

THE EFFECTS OF VIDEO SELF-MODELING ON CHILDREN WITH AUTISM SPECTRUM DISORDER

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Video self-modeling (VSM) is a type of intervention that has been developed to assist students in viewing themselves successfully in a wide variety of domains. The present study was designed to analyze the effects of VSM on children with autism spectrum disorder in an academic setting, with specific focus on improving on-task behavior and appropriate transitions. Participants were two children who were enrolled within the functional interrelated classroom and diagnosed with autism spectrum disorder. Using an alternating treatment design over a 20 day time period, participants received 10 days of VSM and 10 control days in a random order. Results indicated that for the first child on-task behavior significantly increased on VSM days compared to control days and maintenance was established by the increasing of on-task behavior during the weeks of implementation. For the second child, appropriate transitions significantly increased on VSM days compared to control days but maintenance was not established. Additionally, teachers' ratings of participants' behavior improved from a pre-test given before the intervention to the post-test conducted at the conclusion. Practical suggestions for implementing VSM are provided, in addition to suggestions for future research.

Autism is a type of disorder included in the autism spectrum disorder (ASD) category. Other disorders in the category include Asperger's syndrome and pervasive developmental disorder-not otherwise specified. Individuals with autism have a triad of impairments. These impairments include verbal and non-verbal communication, social interactions, resistance to environmental change (Delano, 2007) and restricted behaviors and interests (Braithwaite & Richdale, 2000; Delano, 2007). Examples of restricted behaviors and interests include unusual behaviors and habits or obsessions, such as repetitive ticks or motor routines. In addition, children with autism have deficits in attention behavior, eye contact, and processing of social stimuli. One of the most prominent deficits in children with autism is communication, as 30% of children with autism never develop a language to native-like proficiency.

Volkmar, Cohen, and Paul (1985) found that parents of 50 children diagnosed with autism reported a variety of stereotyped movement including rocking (65%); toe walking (57%); arm, hand, or finger flapping (52%); and whirling (50%). The pervasive influence of autism spectrum disorder on diverse domains can have an adverse impact on a child's educational performance (Delano, 2007) and can cause these children to lag behind peers. Consequently, educational programs for children with ASD must be multi-faceted and address communication and language development, social and affective development, life skills, and academics.

For many years parents, teachers, and therapists have actively and aggressively pursued a wide range of approaches to treating students with ASD (Bugghey, 2005). There have been many attempts to intervene with children who have ASD, some with reasonable success. This literature review will examine such attempts, focusing on a new technique known as video self-modeling and the practical significance its benefits has for children with autism.

The concept of modeling, or observational learning, as an intervention technique was first introduced 40 years ago by Albert Bandura, as part of his seminal work on social learning theory (Bellini & Akullian, 2007). Modeling or observational learning is defined as a result of observing the behavior of a model

(Shiple-Benamou, Lutzker, & Taubman, 2002). This concept is known as *others as model*. Among the countless responses acquired observationally, those behaviors that seem to be effective for others are favored over behaviors that are seen to have negative consequences and the evaluative reactions that people generate toward their own behavior also regulate which observationally learned responses will be performed (Bandura, 1977). Over the course of his career, Bandura (1977, 1997) demonstrated that modeling has a profound impact on the development of children. Bandura (1977) showed that children will imitate behaviors with or without the presence of reinforcement, and will perform the behavior in surroundings other than the settings where it was originally observed. Bandura also stated that children are most likely to attend to a model that they perceive as competent, and who is similar to themselves in some way.

Technological advances in the past two decades have allowed researchers to extend the concept of modeling to include the use of video to teach a wide variety of skills (Sherer, Pierce, Parades, Kisacky, Ingersoll, & Schreibman, 2001). Models presented in televised form are so effective in capturing attention that viewers learn much of what they see without requiring any special incentives to do so (Bandura, 1977). Only a few studies have investigated the effectiveness of video interventions for children with autism, the majority of which have focused on teaching social behaviors and increasing language skills (Shiple-Benamou et al., 2002). In a typical study, children with autism view a video of a target behavior prior to entering the setting in which the target behavior was measured (Delano, 2007). D'Ateno, Mangiapanello, and Taylor (2003) created videotapes for children with autism using adults as models for appropriate play. Children with autism viewed the videotapes, waited one hour, and were observed afterwards in a similar play scenario as the one depicted by the adult in the video. It was noted that the modeling intervention was related to positive gains in appropriate play in children with autism.

As illustrated from the research studies above, the use of video modeling to improve behaviors in a child with autism has been fairly successful. The success could, in part, be explained by four primary features. First, video modeling includes many of the features that Bandura found to be important, such as the use of a competent and similar model. Second, video modeling minimizes attention and language requirements. This is because the child only needs to view a small spatial area (i.e., television monitor) and to listen to a minimum amount of language. Video modeling avoids reliance on social interactions or the presence of a therapist to promote learning. This reduction in the importance of social interactions may be particularly significant for children who struggle in social settings. Finally, motivation for watching television in general might increase interest in watching the video (Sherer et al., 2001).

