participants were provided with four instructions to throw the
ball. Following the instructions, the participants threw the ball to the target. During the
practice sessions, each group was provided with assistance, once from the instructor, and then support was removed. In the VI group, the instructor verbally guided the participant while watching the video and on the second viewing, the instructor did not say anything. In addition, after removing the additional support, the participants were asked to throw the ball without implementing the instructional method. Results showed an increase in accuracy of ball throwing across each of the four instructional methods implemented. In addition, individual scores indicated large variability both within and across participants’ data. As a result, no one instructional method could be isolated as more beneficial for all of the participants.

Based on the demonstrated effectiveness of skills taught through video modeling, as well as the need for more evidence regarding the acquisition of physical exercise through video modeling and the benefits of engagement in physical exercise, the purpose of this experiment was to study if video modeling, an evidence-based strategy (Carr et al., 2005) was an effective intervention in teaching three different physical activities to teenagers with significant disabilities. Specifically, the following research questions were addressed:

1. What are the effects of using video modeling in teaching three different physical activities to four adolescents with significant disabilities?

2. Will an iPod Touch function effectively as a video modeling device for individuals with significant disabilities?

3. What does the classroom staff think about the intervention and procedures?
Chapter 2: Method

Participants

Four individuals with significant disabilities participated in the study. The participants were educated in the same classroom at a specialized school for students with significant disabilities.

Jay was an 11-year-old Hispanic male. There was no medical diagnosis documented in his educational file. Based on his individualized educational program (IEP), he was described as having "multiple disabilities." His communication included two-to-three word sentences in combination with picture symbols and some sign language. Jay's IEP indicated a history of aggressive and noncompliant behavior. Based on a pre-assessment conducted, and anecdotal observations of Jay's physical activity levels during his morning routine (e.g., adapted physical education class), Jay was reported (a) jogging, (b) walking, (c) jumping, and (d) skipping.

Sal was a 13-year-old African American male diagnosed with cerebral palsy. As indicated on his IEP, he was also diagnosed with "multiple disabilities." He communicated through one-to-two word sentences in combination with picture symbols and some sign language. Based on a pre-assessment conducted, and anecdotal observations of Sal's physical activity levels during his morning routine (e.g., adapted physical education class), Sal was reported (a) jogging, (b) walking, and (c) jumping.
Cali was a 15-year-old African American female diagnosed with autism. Her form of communication included a limited number of picture symbols and a limited amount of sign language (i.e., American Sign Language). Cali engaged in self-injurious behaviors, non-compliance, and aggression. Based on a pre-assessment conducted, and anecdotal observations of Cali’s physical activity levels during her morning routine (e.g., adapted physical education class), Cali was reported (a) walking and (b) jumping.

Amy was a 14-year-old Caucasian female diagnosed with cerebral palsy, developmental delays, severe mental retardation, and attention deficit hyperactivity disorder. Her communication included two-to-three word sentences in combination with some picture symbols and sign language. Amy engaged in some challenging behavior, including self-injury. Based on a pre-assessment conducted, and anecdotal observations of Amy’s physical activity levels during her morning routine (e.g., adapted physical education class), Cali was reported (a) walking and (b) jumping.

**Setting**

This study was conducted in a school that serves students between the ages of 5 and 22 who have severe to profound intellectual, developmental, and/or physical disabilities. The study was conducted in the school cafeteria. All tables and chairs were moved to the side, which resulted in an open space. Participants were taken to the cafeteria individually to avoid modeling effects. There were a few sessions in which two participants were brought together, but they were assessed for different activities. In other words, the participants that were brought in together were not assigned to the same
physical activities nor were they performing the same physical activities. Therefore, the risk of a sequence effect from observing one another was not a factor.

**Task Analyses and Materials**

A second generation iPod Touch was used to deliver all video models. The iPod Touch is a portable media player developed by Apple, Inc. The touch screen measures 3.5 in. wide with external volume control, built-in speakers, and wireless capabilities. The videos were uploaded onto the iPod Touch through the iTunes application. The videos were accessed by the experimenter through the video icon, whereby after pressing the icon, the list of the six physical activities was displayed. By pressing one of the videos in the list, the video model of that physical activity could be viewed.

Edible and/or leisure items were delivered in exchange for participation, and were individualized across participants. The instructional assistant informed the experimenter on the participants' preferences for reinforcers. The experimenter presented three picture icons that depicted the choices to the participants, allowing each participant to select the reforcer that he/she would receive for participating. These items included (a) cookies, (b) chips, (c) 5 min on the computer, (d) candy, (e) musical book, (f) toy guitar, (g) a bowl of strawberries, and (h) pretzels.

Intervention focused on teaching the participants to perform three physical activities. A pre-assessment was conducted to determine the skill and level abilities for each participant. Based on the results, Sal, Cali, and Amy were assigned to the following physical tasks: (a) jumping rope, (b) scooter board with cones, and (c) ladder drill (i.e., feet going in and out). Jay was assigned the following physical tasks: (a) ladder design
(i.e., multiple steps), (b) shuttle run, and (c) disc ride. These physical activities were selected because they were age-appropriate, functional, and physically challenging.

**Jumping rope.** The task analysis for jumping rope consisted of the following steps: (a) pick up the jump rope, (b) hold the handle bars in two hands, (c) step over the jump rope or swing the rope over your body, (d) swing the jump rope over your body, (e) jump or step over the rope, (f) swing the jump rope over your body, (g through m) repeat steps e and f four more times, and (n) drop the jump rope onto the floor. Two jump ropes were used in the present study. This was due to the fact that the jump rope was height specific and therefore, two of the participants required the same size jump rope, while the other participant required a different size jump rope. The first measured 9 ft. and was made of plastic with plastic handles. The second measured 12 ft. and was made of rope with wooden handles.

**Scooter board with cones.** Riding on the scooter board and navigating through cones consisted of (a) sit or lay on the scooter board, (b) reach your hands and arms forward to move the scooter board and body in a forward direction, (c) use your hands and arms to navigate through the first cone, (d) use your hands and arms to navigate through the second cone, (e) use your hands and arms to navigate through the third cone, and (f) dismount the scooter board. A circular yellow scooter board was used that had four wheels on the bottom, measuring 2 ft. wide by 6 in. tall. Four orange cones measuring 19 in. tall were used and were placed 4 ft. apart.

**Ladder drill (version one).** The task analysis for version one of the ladder drill consisted of the following steps: (a) stand with two feet together, (b) jump with two feet
together into the middle box in front of you, (c) jump forward with the left foot landing in the left box and the right foot landing in the right box, (d) jump with two feet together into the middle box in front of you, (e) jump forward with the left foot landing in the left box and the right foot landing in the right box, and (f) jump with two feet together into the middle box in front. A large sheet of paper measuring 8 ft. by 3 ft. was used as the ladder grid. Two lines were drawn along the length of the paper and five lines were drawn along the width (i.e., indicating a ladder grid). The widths of the sheet of paper were taped to the floor each session with yellow tape. Two pieces of tape measuring 6 in. were placed in front of the ladder grid in an ṭxđ shape. In addition, during Phase 3 of the error correction procedure, 10 rubber circles measuring 14 in. in diameter were used as a visual cue. There were two blue, four orange, and four red circles.

