

How to Implement Video Modeling in Educational Environment to Improve Communication in Students with ASD: An Evidence-Based Review

Aitor Larraceleta González*

Ministry of Education of Principado de Asturias, Equipo Regional ACNEAE, San Pedro de los Arcos 18, 33012, Oviedo, Asturias, Spain

Abstract: The purpose of this article is to review what is the current knowledge about Video Modeling (VM), a form of observational learning and one of the most important and substantial basic practices based on evidence for students with ASD, and to propose a way to implement it in an educational environment from a social-communicational approach. With this objective, in this article, this practice and its types are defined, its objectives are established, its impact on educational environments is analyzed and an evidence-based implementation sequence is proposed, consisting of three steps: planning, use and monitoring.

Keywords: Autism, School, Evidence-based Practice, Social-Pragmatic Skills, Observational Learning.

DEFINITION AND TYPES

Video modeling (VM) is one of the twenty-seven evidence-based practices (EBP) recommended by the National Professional Development Center on Autism Spectrum Disorders, a project provided by the United States Department of Education [1]. It can be defined as a type of intervention that uses technology (video recording and display equipment) to provide a visual model to assist learning or engaging in a targeted behavior or skill (typically in the behavior, communication play or social domains) [1-3]. Frequently, VM is combined with other EBPs like prompting and reinforcement to maximize the viewer's (learner's) ability to do what they have seen [2]. This assistive technology method can be used as an independent instructional practice or in combination with other evidence-based practices such as self-management, social skills training, or social narratives [1].

There are four most prominent types of video modeling: basic video modeling, video self-modeling, point-of-view video modeling, and video prompting [4]. These VM types have common characteristics and singularities. As for common components across types it can be emphasized that all use videotaped or digital clips of either the individual or other models (classmates, siblings, parents, teachers) performing some target behavior or skill and all require the learner to watch the video in some format, before being asked to perform the target behavior or skill [5-12].

The singularity of each approach or type of VM is found in who serves as a model or how the video is recorded and used. These are the main characteristics:

- a) Basic video modeling: it is the most common type of VM. Model (peer, adult) is recorded correctly performing target behavior/skill. The video is played before each teaching situation and the learner prompted to perform the behavior [4].
- b) Video self-modeling: Student with ASD is the primary model in video. Used to show the student how well he/she performs the skill, demonstrate how skill/behavior should be done and identify positive and negative aspects of how learner used skill/behavior [5].
- c) Point-of-view video modeling: This type shows how the behavior would look like from the student's point of view (as if the student was performing the skill) [9].
- d) Video prompting: used to teach a sequence of skills. Smaller steps (associated with skill/behavior) are recorded and video is stopped or paused at each step to permit student to accomplish the specific step. The process is repeated until complete skill is performed [11, 12].

HOW CAN VM HELP LEARNERS? THE GOALS OF THIS EBP

VM may be highly effective with learners on the autism spectrum because the intervention relies on elements that build on the strengths of individuals with ASD and avoids known dars.

*Address correspondence to this author at the Equipo Regional ACNEAE, San Pedro de los Arcos 18, 33012, Oviedo, Asturias, Spain; Tel: 985272985; E-mail: aitorlg@educastur.org

First, individuals with ASD tend to be visual learners and have strong visual processing skills [13-14] and VM is visual and based on observational learning. The students with ASD learn by watching and this strategy helps them to emulate the behavior of their close people (peers, siblings, parents, teachers, etc.) despite their challenges with imitating others [14].

Second, youth with ASD may have difficulty focusing on relevant cues. VM compensates for attentional difficulties (stimulus overselectivity, shaped tunnel vision) [15] and can highlight important cues, for example, using the camera zoom to emphasize target behaviors of the model and eliminate distractions [4, 16].

Third, VM is consistent, repetitive, and provides structure, all elements that are important for many learners with ASD [1, 4].

Fourth, using tablets, smartphones, computers... are ordinary experiences for all learners today. The use of videos in learning is usual, familiar, and typical. Furthermore, the children with ASD have an intrinsic interest in videos: they are highly motivating [17], are reinforcing [18], and are the most preferred leisure time activity [19]. This practice is easy for teachers and staff members to use as smartphones and tablets seem to be easily accessible in schoolrooms and making and editing videos is quickly and profitably.

Finally, VM does not involve social demands for the student with ASD and compensate social impairments. This practice is less socially demanding than the social demands imposed by face-to-face interaction with live model [20].

Goals, in the educational environment, that can be addressed by using VM include:

- Increasing
 - o independence in transitioning [6]
 - o academic engagement [7]
 - o social initiations [8, 21-23]
 - o independence [25]
 - o understanding of expected task or activity to complete [25]
 - o independent completion of vocational tasks and daily living tasks [26]
 - o social interaction skills [8,27]
 - o demonstration of skills [11,28]

- Reducing
 - o task completion time [6]
 - o inappropriate behaviors associated with a task or transition [24]
- Facilitating
 - o Play [29,30]
 - o Motor imitations [31,32]

EVIDENCE-BASE FOR VIDEO MODELING IN EDUCATIONAL ENVIRONMENT

Different international institutions and organizations have funded research in the form of systematic reviews with the objective of identifying those most effective models or practices in educational or clinical intervention with people with ASD, in relation to a wide range of skills, including communication and social skills leading to different guides [33-35], such as the California Departments of Education and Developmental Services [36], the New York State Health Department [37], the Ministries of Health and Education of New Zealand [38], the ECRI Institute [3-39] or the National Collaborating Centre for Women's and Children's Health [40]. But if we have to highlight a guide for its impact on the educational environment, it is certainly that of the National Professional Development Center (NPDC) on Autism Spectrum Disorder [1]. In his 2014 report, VM meets the evidence-based practice criteria set by NPDC with 31 single case design studies and 1 group design study. This practice was effective for early intervention (0-2 years) to high school-age learners (15-22 years) with ASD. This report detailed how VM can be used effectively to address: social, communication, joint attention, behavior, school readiness, play, cognitive, motor, adaptive, vocational, and academic outcomes [1].