Among all the advantages of other as model, there are some disadvantages. One disadvantage is the child acting as the model may not remain anonymous during the video recording process. This might reduce the number of parents who give permission for their child to serve as a model (Shiple-Benamou et al., 2002). Filming the desired behavior requires time and follow-up sessions may be needed. Locating a child that is age and gender appropriate as well may serve as additional constraints.

These disadvantages might be solved through another idea from Bandura. Specifically Bandura (1997) noted that the advantage of seeing oneself perform successfully provides clear information on how best to perform skills and strengthens beliefs in one's capability. The phrase *self-as-model* refers to a method of having the child with autism spectrum disorder serve as their own model, typically using videotapes. Video Self-Modeling (VSM) has been evaluated as a second type of video modeling in which the children with autism serve as their own models (Delano, 2007). The process involves recording the target child maximizing a specific skill. The videos are edited, removing unwanted behaviors or errors and other distracting footage, and should be around three to five minutes in length all together. The result should be footage of the target child performing desired behaviors. Repeated viewing of the video occurs, showing only desirable behaviors. Moderate to strong outcomes of the reviewed studies suggest that VSM can be used successfully to support students' communication, behavior, and academic performance in educational settings (Hitchcock, Dowrick, & Prater, 2003).

Buggey (2005) applied VSM to autism spectrum disorders to help with such behaviors as social interactions, tantrums, and language productions. In his study, Buggey collected baseline data, and then implemented VSM intervention. After noticeable improvement of behaviors, VSM was withdrawn and conclusions were made. It appeared that all participants made substantial gains as a result of VSM. Shiple-Benamou et al. (2002) found that using VSM was effective in teaching daily living skills to children with autism. An increase in play-related statements in children with autism toward their siblings was found using VSM according to Taylor, Levin, and Jaspers (1999). VSM has proved efficient with

help in academic areas such as math (Schunk & Hanson, 1989) and life skills (Miklich, Chida, & Danker-Brown, 1997). Shunk and Hanson (1989) concluded that children who struggled with arithmetic made noticeable improvements after viewing themselves perform correct fraction problems on videotape. Thus, VSM has been incorporated into the classroom as an effective tool to assist students academically.

The success of the tool could be due to a variety of factors. First, VSM offers a way for individuals to confront their own behaviors (Buggey, 2005). VSM usually has immediate results, making it time and cost efficient (Hitchcock et al., 2003). Videos are also portable and can be used to maintain target behaviors during school breaks, such as winter or summer break. By minimizing attentional requirements, requiring the child only to look at a small spatial area (a television monitor), and to hear only the minimum necessary language, children are more able to direct their focus to relevant stimuli (Shipely-Benamou et al., 2002). Children might enjoy watching themselves more than watching an age-matched model and, thus, may be more motivated to attend to the videotape, as well as the familiarity of the self-model might make visual processing, and thus learning, easier (Sherer et al., 2001). It also allows individuals to see themselves as they could be rather than as they currently are. In addition, television offers a relatively nonthreatening medium of teaching when compared to direct human interaction (Zihini & Zihini, 1998).

Further, watching predominately positive and/or successful behaviors of self, as opposed to negative and/or unsuccessful behaviors, is essential to effective modeling as it increases both attention and motivation to attend to the modeled behaviors (Bellini & Akullian, 2007). Research has supported the notion that skills learned via video modeling and VSM generalize across different settings and conditions and that the positive gains made during the video modeling intervention are maintained for months following the conclusion of the intervention (Bellini & Akullian, 2007). Schreibman, Whalen, and Stahmer (2000) used a video priming technique to reduce or eliminate disruptive behaviors associated with transition situations for children with autism, and in all instances the video priming intervention resulted in decreases in the disruptive behavior and generalized across new transition situations.

There has been limited research in general on VSM, the number only in the single digits. A meta-analysis conducted by Bellini and Akullian (2007), included 23 studies that were published between 1998 and 2005. Of those 23, 15 examined video modeling interventions and only 7 examined VSM, with one study examining both video modeling and VSM. In addition, to date, most of the research on the use of video modeling with children with autism spectrum disorder has focused on improving social-communicative skills (Delano, 2007). There has been limited attention and research conducted regarding children with autism spectrum disorders who exhibit severe attention (Courchesne et al., 1994), social (Pierce & Schreibman, 1995), and motivational deficits (Shipley-Benamou et al., 2002). A majority of research has been conducted to increase social skills in the community, conversational skills, and functional skills such as brushing teeth or washing face, and play behavior. Research on VSM within the last three years has continued to explore its benefits in the areas of social engaged time (Victor, Little, & Akin-Little, 2011), social initiatives during playground time (Buggey, Homes, Sherberger, & Williams, 2011), social skills, functional skills (Gelbar, Anderson, McCarthy, & Buggey, 2012) and extension to pre-school aged children (Buggey & Hoomes, 2011). Consequently, more research needs to be conducted on VSM procedures to improve academic functioning, increase on-task behavior in certain academic fields, or allow parents or teachers to pick the task to increase the social relevance. Hitchcock et al. (2003) noted that more research is needed on VSM and they encouraged teachers and researchers to implement VSM and investigate this type of intervention, since there is little research available to date.