Ladder drill (version two). The task analysis for version two of the second ladder drill consisted of the following steps: (a) stand with two feet together, (b) jump with one foot into the middle box in front of you, (c) jump forward with two feet together landing in the right box, (d) jump forward with the left foot landing in the left box and the right foot landing in the right box, (e) jump forward with one foot into the middle box, and (f) jump forward with two feet together landing in the right box. The same sheet of paper was used as with the first ladder drill was used with this version of the ladder drill.

Shuttle run. The shuttle run consisted of (a) stand next to the bucket, (b) run or walk to the bean bags, (c) pick up the bean bag with the letter ḏḥđ (d) run or walk to the bucket, (e) drop the bean bag with the letter ḏḥđ into the bucket, (f) run or walk to the bean bags (g) pick up the bean bag with the letter ḏḥđ (h) run or walk to the bucket, (i)
drop the bean bag with the letter I into the bucket, (j) run or walk to the bean bags, (k) pick up the bean bag with the letter J, (l) run or walk to the bucket, (m) drop the bean bag with the letter J into the bucket, (n) run or walk to the bean bags, (o) pick up the bean bag with the letter K, (p) run or walk to the bucket, and (q) drop the bean bag with the letter K into the bucket. An orange square bucket measuring 14 in. tall and wide, as well as four square green bean bags measuring 5 in. both in length and height were used in the present study. Each bean bag was labeled with one of the following capital letters H, I, J, and K. The letters were printed with 350 font size and Times New Roman font style. The perimeters of the letters were cut into a square, which measured the same length and height as the bean bags, and were attached to the bean bag using clear tape. The bucket was directly across from the bean bags at a distance measuring 18 ft. The bean bags were placed in a horizontal line and were randomly placed out of order for each session.

**Disc ride.** The task analysis for the disc ride consisted of the following steps: (a) get onto the scooter board in a sitting position (just outside of the half circle of discs), (b) use your feet to move the scooter board in a forward direction and enter the half circle, (c) pick up the disc with the number 20, (d through h) repeat step d for the discs from 21 through 25 in order, and (i) place the discs on the floor. A circular yellow scooter board was used that had four wheels on the bottom, measuring 2 ft. wide and 6 in. tall. The discs used were six white Frisbees placed in a half circle measuring 6 ft. in diameter. The scooter board was placed directly outside the half circle of Frisbees. The Frisbees were labeled with one of the following numbers: 20, 21, 22, 23, 24, and 25. The numbers were
printed using 375 font size and Times New Roman font style and were cut so that the perimeter of each number was square. Each number was taped onto the front of the Frisbees with clear tape.

**Video Models**

A total of six videos were filmed. The duration of the videos ranged from 7 to 52 s. Each video was recorded from the perspective of a bystander watching the physical activity being performed. Therefore, when the participants viewed the video, they watched it from the perspective of a bystander watching someone else (i.e., one of the authors) complete the physical activity. In addition to the demonstration of the physical activity, being demonstrated, each video included simple language describing the physical activity.

**Jumping rope.** The jumping rope video was 17 s. At the start of the video a voice said, "Jump rope five times." The model picked up the jump rope from the floor, placed it in her hands, stepped over the rope and began to swing the jump rope in revolutions and jump over the rope five times. Once the model began to swing the rope, the voice counted in sync with each revolution, saying, "One, two, three, four, five." At the end of the video, the model placed the jump rope back on the floor.

**Scooter board with cones.** This video was 27 s. At the start of the video, a voice said, "Get onto the scooter and ride through the cones." As the voice was saying this, the model got onto the scooter-board. Then the model used her hands and feet to pull her body forward on the scooter-board. The model navigated through three cones, weaving in
and out, until she got to the fourth orange cone. Finally, she dismounted the scooter-board and stood up.

**Ladder drill (version one).** The video of the ladder drill was 8 s. At the start of the video, a voice said, Do the ladder drill. The model was standing at the beginning of the ladder grid. Following the initial voice over, the model jumped with two feet together into the first rung, and then two feet apart into the next rung, followed by two feet together into the next rung, and then two feet apart into the next rung, and finally two feet together into the last rung of the ladder. During the model’s demonstration, the voice said in sync with the demonstration, Both feet in, both feet out, until the model finished the last step.

**Ladder drill (version two).** The video of the ladder drill was 7 s. At the start of the video, a voice said, Do the ladder drill. The model was standing at the beginning of the ladder design. Following the initial voice over, the model jumped with one foot into the first rung of the ladder, then two feet together into the second rung, followed by two feet out into the next rung, then one foot into the next rung, and finally two feet together into the last rung of the ladder. During the model’s demonstration, the voice said in sync with the demonstration, One foot in, two feet together, two feet out, continuing until the last step of the ladder drill.

**Shuttle run.** The shuttle run video was 25 s. At the start of the video, the model stood next to an orange square box and a voice said, Run and pick up the beanbags. The four green beanbags (labeled with the letters H, I, J, and K) were positioned at a distance of 18 ft. directly across from the model. Following the initial voice over, the
model ran to the beanbags and picked up the first beanbag (\( \text{H} \)) and then ran back to the orange box and dropped it in. This was repeated until the model ran to the final beanbag (\( \text{K} \)), picked it up, and dropped it into the orange box. During this portion of the video, the voice was in sync with the model as she picked up each beanbag, saying the corresponding letter of the beanbag. For example, when the model picked up the beanbag labeled \( \text{H} \), the voice said, \( \text{H} \).

**Disc ride.** The disc ride video was 52 s. At the start of the video, the voice said, \( \text{Use your scooter-board to pick up the numbers in order.} \). Following the voice over, the model sat on the scooter-board and picked up the white Frisbees labeled with the numbers 20 through 25 in order. The Frisbees were positioned in a semi-circle and the model sat on the scooter-board using her feet to propel herself into the semi-circle. The voice was in sync with the model as she picked up each Frisbee with the corresponding number. For example, when the model picked up the Frisbee labeled with the number 21, the voice said, \( \text{21} \). The last thing shown on the video was the model moving in a backward motion and placing the Frisbees on the floor.

**Dependent Measure and Data Collection**

Data were collected on the percentage of steps completed independently and correctly on the physical activities. To be scored as correct, the student had to perform the activity as described in the task analysis within 30 s of the \( S^D \) (during baseline) or video model (intervention). If a student performed the steps incorrectly, the researcher either allowed the student to continue for 30 s and marked the step or steps as incorrect (during baseline and video modeling), or implemented the error correction procedure and
marked whether the step or steps were completed correctly or incorrectly following error correction (during the error correction phases).