The purpose of the present study was to implement VSM in the classroom to improve academic performance, such as on task behavior and appropriate transitions with two students with ASD. Specifically, this study utilized the image of future success (Dowrick, 1999) or video feedforward. Video feedforward is a category of VSM interventions. In feedforward interventions, individuals observe themselves successfully demonstrating skills that are slightly above their current capability (Bellini & Akullian, 2007) or that have not been previously attained (Hitchcock et al., 2003). In a study conducted by Dowrick, Kim-Rupnow, and Power (2006), it was found that video feedforward had significantly increased students' rate of improvement in reading fluency.

Research indicates the utility of self-modeling is evident in that it has been used to address successfully a myriad of conditions, including daily living skills (Shipley-Benamou et al., 2002); language production (Buggy, 2005); preteaching reading skills (Beck, Burns, & Lau, 2009); responding behaviors (Buggy, Toombs, Gardener, & Cervettie, 1999); attention-deficit/hyperactivity disorder (Walker & Clement,

1992); transitions (McCoy, Mathur, & Czoka, 2010); and learning/behavior disabilities (Clare, Jenson, Kehle, & Bray, 2000). With regards to increasing children's on-task behavior, previous investigations employing self-modeling have revealed mixed results (Clare et al., 2000). Clare et al. (2000) reported a substantial increase in their participants' on-task behaviors. In contrast, however, Possell, Kehle, McLoughlin, and Bray (1999) found idiosyncratic and limited effects of self-modeling with similar students used in previous studies. Thus, the present research explored the implementation of VSM within a functional interrelated classroom to explore the effects it had on children with autism spectrum disorder and on-task behavior. Therefore, it was hypothesized that *the implementation of VSM would significantly increase the percentage of on-task behavior compared to control conditions*. With regards to Clare et al. (2000), students' on-task behaviors were maintained at six and eight weeks after termination of treatment. Lonnecker, Brady, McPherson, and Hawkins (1994) also observed maintenance during the fading phase of research conducted. Consequently, it was also hypothesized that *the implementation of video self-modeling (VSM) within the functional interrelated classroom would demonstrate maintenance or the general increase in on-task behaviors over the seven weeks of implementation*.

Making successful transitions from one activity to another is difficult for many children, especially children with autism spectrum disorder; increasing the length of the transition is directly relevant to the amount of time available for student engagement in an expected task (McGrath & Rust, 2002). Visual supports may improve learning for children who have limitations in processing or attending to transient information or who are challenged to recall information presented verbally (McCoy et al., 2010). It was hypothesized that *the implementation of VSM would increase the percentage of appropriate transitions as compared to control conditions*. With regards to this hypothesis, it was also predicted that *the implementation of VSM would demonstrate maintenance, or the general increase in appropriate transitions over the weeks of implementation*.

Finally, the present study investigated the functional interrelated classroom teachers' responses before the implementation of VSM and after the completion of VSM. It was hypothesized that *teacher's ratings of on-task behaviors and appropriate transitions would significantly increase after the introductions of VSM as compared to baseline ratings*. This hypothesis was intended to provide a clearer understanding of how the functional interrelated classroom teachers perceived the implementation of VSM and whether they found it effective with their chosen students and areas of improvement.

Method

Participants

Two middle school students were chosen to participate in this study. Both students attended one middle school in Western Kansas and participated in a special education functional interrelated classroom on a daily basis. They were selected for participation in this study because they were previously diagnosed with ASD as documented on the individual education plan (IEP), showed struggles or difficulties in specific academic areas, and were thought to benefit from VSM when teacher input was taken into consideration.

The first student was a 13-year-old Caucasian girl in the 8th grade. VSM was implemented to assist her in increasing her time on-task during reading class (30 minutes), suggested by the two functional interrelated classroom teachers. Beck et al. (2009) described time on-task as attending to the assigned reading material (e.g., appearing to silently read material, writing, raising hand to ask for assistance, and listening to a teacher explain directions). Clare et al. (2000) defined on-task behavior as having eye contact with the teacher, or the assigned task, and performing the requested assignment. In the current study, these definitions were used in addition to time on-task including the student being engaged in academic learning time. Academic learning time consisted of listening to a story, cut and paste activities, coloring or drawing, handwriting practice, or flashcards. Time on-task also included increasing her positive interaction with peers and classroom staff, which encompassed keeping her hands to herself (no pinching, hitting, pulling hair), and replacing automatic refusal to do academic activities with willingness to attempt activities. Off-task behaviors were as defined by previous research and included not having eyes orientated toward the assigned material. Examples of off-task behavior included talking to a peer about something other than the assigned task, staring out the classroom window, being out of seat, and showing any physical aggression (Beck et al., 2009). These definitions of off-task behavior were utilized in the current study.

The second student was a 14-year-old Caucasian girl in the 8th grade. VSM was also implemented to assist her with transition difficulties. In particular, she struggled with transitions during specific class periods when she was asked to switch activities or when she was asked to leave for related services. According to the functional interrelated classroom teachers, her struggles included: very vocal responses and exaggerated questions as to what is going on, tears or crying, hand or finger flapping, and/or exaggerated sobbing. For the purpose of this study, the research focused on transitions during academic periods, which included switching activities in the same academic period. This study focused specifically on math class, because both teachers reported math as being the academic class period where a majority of her difficulties were observed.

Appropriate transitions for this student encompassed attending to the assigned task, which included eyes focusing on the assignment, remaining in her seat, and little to no loud vocalizations or interruptions. Appropriate transitions also included putting away specific materials as directed and retrieving materials for the next activity in math class. Inappropriate transitions consisted of loud vocalizations by the student when asked to begin a new activity in the math class, such as exaggerated sobbing, crying, and dramatic questions. Inappropriate transitions also encompassed refusal to put away class materials or refusal to get out new class materials for the new activity

Experimental Design

This study utilized a single subject repeated measures design. Single subject designs are designs that can be applied when the sample size is one or when a number of individuals are considered one group; these designs are typically used to study the behavioral change an individual exhibits as a result of some treatment (Bonds-Raacke & Raacke, 2012; Wasson, 2010) and are frequently used in VSM research (Bellini & Akullian, 2007; Beck et al., 2009; Hines & Simonsen, 2008). For the current study, a pre-assessment evaluation completed by the teachers before implementation of VSM of each student's academic behavior occurred. Next, the independent variable was introduced and impacts measured. Finally, a posttest assessment, again completed by the teachers, evaluated the effectiveness of VSM on targeted skills.

An alternating-treatment design with comparison and withdrawal conditions was used to compare the effects of VSM on the performance of on-task behaviors and transitions by the two respective students. An alternating-treatment design is one in which two or more treatment options are alternated in quick succession to evaluate differential effects. Each time a condition is introduced it is maintained only for a brief period before being alternated with a different condition. This design was selected for the current study because of its numerous benefits such as the elimination of baseline data. In addition, previous research utilizing the alternating-treatment design has found that conditions are quickly discriminated by the participants and the influence of conditions can be easily observed (White, 2010). However, there are also some limitations to this design when the population of interest is children with ASD. For example, many children with autism spectrum disorders are preoccupied with *sameness* in their home environments and with school routines. It is not uncommon for changes in the routine to lead to a tantrum or other emotional disturbances (Filipek et al., 1999). However, the advantages outweighed the possible limitation and consequently, the alternating-treatment design consisted of 20 days of implementation, occurring three days a week for seven weeks. Of the 20 days, 10 days utilized VSM treatment and 10 days served as a control. The order of the implementation was determined using a random procedure.

Materials and Procedure

After obtaining consent from the school district to conduct the study, permission was granted by both the functional interrelated classroom teachers. Consent was then obtained from each of the student's parents and, child assent was also obtained from each of the participants in the present study. Once consent was granted, the teachers completed the pre-assessment baseline surveys. For Student 1, the survey measured on-task behaviors (such as making eye contact, performing required assignments, engaging in academic learning time) and off-task behaviors (such as talking to peers at inappropriate times, staring out the classroom window, getting out of the seat). For student 2, the survey measured teachers' perceptions of appropriate transitions like putting away materials when directed and inappropriate transitions like refusal to begin a new activity.

Next, video recording began on each individual child to record the specific target behaviors for VSM footage used in implementation of the research. Video recording took approximately one week to obtain enough footage to create a master video for the two students to view on their randomly assigned VSM

days. Editing the videos occurred as well to ensure that only positive behaviors were viewed. Once the videos were edited, a voice over was provided with encouraging prompts for the first student to increase self-efficacy. Such auditory prompts included *Great work, nice job working quietly*, or *look how good you are working!* The master video for the second student made use of visual prompts she could read. These visual prompts included *Nice job working quietly, good job*, and *great work!* Videos were played to the child before the specified academic class on the randomly assigned VSM day. To document any change in behaviors, each student was recorded using the Flip video camera each day of the research, which included VSM days and control days for comparison to measure change.