Data were collected during one-to-one sessions, three to four times per week. Each session lasted approximately 10 min. Data were collected using a task analysis for each physical activity. The experimenter had three different task analyses for each participant. The task analysis described each step, and the experimenter marked the steps performed correctly and independently (e.g., \(I\)) or incorrectly (e.g., \(O\)) while observing the participant perform the physical activity. When the error correction procedures were implemented for a specific physical activity, the task analysis included additional information that the experimenter marked while observing. During Phase 1 of the error correction procedures, the experimenter recorded the steps performed correctly after watching the video model a second time. Additionally, the experimenter recorded steps performed correctly following the live demonstration. A correct step was indicated by marking an X on the data sheet after the participant re-watched the video model a second time, and marking an M after the live demonstration was performed. During Phase 2 of the error correction procedures, the experimenter marked G on the task analyses if the participant corrected the step(s) after least-to-most prompts were implemented.

During the in-vivo training condition, data were collected using a task analysis. The task analysis described each step, and the experimenter marked if the step was performed correctly and independently, as well as indicating if a verbal, gestural, or full physical prompt was provided.
Interobserver Agreement and Procedural Integrity

Interobserver agreement (IOA) and procedural integrity were calculated for 30% of sessions across all phases and participants of the study. A second observer was trained through descriptions of the task analysis and provided with live demonstrations of examples and non-examples until they were all in 100% agreement.

For IOA, the second trained observer collected data on participant behavior, which included percentage of steps completed independently and correctly on the physical activities. In addition, data were collected on the implemented error correction procedure, and the second observer marked the step or steps as incorrect, as well as whether the student performed the step or steps correctly following the error correction (during the error correction phases). An agreement was scored when both the researcher and second observer scored a step as correct or incorrect. IOA was calculated by dividing agreements by agreements plus disagreements and multiplying by 100. Interobserver agreement was calculated to be 100% across all sessions and participants.

For procedural integrity, the second trained observer collected data on the researcher’s behavior. The second trained observer used a task analysis that included the list of steps the researcher had to complete for each session and marked which steps were completed as correct or incorrect. Procedural integrity was calculated by dividing the number of procedural steps completed correctly by the total number of procedural steps and multiplying by 100%. Procedural integrity was calculated 100% across all sessions and participants.

Experimental Design
A multiple probe design across three activities (Cooper, Heron, & Heward, 2007) was implemented that included two conditions: (a) baseline and (b) intervention. In order to demonstrate experimental control, the first physical activity was implemented once baseline data were stable across at least three sessions. The second tier began intervention when (a) baseline was stable and low, verifying the baseline pattern of responding in the first tier, and (b) the pattern of responding was higher during intervention on the first tier. The third tier began intervention when (a) the second tier replicated the pattern of responding of the first tier during intervention, and (b) the baseline was stable and low in the third tier, verifying the pattern of responding in the second tier.

**Procedures**

**Baseline.** During baseline, each participant was individually brought to the cafeteria from the classroom. All materials for each activity were set up prior to the participant’s arrival. The participant stood in front of each activity and was presented with the S\(^D\) (e.g., “Do the ladder drill.”). No further prompts were provided. If the participant did not engage in the activity within 30 s, the activity was terminated, and the S\(^D\) was given for the next activity. Upon completion of the session (i.e., three physical activities), the participant was provided with an edible or tangible reinforcer for participating in the session.

**Video modeling.** Once a low and flat trend in baseline was established for one of the three physical activities, the video modeling phase was implemented. The participant accompanied the researcher from the classroom to the cafeteria upon arrival in the morning or after eating breakfast. As in baseline, the physical activity materials were set
up prior to the participant’s arrival. The participant stood in front of the first activity and the researcher held the iPod Touch so that the participant could see the video, said, “Watch this,” and showed the video to the participant. Upon completion of watching the video, the participant was presented with the S^D to perform the desired activity. For example, after the participant viewed the ladder drill video, the researcher said, “Jump through the ladder drill.” The researcher provided no further prompts. When the participant completed the activity, or if he or she did not engage in the activity within 30 s after watching the video, the activity was terminated and the researcher said, “All finished.” The researcher then led the participant to the next activity, if applicable, and the process was repeated. Procedures were the same for the 2^{nd} and 3^{rd} tiers of intervention. After the specified number of activities was completed, the researcher terminated the session, and the participant was provided with an edible or tangible reinforcer.

**Error correction.** Error correction procedures were implemented during the video model phase after three consecutive sessions in which video modeling alone was demonstrated to be insufficient to teach the participants the physical activity (i.e., either no change in behavior or a decreasing trend). Each phase of the error correction procedures was implemented in sequential order following three stable data points. For example, if after implementing Phase 1 of the error correction procedures no progress was made and intervention data remained stable, Phase 2 of the error correction procedures was implemented. Phases 1 through 3 of the error correction procedures were
additive in nature, meaning that they were simply added to the video modeling intervention and any previously implemented error corrections phases.

**Phase 1.** The first error correction procedures consisted of the participant watching the video model a second time. After watching the video, the participant was re-presented with the $S^D$ to begin the activity. If the participant did not complete each step correctly after viewing the video, the researcher stopped the participant by saying, "Stop. Come back," and then modeled the entire activity. After watching the researcher model the activity, the participant was re-presented with the $S^D$ to begin the activity. Data were collected after each step of the error correction procedures. For example, after watching the video a second time, if the participant completed any of the steps correctly, data were recorded as correct with video correction. However, these data were not included as independently accurate.

**Phase 2.** If after three data points little or no improvement was made, the second phase of the error correction procedures was implemented. During this phase, least-to-most prompting was provided. This included verbal, gestural, and full-physical prompts. For example, the researcher said, "Jump through the ladder drill," and as the participant was completing each step, the researcher lightly tapped the participant's foot and the placement in which the foot should go. Prompting was only implemented for steps that were previously performed incorrectly. Data collection was the same as Phase 1.

**Phase 3.** After three data points with little or no improvement, the participant was provided with visual cues. The only activity that received this level of error correction was the ladder drill. Rubber circles were placed on the ladder in the boxes where the
participant needed to step. The circles were only added on the ladder rungs that were previously performed incorrectly.

**In-vivo training.** It was necessary for one participant to move to a different intervention. Cali received in-vivo training. During this phase, least-to-most prompting was provided. This included verbal, gestural, and full-physical prompts. For example, the research said, *“Ride through the cones,”* and as the participant was completing each step, the researcher placed her hands on the scooter board and propelled the participant’s scooter board and body forward to the first cone. Prompting was only implemented for steps that were previously performed incorrectly. Data collection was the same as Phase 1.