Dependent Variables

Classroom data was collected by employing momentary-time sampling, with behavior of each student rated every 10 seconds during 30 minute observation sessions with Student 1 and 10 minute observation sessions with Student 2. Momentary time sampling has been shown to effectively measure on-task behavior for typically developing students as well as students with BDs (Beck et al., 2009; Gunter, Venn, Patrick, Miller, & Kelly, 2003). The two dependent variables included on-task/off-task behaviors for the Student 1 and appropriate/inappropriate transitions for the Student 2. To gather the dependent variables the present study made use of three research assistants to assist with coding the data obtained.

There were a total of three observers who viewed the video tapes, two current school psychology graduate students and one undergraduate student with a minimum of one year of experience in a research setting. The observers received a one hour training session. During the training session, the operational definitions for on-task and off-task behaviors and appropriate and inappropriate transitions were provided. In addition, example video clips were provided to illustrate on-task and off-task behaviors for the first student, as well as appropriate and inappropriate transitions for the second student. The examples provided did not contain actual footage to be analyzed during the experimental procedure. The observers watched the sample videos, and practiced classifying on-task and off-task behavior and appropriate and inappropriate transitions, and discussed the results. When a 90% consensus was reached, the experimental procedure was ready to begin. The observers were blind to the conditions of the study as recommended by Clare et al. (2000).

Results

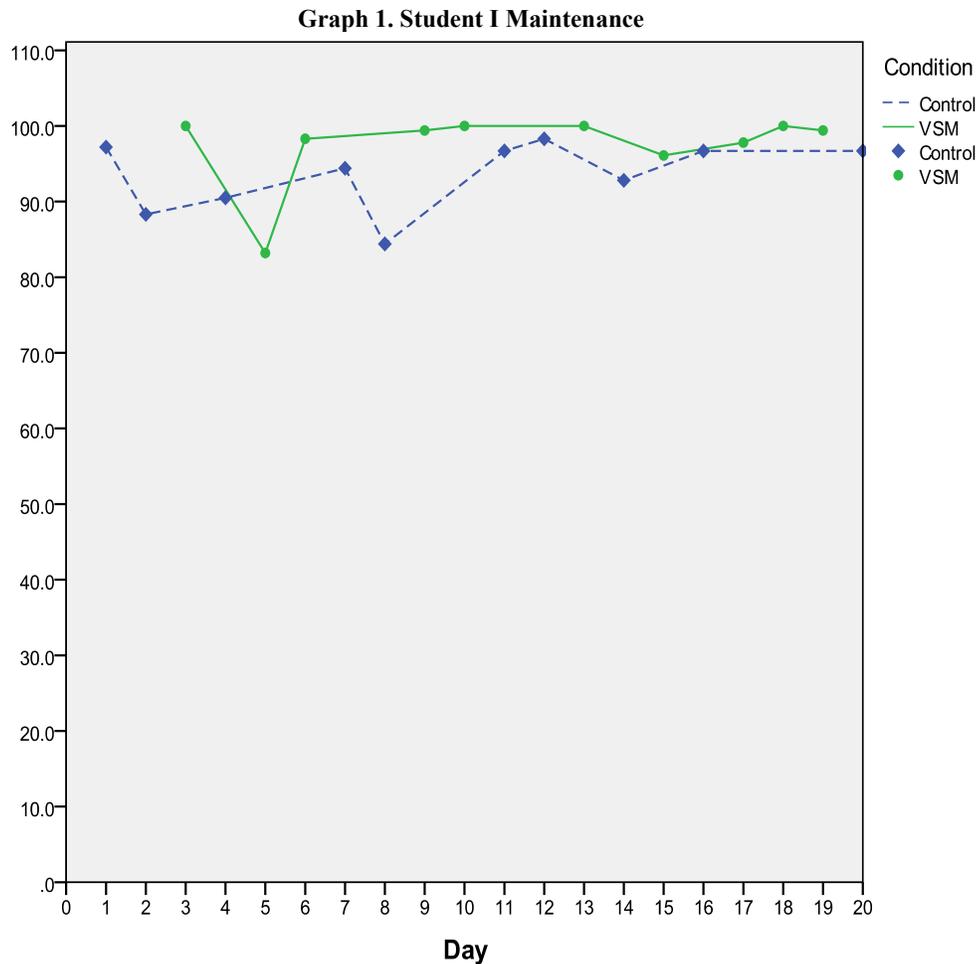
A Pearson correlation coefficient was calculated to assess the relationship between each of the three observers' scores to find the highest correlations between each when looking at Student 1 data. There were strong positive correlations found with Researcher one when compared to Researchers two ($r(20) = .873, p < .05$) and Researcher three ($r(20) = .854, p < .05$). Researcher one was determined the primary observer regarding Student 1; due to having the highest correlations (J. M. Naylor, personal communication, April 11, 2012)). A Pearson correlation coefficient was also calculated to assess for the relationship between each of the three observer's scores to find the highest correlations between each when looking at Student 2 data. There were strong positive correlations found with Researcher one when compared to Researcher two ($r(20) = .957, p < .05$) and Researcher three ($r(20) = .955, p < .05$). Again, Researcher one was determined the primary observer regarding Student 2, due to having the highest correlations.