**Social Validity**

The participating classroom teacher and instructional assistant were provided with a questionnaire to complete one week prior to the end of the study. The questionnaire was developed by the researcher in which the social validity and acceptability of the acquisition of physical activities through video modeling and the iPod Touch as the technology were assessed. They were asked to answer eight questions using a 7-point rating scale.
Chapter 3: Results

Sal

Figure 1 depicts the percentage of steps Sal completed correctly across three physical activities: (a) jumping rope, (b) ladder drill (version one), and (c) scooter board with cones. The performance of the three activities was measured across the following conditions: (a) baseline, (b) video modeling, and (c) error correction.

Jumping rope. During three baseline sessions, Sal completed 0% of the jumping rope activity correctly. With the introduction of video modeling, Sal showed an immediate change in the level of responding from baseline, performing an average of 90% (range: 85%–92%) of the jumping rope activity correctly. There was a sharp decrease in responding in sessions 9 and 10, followed by a quick return to an average of 92% (range: 92%–100%) of the steps performed correctly. Sal’s overall trend remained stable and high.

During video modeling, two different verbal prompts were implemented. The first was implemented in session 22 and included counting aloud with each revolution of the jump rope. Following the first implemented verbal prompt, the trend remained stable with no improvement in responding. As a result, in session 35, an additional verbal prompt (i.e., “finished”) was added to signal he was done jumping. This verbal prompt did not improve responding either.
Figure 1. Percent correct for the jumping rope, ladder drill, and scooter board with cones activities for Sal.
**Ladder drill (version one).** During four baseline sessions, Sal completed an average of 28% (range: 16 – 66%) of the ladder drill activity correctly. He completed 66% of the steps correctly of the ladder drill activity in the first baseline session. This was due to the fact that he correctly completed four out of the six steps by jumping with two feet together on the ladder grid. With the introduction of video modeling, Sal showed some increase in the level of responding from baseline, but responding continued to be low and stable. Therefore, Phase 1 of the error correction was implemented, and an increasing and variable trend was established. He completed an average 47% (range: 16 – 66%) of the ladder drill activity correctly. As a result of the variability in completing the task, Phase 2 of the error correction procedures was implemented in session 21. Because responding remained stable with no increase in, a smaller grid was implemented in session 23. Following no increase in responding and three stable sessions with the smaller grid plus Phase 2 of the error correction, the regular size grid was reinstated, along with visual cues in session 26. With the introduction of the visual cues, there was an immediate and significant change in the level of responding from the previous phase. Sal finished the study completing 100% of the steps correctly.

**Scooter board with cones.** During 12 baseline sessions, Sal completed an average of 20% (range: 0 – 50%) of the scooter board with cones steps correctly. With the introduction of video modeling, Sal did not show an immediate change in his levels of responding from baseline. His overall average was 41% (range: 33 – 66%) of correctly completing the activity during video modeling. Following three sessions of a stable and
low pattern of responding at 33% correct, Phase 1 of the error correction procedures was implemented. During this Phase, Sal maintained a stable and low pattern of responding with the exception of two data points in which he completed 66% of the steps correctly. Phase 2 of the error correction procedures was not implemented due to the school year ending.

**Jay**

Figure 2 depicts the percentage of steps completed correctly for Jay across three physical activities: (a) shuttle run, (b) disc ride, and (c) ladder drill (version two). The performance of the three activities was measured across the following conditions: (a) baseline, (b) video modeling, (c) error correction, (d) video chunking, and (e) obstacle course without video models.

**Shuttle run.** During three baseline sessions, Jay completed an average of 3% (range: 0–5%) of the shuttle run steps correctly. With the introduction of video modeling, Jay showed an immediate increase in responding from baseline, performing 100% correct across the video modeling phase and the chunking of the three video models. There was a slight decrease in responding in sessions 32 and 33, but it was followed by a quick return to completing 100% of the steps correctly. Jay’s overall trend remained high and stable.

**Disc ride.** During four baseline sessions, Jay completed an average of 11% (range: 0–22%) of the disc ride steps correctly. With the introduction of video modeling, Jay showed an increase in the level of responding from baseline, but responding decreased to 33% in session six and continued to be low and stable. Therefore, Phase 1 of the error correction procedures was implemented, and an increasing and high trend was
Figure 2. Percent correct for the shuttle run, disc ride, and ladder drill activities for Jay
established. Jay completed an average 96% (range: 33%-100%) of the disc ride steps correctly across the video modeling phase and the chunking of all three video models.

**Ladder drill (version two).** During seven baseline sessions, Jay completed an average of 13% (range: 0%-16%) of the ladder drill steps correctly. With the introduction of video modeling, Jay did not show an immediate change in level from baseline. Following three sessions of stable and low patterns of responding at 16% correct, Phase 1 of error correction procedures was implemented, which resulted in a stable and increasing pattern of responding. He completed an average of 79% (16%-100%) of the ladder drill steps correctly across the video modeling phase and chunking of all three video models. In session 17, Jay completed 100% of the ladder drill correctly. His pattern of responding remained high and stable.

**Obstacle course.** During eight sessions in the obstacle course phase without the video models, Jay continued to complete an overall average of 98% (range: 94%-100%) of the steps of all three activities correctly. With the removal of the video model in session 30, Jay completed the obstacle course in the reverse order in sessions 30 and 31. Therefore, a verbal prompt was implemented. With the introduction of the verbal prompt, a slight decrease in responding of the shuttle run activity was observed in sessions 32 and 33. Following the slight decrease in responding, an immediate return to high and stable levels of responding was established.

**Cali**

Figure 3 depicts the percentage of steps Cali completed correctly across three physical activities: (a) jumping rope, (b) ladder drill (version one), and (c) scooter board.
with cones. The performance of the three activities was measured across the following conditions: (a) baseline, (b) video modeling, (c) error correction, (d) baseline, and (e) in-vivo training.

It should be noted that Phase 3 of the error correction procedures was not introduced to the ladder drill activity. This decision was based on the fact that Cali's level of responding remained similar to baseline after implementing Phases 1 and 2 of the error correction procedures. As a result of responding not improving from baseline levels, it was determined that Cali return to baseline across all three physical activities, before introducing in-vivo training.

**Ladder drill (version one).** During three baseline sessions, Cali completed 0% of the ladder drill steps correctly. With the introduction of video modeling, Cali did not show an increase in responding from baseline. Therefore, Phase 1 of the error correction was implemented, during which Cali showed no improvements in the level of her responding. As a result, Phase 2 of the error correction was implemented, which did not improve her responding.

Given that Cali's performance never improved from baseline levels, it was determined that a return to baseline for all three activities was necessary in order to implement in-vivo training. Because the ladder drill was not put into in-vivo training first, it remained in baseline until the end of the study due to the school year ending.