Hypothesis (a)

A paired-samples t test was calculated with Student 1 data to determine if on-task behavior varied between control days and video self-modeling (VSM) days. Results indicated that the average percent of on-task behavior on the VSM days ($M = 97.42; SD = 5.16$) was significantly higher than the average percent of on-task behavior on the control days ($M = 93.6; SD = 4.56$), $t(9) = 2.18, p < .05$. A paired-sample t test was also calculated using Student 1 data to determine if off-task behavior varied between control days and VSM days. The average percent of off-task behavior on the control days was 6.12 ($SD = 4.83$), and the average percent of off-task behavior on the VSM days was 2.58 ($SD = 5.16$). Thus, significantly higher mean scores were found for off-task behavior on the control days than on the VSM days, $t(9) = 1.98, p < .05$.

Hypothesis (b)

A Pearson correlation coefficient was calculated to assess the maintenance effects of VSM on Student 1 over the course of implementation. A moderate positive correlation was found ($r(20) = .402, p < .05$), indicating a significant linear relationship between the day of treatment and on-task behavior. Maintenance was achieved over the course of implementation of the research for Student 1 (See graph1).



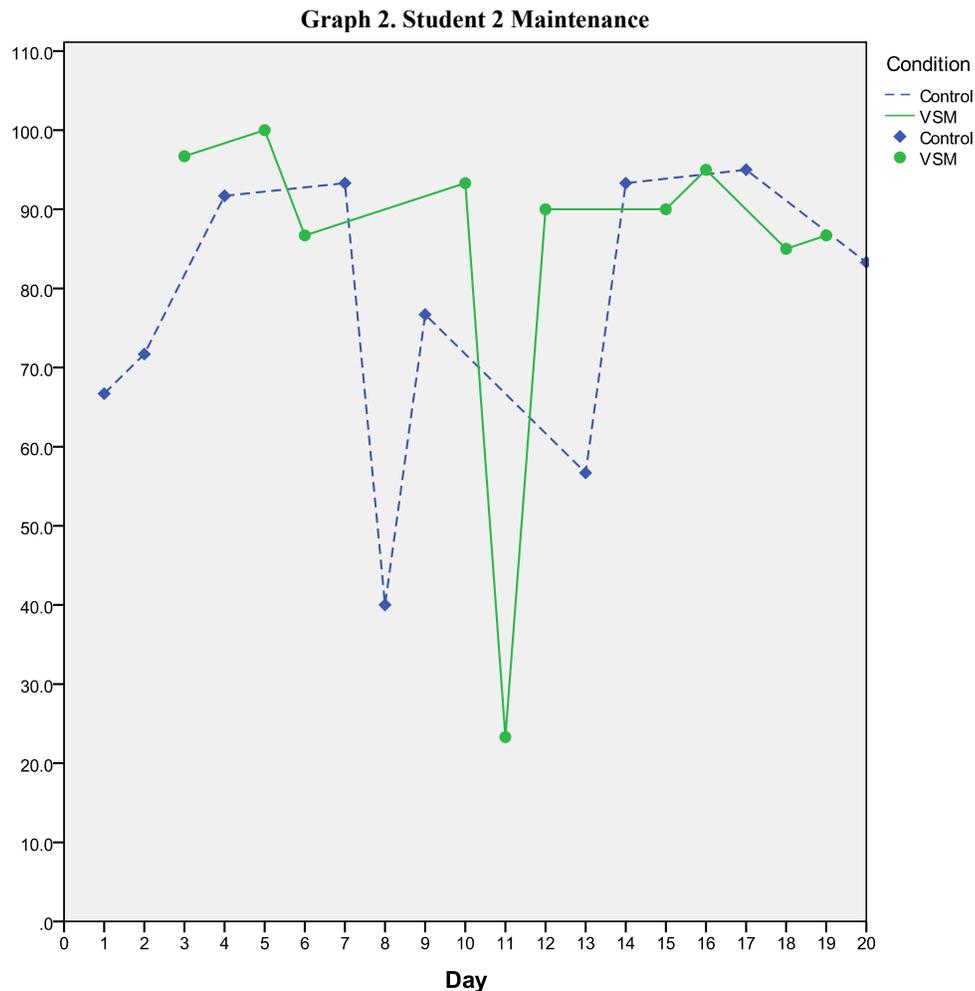
Hypothesis (c)