During seven additional baseline sessions, Cali completed 0% of the ladder drill steps correctly.
Figure 3. Percent correct for the jumping rope, ladder drill, and scooter board with cones activities for Cali
**Jumping rope.** During five baseline sessions, Cali completed 0% of the jumping rope steps correctly. With the introduction of video modeling, Cali did not show an increase in responding from baseline. Therefore, Phase 1 of the error correction was implemented, during which Cali showed no improvement in responding. As a result, Phase 2 of the error correction was implemented, during which Cali's level of responding did not improve and remained at baseline levels.

It was decided to place the jumping rope activity into video model based on three criteria: (a) there was no set criterion for reaching mastery, (b) level of responding remained stable, and (c) determine of video modeling might have effect on a different physical activity.

Given that Cali’s performance never improved from baseline levels, it was determined that a return to baseline for all three activities was necessary in order to implement in-vivo training. Because the jumping rope was not put into in-vivo training first, it remained in baseline until the end of the study due to the school year ending.

During seven additional baseline sessions, Cali completed 6% (range: 0–21%) of the jumping rope steps correctly.

**Scooter board with cones.** During eight baseline sessions, Cali completed an average of 4% (range: 0–16%) of the scooter board with cones steps correctly. The scooter board with cones activity was never introduced to video modeling, due to the lack of increased responding in the ladder drill and jumping rope activities.

With the introduction of in-vivo training, Cali completed 10% (range: 0–33%) of the scooter board steps correctly. This was an increase in responding from baseline.
Figure 4 depicts the percentage of steps Amy completed correctly across three physical activities: (a) jumping rope, (b) ladder drill (version one), and (c) scooter board with cones. The performance of the three activities was measured across the following conditions: (a) baseline, (b) video modeling, and (c) error correction.

**Ladder drill (version one).** During four baseline sessions, Amy completed 0% of the ladder drill activity correctly. With the introduction of video modeling, Amy showed an immediate change in the level of responding from baseline, performing at a stable level of 33% correct. Although there was an observed change in the level, responding continued to be low and stable. Therefore, Phase 1 of the error correction procedures was implemented, during which her pattern of responding remained low and stable with an average of 29% (range: 16–33%) of the steps completed correctly. As a result, Phase 2 of the error correction procedures was implemented in session 17. A slight increase with some variability in responding was observed, averaging 37% (range: 16–50%) correct. Due to the slight increase with some variability in responding, Phase 3 of the error correction procedures (i.e., visual cues) was implemented in session 25. Finally, with the introduction of the visual cues, there was an immediate change in the level of responding. The average increased to 60% (range: 50–66%) correct.

**Jumping rope.** During six baseline sessions, Amy completed an average of 18% (range: 14–21%) of the jumping rope steps correctly. With the introduction of video modeling, Amy did not show a change from baseline. Therefore, Phase 1 of the error
Figure 4. Percent correct for the jumping rope, ladder drill, and scooter board with cones activities for Amy.
correction procedures was implemented, but her responding did not change. As a result, Phase 2 of the error correction procedures was implemented in session 12. Amy’s level of responding improved to an average of 29% (range: 21–35%) of the steps completed correctly. No further decisions were made due to the fact that Amy was withdrawn from school unexpectedly and was not able to finish the study.

**Scooter board with cones.** During 12 baseline sessions, Amy completed an average of 12% (range: 0–16%) of the scooter board with cones steps correctly. The scooter board activity was not introduced to video modeling because Amy was withdrawn from school unexpectedly and was not able to finish the study.

**Social Validity**

Based on the results of the questionnaire, both the classroom teacher and instructional assistant indicated that they would be willing to change their classroom routine to implement the procedures used in the present study (M = 6.5, range: 6–7). They both felt that the use of technology (i.e., iPod Touch) was "very important" and felt comfortable (M = 6.5, range: 6–7) implementing the procedures with the technology. In addition, teaching physical exercise in their classroom was rated as important, and they both specified that the present study changed their perception of exercise in their classroom for the better (M = 6.5, range 6–7). Their understanding of the procedures was rated as "very clear." Finally, when asked if the present study would increase the effort required to teach the learners new physical exercises, both the classroom teacher and instructional assistant marked "no increase." Whereas the classroom teacher felt "neutral" regarding the question of whether the intervention would decrease the effort required to
teach new physical exercises, the instructional assistant responded that there would be a
decrease in the effort required to teach the learner new physical exercises (M = 3, range: 2–4).
Chapter 4: Discussion

Results from this study support previous studies demonstrating the effectiveness of teaching three different physical activities through video modeling to adolescents with significant disabilities (Dove & Dowrick, 1980; Gillespie, Porretta, & Surburg, 1999). Two of the participants acquired the physical activities through video modeling. Specifically, one showed high levels of responding across all three physical activities and the other showed high levels of responding across two physical activities after error correction procedures were implemented for one of the physical activities. A third participant showed higher levels of responding across two of the physical activities after error correction procedures were implemented. The fourth participant, who was exposed to in-vivo training, showed little increase in her level of responding.

The present study extends the literature on using video modeling to acquire physical activities in several ways. First, we were able to identify two articles that specifically studied the acquisition of physical activities using video modeling, and one article that studied video prompting for students with disabilities (Dove & Dowrick, 1980; Geis, 2012; Gillespie et al., 1999). In these studies the video models were presented using a television. Therefore, this study extends the literature by using an iPod Touch and provides evidence for acquiring physical activities, specifically for students with significant disabilities.
Second, this study addresses the need for visual cues and different prompting levels in acquiring physical skills through video modeling. With the exception of Jay performing on the shuttle run activity, each of the participants required some level of additional prompting in order to complete the physical activity. In addition, it was observed that the effectiveness of the error correction procedures varied across participants and activities. For example, Jay self-corrected his performance after re-watching the video model versus the live demonstration on the ladder drill activity. In contrast, it appeared that the live demonstration was more effective during the disc ride activity for Jay. Both Amy and Sal responded similarly after the visual cues were placed on the ladder drill compared to both Phases 1 and 2 of the error correction procedures. Visual cues of placing the dots on the ladder grid were found to be the most salient feature for cueing and attending to the activities. Amy showed improvements in performance after the introduction of Phase 2 versus Phase 1 of the error correction procedures. Lastly, verbal cues of counting each revolution of the swing and saying "finished" did not improve the level of completing the jumping rope activity. The ineffectiveness of using verbal prompts with Sal provides evidence that verbal cues may not be effective in teaching a physical activity for students with significant disabilities. Due to the physicality of performing the physical activity of jumping rope, it may be that the verbal cues did not provide enough reinforcement to capture Sal's attention on correctly completing the steps. According to Gillespie et al. (1999) little evidence is available regarding the effects of verbal instruction with students with mild mental retardation. These results show a need for more evidence regarding the effectiveness of
different prompting procedures with teaching different physical activities, specifically for students with significant disabilities.

Third, this study extends the use of video modeling to students with multiple disabilities. In researching studies that used video modeling, we found that the majority were conducted with students with mild to moderate disabilities or specifically autism. In addition, the majority of studies targeted functional and social skills. Therefore, by extending the use of video modeling for acquiring physical activities to include students with more severe disabilities, we were able to show the effectiveness of video modeling with additional prompting procedures in acquiring physical activities for two of the four participants.

**Limitations and Future Research**

Although the results of the present study provide several advantages to using video modeling as an intervention for teaching physical activities, there were several limitations that should be addressed by future research. First, participants were provided with no feedback during baseline sessions. This resulted in participants practicing errors until the tier was introduced to the video modeling phase. For example, Sal remained in baseline for the scooter board with cones activity for 12 sessions as compared to the eight sessions of the video modeling phase. As a result, it was observed that with the exception of two sessions of completing the activity with 66% accuracy during the video modeling phase, he continued to complete the scooter board activity at a similar level as compared to baseline, which was riding on the scooter board around the cones, instead of through them. He continued to do this, even after the introduction of video modeling. This may
have occurred due to the reinforcement he received in the 12 sessions of practicing the activity in this manner in baseline. For example, Sal remained in baseline for three sessions of the jumping rope activity and four sessions of the ladder drill activity. With the introduction of video modeling in both the first and second tiers, an immediate change in level of responding from baseline was observed. Although not providing feedback may result in participants being reinforced through practicing errors, we determined this was the best method to demonstrate experimental control, because our goal was to observe the effects of video modeling and ensure that the changes in responding were as a result of video modeling and not because of any extraneous variables (i.e., error correction). Therefore, it was imperative that we did not provide feedback in order to assess the effects of video modeling and changes in responding from baseline.

Dove and Dowrick (1980) reported similar effects when using a multiple baseline design for the third participant. The authors noted that the third participant remained in baseline for seven weeks prior to the introduction of self-video modeling. Additionally, there was a broad range of responding levels among the four participants. For example, Jay was the only participant who completed the obstacle course without the use of the video models as compared to Cali whose performance during the video modeling phase and in-vivo training never improved from baseline levels. Future research should examine whether students with significant and developmental disabilities could acquire different physical activities through video modeling by excluding the additional extraneous variable of practicing errors during baseline. This should be done by
terminating or limiting sessions to the first error performed in baseline. By preventing the participants from practicing errors during baseline sessions, future research may show a significant increase in the level of responding from baseline. In addition, future research should examine the effectiveness of using a different experimental design that may limit the amount of time each activity remains in baseline.

A second limitation included the order in which the tiers were introduced to the video modeling phase. The tiers were introduced to the video modeling phase in order of difficulty. This may have contributed to the slower acquisition rates of responding, as well as the amount of prompting and visual cues that had to be added to video modeling to teach the physical activities. It was noted that even with the additional prompts and visual cues, one of the four participants did not achieve higher levels of responding from baseline. For example, it was determined that Cali should return to baseline for all three activities based on the fact that video modeling was not an effective intervention for her. As a result, we decided to implement in-vivo training. Although Cali’s level of responding during in-vivo training remained similar compared to the previous phases, in sessions 17 and 21 of the in-vivo training phase, it was observed that she completed the scooter board with cones activity (i.e., riding on the scooter board, navigating through the three cones) with both verbal and gestural prompts. Additionally, we found that the less intrusive prompts were more effective in acquiring the physical activities. For example, when the visual cues of the dots were placed on the ladder grid, both Sal and Amy’s performance increased compared to Phases 1 and 2 of the error correction procedures. In another example, Sal showed similar levels of responding as compared to baseline when
performing the scooter board with cones activity during the video modeling phase. However, Phase 1 of the error correction procedures, specifically re-watching the video model a second time before performing the scooter board with cones activity, showed a gradual increase in the level of responding. For example, in sessions 17 to 20, after re-watching the video model, he self-corrected by riding on the scooter board through each cone.

Research by Gillespie et al. (1999) noted that students with moderate mental retardation may have difficulty when processing relevant stimuli. The authors found that the participants struggled to acquire the physical skill through video modeling, because they may not have attended to the salient stimuli in the video model. This observation is consistent with the present study for students with significant disabilities. In the present study, it was unclear which prompting procedure was most effective in conjunction with video modeling in teaching the participants the physical activities. Therefore, future research should examine the effectiveness of the different prompting procedures (i.e., component analysis) in order to determine the most effective prompts to be paired with video modeling for teaching students with significant disabilities. In addition, future research should compare and examine in-vivo training and video modeling to study which intervention may be more effective in acquiring different physical activities for students with significant disabilities.

A third limitation is that no measures of generalization or maintenance of the physical activities were included. This was due to the fact that the study was limited to the participants' school year, and there was not sufficient time to implement
generalization or maintenance phases. According to Akullian and Bellini (2007) only seven out of the 23 studies reviewed in their meta-analysis of video modeling and self-video modeling qualified as measures of generalization. Therefore, future research should measure the effects of generalization and maintenance phases with video modeling and teaching physical activities to determine if the skills extend to different environments and/or materials. For example, in the present study the ladder drill activity used a ladder grid that was created on a large sheet of paper using marker ink as the lines. This activity could be generalized by creating the ladder grid outside using chalk on black asphalt. In another example, different jump ropes could be implemented for the participants to use, or using different teachers to implement the present study’s procedures. Lastly, these physical activities lend themselves to a variety of social opportunities with same-age peers, such as jumping rope on a playground. Therefore, future research should examine the effects of performing the physical activities in different social settings.

A fourth limitation to the present study included no measures of the participants’ overall physical status, such as height, weight, body mass index (BMI), etc. Therefore, it was unclear as to whether a physical or cognitive component may have attributed to the results of the current study. For example, based on anecdotal observations of the participants, Jay appeared to be the most physically fit, whereas Cali appeared to be overweight. Future research should include a variety of physical measures of individuals with significant disabilities to be able to determine the importance of these measures in acquiring physical activities through video modeling.
A final limitation to the current study included not programming for self-directed video modeling. In other words, teaching the participants to operate and use the iPod Touch to be able to access the video models. Although the purpose of the study was to investigate the effects of video modeling on teaching physical activities, future research should examine the effect of self-directed video modeling on teaching physical activities to students with significant disabilities.

**Implications for Practitioners**

The results from the present study provide evidence for using video modeling for teaching students with significant disabilities physical activities. Video modeling can be seen as a highly motivating activity for students with and without disabilities and may increase attention and motivation in learning the modeled activities (Akullian & Bellini, 2007). For example, anecdotal observations of the participants' reactions towards the present study showed three of the four participants were interested in watching the video models each session. They showed attentiveness by keeping their eyes on the screen for the duration of the video model. In another example, it was observed that Jay and Sal enjoyed performing the physical activities as well. This was noted by their facial expressions; they smiled after completing each activity. In addition, it was observed in several of the sessions that Jay threw his hands in the air and smiled while skipping around the cafeteria after completing the last physical activity. It was also noted that Jay would immediately go to the first activity and wait for the researcher to present the video model.
These anecdotal observations further support the use of the video modeling with students with significant disabilities. Although video modeling can be seen as a motivating intervention, it is important that teachers and practitioners determine whether the students are motivated by watching videos prior to implementing video modeling. For example, Cali was the only participant among the four who was not motivated to watch the videos and struggled to focus in the current studies’ environment. This was due to the fact that she was highly motivated by food and would try to seek out the food displayed in the cafeteria. Therefore, an implication from the current study suggests that video modeling be implemented in settings where it is not competing with other reinforcers that may be seen as more reinforcing to the student, as well as making sure that the student possesses the prerequisite of attentiveness to viewing videos.