A paired-samples t test was calculated with Student 2 data to determine if appropriate transitions varied between control days and video self-modeling (VSM) days. The average percent of appropriate transitions on the control days was 76.84 ($SD = 18.34$), and the average percent of appropriate transitions on the VSM days was 84.67 ($SD = 22.09$), $t(9) = -1.41$, $p > .05$. A review of the days in which the video was applied to Student 2 revealed an anomaly. This anomaly may be due to the fact Student 2 had a different para-educator than she usually has on this specific day, resulting in a change in the student's schedule. Student 2 had a consistent para-educator to work with during math class each day, but on this day the para was absent. Many students with ASD display resistance to environmental change, which may have led to the anomaly. Thus, the paired-samples t test was re-run with the exclusion of the anomaly. The average percent of appropriate transitions on the control days was 80.93 ($SD = 13.78$), and the average percent of appropriate transitions on the VSM days was 91.45 ($SD = 5.09$). With the removal of the anomaly, there was a significant difference between the control days and the VSM days ($t(8) = -1.94$, $p < .05$). A paired-samples t test was calculated with Student 2 data to determine if inappropriate transitions varied between controls days and VSM days. The average percent of inappropriate transitions on the control days was 23.16 ($SD = 18.34$), and the average percent of inappropriate transitions on the VSM days was 15.33 ($SD = 22.09$), $t(9) = 1.41$, $p > .05$. Again the analysis was re-run excluding the anomaly. The average percent of inappropriate transitions on the control days was 19.07 ($SD = 13.78$), and the average percent of inappropriate transitions on the VSM days was 8.51 ($SD = 5.09$). With the removal of the anomaly, there was a significant difference between the control days and the VSM days ($t(8) = 1.94$, $p < .05$).

Hypothesis (d)

A Pearson correlation coefficient was calculated to assess the maintenance effects of VSM on Student 2 over the course of implementation. A weak positive correlation was found ($r(20) = .103$, $p > .05$), indicating a lack of a significant linear relationship between the day of implementation and appropriate

transitions. Maintenance was not easily achieved over the course of implementation of the research for Student 2 (See graph 2).



Hypothesis (e)

A 5-point likert-scale was administered to the two classroom teachers before implementation of VSM and upon completion of the VSM research. The likert-scale had each of the teachers rate on-task behavior as well as off-task behavior for Student 1 and appropriate and inappropriate transitions for Student 2. A paired-samples t test was calculated to compare the teachers' perceptions of on-task behavior for Student 1 before implementation of VSM, to the teachers' perceptions of behaviors after implementation of VSM, with higher scores indicating greater frequency of behavior. The average mean rating of the teachers' perceptions before VSM implementation was 2.79 ($SD = .49$), and the average mean rating of the teachers' perceptions after implementation of VSM was 4.12 ($SD = .24$). According to the two teachers' responses, there was a significant increase of on-task behavior in Student 1 upon completion of the VSM research ($t(6) = -5.20, p < .05$). A paired-samples t test was also calculated to determine the teachers' perceptions before and after VSM implementation of off-task behavior, with higher scores on the post-test indicating improvement or a decrease in behaviors. The average mean rating of the teachers' perceptions before implementation was 2.90 ($SD = 1.93$), and the average mean rating of the teachers' perceptions after implementation was 4.40 ($SD = .42$). Again, according to the two teachers' responses, there was a significant decrease of off-task behavior in Student 1 upon completion of the VSM research ($t(4) = -3.00, p < .05$).

A paired-samples t test was calculated to compare the teachers' perceptions before implementation of VSM, to the teachers' perceptions after implementation of VSM of appropriate transitions for Student 2, with higher scores indicating greater frequency of behavior. The average mean rating of the teachers'

perceptions before VSM implementation was 2.80 ($SD = .67$), and the average mean rating of the teachers' perceptions after implementation of VSM was 4.20 ($SD = .57$). According to the two teachers' responses, there was a significant increase in appropriate transitions in Student 2 upon completion of the VSM research ($t(4) = -14.00, p < .05$). A paired-samples t test was calculated to compare the teachers' perceptions before implementation of VSM, to the teachers' perceptions after implementation of VSM of inappropriate transitions for Student 2, with higher scores on the post-test indicating improvement or a decrease in behaviors. The average mean rating of the teachers' perceptions before VSM implementation was 3.20 ($SD = 1.35$), and the average mean rating of the teachers' perceptions after implementation of VSM was 4.40 ($SD = .55$). Thus, there was no significant difference found between before and after implementation of the VSM research with regards to inappropriate transitions ($t(4) = -1.47, p > .05$).

Discussion

The purpose of the present study was to examine the effects of video self-modeling on children with autism spectrum disorder when implemented in an academic setting and the maintenance of desired behaviors over time. This study was developed in response to previous research (Buggey, 2005; Clare et al., 2000; Sherer et al., 2001; Shipley-Benamou, 2002; Schunk & Hanson, 1989) suggesting the positive gains made by video self-modeling on children in various settings. However, this study was implemented in the classroom to improve academic performance, including on-task behavior and appropriate transitions with students with ASD. The present study added to the literature by allowing teachers to choose the specific students with concerns, the academic behavior to target, and the class period to implement VSM, thus increasing social relevance.