Results from the social validity questionnaire completed by the classroom teacher and instructional assistant support the use of implementing the present study. Both had positive responses regarding their perspective of the intervention and willingness to implement the current study. When asked if they felt comfortable using technology such as the iPod Touch, they indicated that they did. In addition, both the teacher and assistant noted that their perception of exercise changed as a result of the current study. For example, during the course of the study, the assistant attended each session with Jay. Prior to each phase being implemented, the assistant vocalized her apprehension in Jay participating, due to her perceived opinion of Jay not engaging in activities without full support and without the activity being demonstrated by the researcher. After the obstacle course phase, when video modeling was removed, the assistant opined once again that
she did not think Jay would participate because of the new condition being introduced (removal of the video modeling). After observing Jay perform the activities and seeing his reaction following the completion of the obstacle course, she was very surprised by Jay’s willingness to engage in activities without being prompted. The teacher attended one session during the course of the study. She told us that she did not believe the students would engage or participate without exhibiting challenging behaviors and was impressed by the students’ willingness to participate. Due to the discrepancy of the classroom staff’s skepticism concerning the students’ willingness to participate prior to observing the session, and her positive responses on the social validity questionnaire, future research should examine classroom staff’s behavior regarding the implementation of the current studies’ procedures.

**Conclusion**

In summary, the current study implemented video modeling for teaching physical activities to four students with significant disabilities. Video modeling was shown to be effective in teaching three of the four participants. One of the participants demonstrated high levels of responding across all three physical activities with and without (i.e., obstacle course) the use video models. Two of the participants showed higher levels of responding from baseline after additional error correction procedures were implemented. The fourth participant did not show increases in responding from baseline, and minimal increases were observed after implementing in-vivo training. The data indicate that video modeling can be used as an effective intervention for teaching students with significant
disabilities physical activities. The iPod Touch was shown to be an effective tool for video modeling, and video modeling can be seen as a highly desired and motivating tool.
References


Appendix A: Research Consent Form
The Ohio State University Parental Permission
For Child’s Participation in Research

Study Title: inPromptu: Video Assisted Learning and Self-Management for Individuals with Significant Intellectual Disabilities of Transition Age

Researcher: Helen I Malone
Sponsor: US Department of Education

This is a parental permission form for research participation. It contains important information about this study and what to expect if you permit your child to participate.

Your child’s participation is voluntary.
Please consider the information carefully. Feel free to discuss the study with your friends and family and to ask questions before making your decision whether or not to permit your child to participate. If you permit your child to participate, you will be asked to sign this form and will receive a copy of the form.

Purpose:
The purpose of this project is to investigate different methods for teaching new skills in efficient and effective manners, as well as increasing the independence of individuals with developmental disabilities. Teaching these skills has the potential to increase quality of life by providing your child with greater independence.

Procedures/Tasks:
All of the students in your child’s classroom will receive instruction using video modeling and prompting that will focus on teaching new daily living skills. Instruction on these skills will be conducted 3-4 times weekly for approximately 30 minutes. During these sessions, your child will watch a video of a skill being completed and then be given the opportunity to then complete the skill on his or her own. When using video prompting, your child will see one step of a task being completed and have the opportunity to complete that step before watching the next step. In video modeling, your child will watch the entire task being completed, then have the opportunity to complete the entire task. The data we gather will help us determine whether video modeling or video prompting is more effective and efficient at teaching new skills. We will also compare the effectiveness of using the video in teaching to traditional teaching. Any data that we collect on how well your child does with these instructional strategies will be coded so that their data cannot be identified.

In addition to participating in these two phases, we will collect information from your child’s educational file that is not publicly available, including your child’s disability and standardized assessment scores (where available).
The Ohio State University Parental Permission
For Child’s Participation in Research

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Researcher: Helen I Malone

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In addition to participating in these two phases, we will collect information from your child’s educational file that is not publically available, including your child’s disability and standardized assessment scores (where available).
Duration:
This study will last approximately two years. During this study, we expect to work with each
student three to four days per week for approximately thirty minutes per day.
Your child may leave the study at any time. If you or your child decides to stop participation
in the study, there will be no penalty and neither you nor your child will lose any benefits to
which you are otherwise entitled. Your decision will not affect your future relationship with
The Ohio State University.

Risks and Benefits:
We do not anticipate any risks as a result of participating in this study. Participants will be
working with OSU students they are familiar with, so they should be comfortable in the study
sessions. One potential risk is that the study is not successful in systematically teaching your
child new daily living skills.
Participants may acquire new daily living skills using a current technology that is being used
by their typically developing peers. In acquiring these new skills, our participants will
increase their overall levels of independence and, therefore, possibly attain a higher quality of
life.

Confidentiality:
Efforts will be made to keep your child’s study-related information confidential. However,
there may be circumstances where this information must be released. For example, personal
information regarding your child’s participation in this study may be disclosed if required by
state law. Also, your child’s records may be reviewed by the following groups (as applicable
to the research):

- Office for Human Research Protections or other federal, state, or international
  regulatory agencies;
- The Ohio State University Institutional Review Board or Office of Responsible
  Research Practices;
- The sponsor, if any, or agency (including the Food and Drug Administration for FDA-
  regulated research) supporting the study.

Incentives:
There are no incentives for participating in this study.

Participant Rights:
You or your child may refuse to participate in this study without penalty or loss of benefits to
which you are otherwise entitled. If you or your child is a student or employee at Ohio State,
your decision will not affect your grades or employment status.
If you and your child choose to participate in the study, you may discontinue participation at
any time without penalty or loss of benefits. By signing this form, you do not give up any
personal legal rights your child may have as a participant in this study.

An Institutional Review Board responsible for human subjects research at The Ohio State
University reviewed this research project and found it to be acceptable, according to
applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.

Contacts and Questions:
For questions, concerns, or complaints about the study you may contact Helen Malone at 614-247-8710 or malone.175@osu.edu.

For questions about your child’s rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.

If your child is injured as a result of participating in this study or for questions about a study-related injury, you may contact Helen Malone at 614-247-8710 or malone.175@osu.edu.
Signing the parental permission form

I have read (or someone has read to me) this form and I am aware that I am being asked to provide permission for my child to participate in a research study. I have had the opportunity to ask questions and have had them answered to my satisfaction. I voluntarily agree to permit my child to participate in this study.