In an effort to examine the effects of video self-modeling on children with autism spectrum disorder, five hypotheses were developed. The first hypothesis developed stated the implementation of VSM would significantly increase the percentage of on-task behavior compared to control conditions. Consistent with prior research, the data suggests that video is a useful medium for accomplishing positive behavior change in this population (Charlop & Milstein, 1989; Lonnecker et al., 1994; Pierce, Clad, & Schreibman, 1997; Schreibman et al., 2000; Shipley-Benamou et al., 2002) and the first hypothesis was supported. There was a clear demonstration that for Student 1 on-task behavior greatly improved as a result of the VSM implementation in her reading class. Consistent with the second hypothesis developed, the implementation of VSM demonstrated maintenance over the seven weeks of implementation. In other words, at the completion of the study, on-task behavior for Student 1 had increased overtime regardless of the condition.

The third hypothesis developed stated that the implementation of VSM would increase the percentage of appropriate transitions as compared to control conditions. Student 2 was approaching significance overall, but showed evidence of an anomaly within the 20 days of implementation. With the removal of this anomaly, Student 2 showed a significant difference in overall appropriate transition behavior. The anomaly occurred on day 11 when the student's para-educator was absent unexpectedly. As mentioned earlier, children with ASD show resistance to environmental change (Delano, 2007). It was apparent that the removal of her consistent para-educator led her to struggle during her math class and removing this day provides a clearer picture of the actual impact of VSM.

The fourth hypothesis developed stated that the implementation of VSM would demonstrate maintenance. Maintenance for Student 2 was difficult to establish, and it is thought with more time dedicated to the implementation of VSM, maintenance may be found.

The fifth, and final, hypothesis developed stated the teachers' ratings of on-task behaviors and appropriate transitions would significantly increase after the introductions of VSM as compared to baseline ratings. Consistent with this hypothesis, teachers rated on-task behavior and appropriate transitions low on the administered likert-scale before implementation. Upon completion of the present study, another likert-scale was administered for the teachers to rate the strength of improvement in on-task behavior and appropriate transitions. Each teacher gave high ratings for improvement and an increase in on-task behavior and appropriate transitions.

Skills are not perfected through observation alone, nor are they developed solely by trial-and-error fumbling (Bandura, 1977). It is important to stress that some progress is significant when working with children with ASD. Their triad of impairments, consisting of verbal and non-verbal communication, restricted behaviors (Delano, 2007; Braithewaite & Richdale, 2000) and resistance to environmental

change (Delano, 2007) can drastically affect their performance academically in the classroom. With VSM implementation, an increase in desired behaviors in the specific VSM days when compared to the control days was achieved. Children with ASD do present a resistance to small changes in their schedule, and the progress that was observed and noted can be considered a success in their academic classes.

It is important to note the clear benefits of VSM. First, the implementation of VSM was relatively nonintrusive, only taking a few minutes at the beginning of their chosen class period to view the edited video clip of positive and appropriate behaviors. Another benefit of VSM is that it tends to produce almost immediate results upon viewing the video clip. No researchers have found instances of delayed effect or even slow, gradual effects; thus if immediate results are not exhibited, it is unlikely that continued viewing will be effective unless it is adapted (Buggey, 2005). These reasons make VSM a viable option for teachers to select.

Limitations and Future Research

A possible limitation due to the single-subject design is the small sample size (Buggey, 2005). In this specific study, that threat was confounded by only having two participants with ASD. In addition, the implementation of VSM was conducted in a natural environment, where there were many extraneous variables that could not be controlled for such as fire drills and school wide activities. Another possible threat to validity was the presence of the video-camera throughout the implementation of the research. Known as the Hawthorne Effect, students may have tended to increase their on-task and appropriate behavior having known there was a camera recording their behavior. A final limitation of the present study is the lack of a follow-up phase. Maintenance as well as replication of skills across settings and contexts within the student's natural environment remains uncertain (Shipley-Benamou et al., 2002). This study was performed within 20 days of control and VSM implementation; the two participants may have benefited and maintained appropriate behaviors given more time.

Future research is needed to verify the current studies results and to continue exploring the effects of video self-modeling on children with autism spectrum disorder. The future research should also extend the amount of time between the intervention and the follow-up phase to determine maintenance of video self-modeling. Generalization across different settings and skills should also be explored. The application of video self-modeling should also be extended to being used in other academic and behavior areas and throughout each day, as opposed to once a day a few times a week. Future research can also include training sessions to assist the teachers and staff in developing and implementing specific video clips for chosen students. Finally, future research is needed to determine if the intervention is equally effective in culturally diverse populations, which would be predicted given promising preliminary findings using VSM with English language learners (Ortiz, Burlingame, Onuegbulem, Yoshikawa, & Rojas, 2012).

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