I am not giving up any legal rights by signing this form. I will be given a copy of this form.

Printed name of subject

Printed name of person authorized to provide permission for subject

Signature of person authorized to provide permission for subject

AM/PM

Relationship to the subject

Date and time

Investigator/Research Staff

I have explained the research to the participant or his/her representative before requesting the signature(s) above. There are no blanks in this document. A copy of this form has been given to the participant or his/her representative.

Printed name of person obtaining consent

Signature of person obtaining consent

AM/PM

Date and time
Appendix B: Participant Continuation Letter
Dear Parents,

We would like to include your child’s data in a study that will examine the effectiveness of using video modeling and video prompting to teach new skills to individuals with developmental disabilities. The purpose of this project is to investigate different methods for teaching new skills in efficient and effective manners, as well as increasing the independence of individuals with developmental disabilities. Teaching these skills has the potential to increase quality of life by providing your child with greater independence.

All of the students in your child’s classroom will receive instruction using video modeling and prompting that will focus on teaching new daily living skills, such as doing laundry and washing dishes. Instruction on these skills will be conducted 3-4 times weekly for approximately 30 minutes. During these sessions, your child will watch a video of a skill being completed and then be given the opportunity to then complete the skill on his or her own. When using video prompting, your child will see one step of a task being completed and have the opportunity to complete that step before watching the next step. In video modeling, your child will watch the entire task being completed, then have the opportunity to complete the entire task. The data we gather will help us determine whether video modeling or video prompting is more effective and efficient at teaching new skills. We will also compare the effectiveness of using the video in teaching to traditional teaching. Any data that we collect on how well your child does with these instructional strategies will be coded so that their data cannot be identified.

I will be leading this project with the assistance of my graduate students and the support of your child’s teacher. If you would like more information, please feel free to contact me at 614-247-8710 or malone.175@osu.edu. If you would like for your child’s data to be included in our analyses, please sign the attached consent form and return it to your child’s teacher. Please know that your consent for your child’s participation is voluntary, you can refuse to answer questions that you do not wish to answer, and you can refuse your child’s participation or withdraw your child at any time without penalty or repercussion.

Thank you for your time and attention.

Ph.D.
Assistant Professor

Helen I. Malone
Appendix C: Experimenter Procedural Integrity Data Collection Sheets
<table>
<thead>
<tr>
<th>Instruction: Three physical tasks</th>
<th>Activity:</th>
<th>Name of Student:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circle (✓): Completed Correctly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Circle (✗): Completed Incorrectly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Instructor and participant standing in the cafeteria in front of specific activity.</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>2. Instructor orients participant towards iPod.</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>3. Instructor presses the power button on the iPod and moves finger across screen to unlock iPod.</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>4. Instructor presses play on the video.</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>5. Instructor says aloud to the participant, “Watch the video.”</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>6. Instructor and participant watch the video.</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>7. Instructor moves iPod away from the participant by holding the device close to their leg.</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>8. Instructor prompts participant to perform target behavior by stating aloud the SP.</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>9. Instructor observes and records data of participant performing activity.</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>10. Instructor waits for participant to complete activity or terminates session after 30 s by stating, “All Finished.”</td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Percent Correct</th>
<th>Reliability</th>
</tr>
</thead>
</table>
### Activity:
Data Collector: 
Condition: **Video Modeling without Videos**

### Student:
IOA (circle one): Y N

<table>
<thead>
<tr>
<th>Instruction:</th>
<th>Treatment Integrity for obstacle course without videos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circle: (i) completed Correctly Circle: (0) Completed Incorrectly</td>
<td>![Table of Treatment Integrity]</td>
</tr>
<tr>
<td>1. Instructor and participant standing in the cafeteria in front of specific activity.</td>
<td>![Columns for Treatment Integrity]</td>
</tr>
<tr>
<td>2. Instructor prompts participant to perform activity by stating aloud the $S^O$.</td>
<td>![Columns for Treatment Integrity]</td>
</tr>
<tr>
<td>3. Instructor observes and records data of participant performing all three activities.</td>
<td>![Columns for Treatment Integrity]</td>
</tr>
<tr>
<td>4. Error Correction: Instructor verbally prompts participant by indicating the correct station or terminates session after 30 s by saying, “All finished”.</td>
<td>![Columns for Treatment Integrity]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
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<tbody>
<tr>
<td>Percent Correct</td>
</tr>
<tr>
<td>Reliability</td>
</tr>
<tr>
<td>Name: (Treatment Integrity):</td>
</tr>
<tr>
<td>-----------------------------</td>
</tr>
<tr>
<td><strong>Condition: Baseline</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Instruction: Three physical tasks</th>
<th>Activity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Circle: (I) Completed Correctly</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Circle (0): Completed incorrectly</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

1. Instructor and participant standing in the cafeteria in front of specific activity.

2. Instructor prompts participant to perform activity by stating specific SD.

3. Instructor observes and records data of participant performing activity.

4. Instructor waits for participant to complete activity or terminates session after 30 s by stating, “All Finished.”

<table>
<thead>
<tr>
<th>Date</th>
<th>Percent Correct</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</table>

67
Appendix D: Social Validity Questionnaire
# Video Modeling Treatment Acceptability Rating

1. How clear is your understanding of the intervention procedures?

<table>
<thead>
<tr>
<th></th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Clear</td>
<td>Neutral</td>
<td>Not Clear</td>
<td></td>
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</tbody>
</table>

2. Would this intervention increase the effort required to teach the learner new physical exercises?

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<th>4</th>
<th>3</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Increase</td>
<td>Neutral</td>
<td>No Increase</td>
<td></td>
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3. Would this intervention decrease the effort required to teach the learner new physical exercises?

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<tr>
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<th>7</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Decrease</td>
<td>Neutral</td>
<td>No Decrease</td>
<td></td>
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</table>

4. How important to you is teaching physical exercise in your classroom?

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<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Important</td>
<td>Neutral</td>
<td>Not Important</td>
<td></td>
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</tbody>
</table>

5. Based on the intervention procedures, has your perception of exercise in the classroom changed for the better?

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<th>4</th>
<th>3</th>
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<th>1</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Changed</td>
<td>Neutral</td>
<td>No Change</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

6. How important to you are interventions that implement the use of technology (i.e., iPods)?

<table>
<thead>
<tr>
<th></th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Important</td>
<td>Neutral</td>
<td>Not Important</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. How comfortable do you feel implementing such technology (i.e., iPod) with your learners?

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<thead>
<tr>
<th></th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Comfortable</td>
<td>Neutral</td>
<td>Not Comfortable</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

8. How willing would you be to change your classroom routine to implement these procedures?

<table>
<thead>
<tr>
<th></th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Willing</td>
<td>Neutral</td>
<td>Not Willing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>