More specifically, in relation to the socio-communicative dimension (social, communication, joint attention and play skills), this practice was effective as shown in Table 1.

HOW IMPLEMENT VIDEO MODELING IN THE SCHOOL FOR IMPROVING SOCIAL-COMMUNICATION? A EVIDENCE BASED PROPOSAL: PLANNING

Assessment of the Student's Prerequisite Skills

Three prerequisite skills are required for a student in order to acquire knowledge from a video model [41]:

- Imitate others' behaviors. Many children and youth will spontaneously imitate others. For example, a preschooler might imitate an adult making a phone call or an elementary school student might imitate a sentence used by peers.
- Accomplish some of the component skills that make up the target ability as many skills can be broken into smaller sub-skills. For example, making a phone call requires a learner to pick up the phone, dial the number, say hello and hold a conversation. When behavior cannot be broken into discrete sub-skills, consider the components that are required in order to demonstrate the target ability. If the target behavior is reading two-words sentences, the components would include sounding out the different single words. While the student does not need to have mastered all of the sub-skills or components that conform to the target skill or behavior, it is important that the learner demonstrates some of the sub-skills in order for VM to be an effective strategy.
- Sustained attention long enough to watch the video model perform the target skill. The amount of time needed for the student to witness depends on the length of time needed to perform the target skill or behavior. Saying 'hello' to a peer might take 2-3 seconds. However, the target skill of going to ask chalks from another classroom will take longer.

VM Type Choice

As we saw previously there are several types of VM that can be used. All video modeling techniques offer positive outcomes for individuals with autism but some of them are more indicated to improve socio-communicative outcomes than others [42]. It's the case that Self-modeling Intervention which resulted in a reduction in tantrums, increase in positive social interaction and increase in task fluency and Peer Modeling approaches, which incorporating either peers or siblings as models, demonstrate effectiveness in enhancing and generalizing language skills [42]. The rest of the types of VM are recommended for other purposes that, to a lesser extent than self-modeling, may be related to communication such as imitation and academic responding (Basic VM) [4], specific discrete skills (Point of view VM) [9] and teaching a sequence of skills (Video Prompting) [11, 12].

Reinforcers Selection

Reinforcement helps to increase the likelihood that a targeted behavior or skill will reoccur. For selecting those items that are most motivating for the students of any age may be useful to do a reinforcement assessment. Further, in the event of one item loses its effectiveness as an reinforce, several items should be identified in the process of assessment [43]. Depending on age, asking the students or their teachers (Elementary and older students) or to the parents (for young children) may be helpful to identify reinforcers that can be used in different environments such as school, home or kindergarten [43].

Video Equipment Choice

There are three specific equipment functions needed in order to use VM as an effective intervention. These would be [2, 4]:

- Equipment to record the behavior or skill,
- Software to edit the video once it is recorded (if necessary)
- A device for the learner to view the video model.

It is certainly useful to ask some questions previous selecting the equipment with which will be created the video. Some of these questions are [2, 4, 5]:

- What equipment do I need or have?
- Does the equipment I have meet the specific function to:
 - o Record (smart phone, tablet/iPad, video camera)?
 - o Edit (computer with software, some cameras or tablets may have editing features)?
 - o View (computer, tablet/iPad, smartphone)?

Multiple devices can be used to watch videos. It's important to consider the readiness of the display devise in the environment in which will show the student the video model, the portability of the display devise (e.g., in the recess, at a work site, in the classroom), and the quality and size of the display (e.g. adequate video's quality) [4-5]. In relation to possible devices, it can be used [4-5, 18]:

- TV with a Digital Video Disk (DVD) or USB port: large screen, not portable.

- Computer with a video player (e.g., Real Player, Apple Quick Time Player, Windows Media Player): large screen and not portable unless using a laptop computer.
- Tablet: comfortable screen size for viewing and very portable.
- Smartphone: not ideal as it is too small but highly portable.

Testing previously the recording equipment it's necessary if audio is required for the VM intervention to ensure that the audio is captured clearly. An external microphone will be added if this is not possible. [4-5].

It is important for the user to become familiar with the equipment and its features. For that reason, teachers and other practitioners should practice using all equipment before recording the VM intervention. This will save time and ensure that the recording can be completed in a timely way [2, 4-5, 18].

Video Elaboration

Once the equipment necessary to record the video has been identified and practiced with it, it is necessary to create the actual video. For that purpose we will consider several critical planning features.

Select and Prepare the Model

The selection of the model is an important decision. Various individuals like teachers, peers, older siblings, other adults, or the student him or herself (self-modeling) can serve as models for the video. [4-5, 9, 11-12]. There are some things to consider during the planning process include to:

- Establish the behavior or skill to be recorded [4-5].
- Ensure that the targeted behavior or skill can be modeled [6, 12].
- If it's possible to choose one peer of the same child's age. If this is not possible, the teacher, a sibling, or another adult can model the behavior, unless you are recording a learner's self-modeling sequence [4-5].
- Give the model time to practice the skill when using a model other than the student. Practice is likely to be required if the model is going to use a script or is going to show a specific skill using items such as toys or puzzles [4-6]

- Decide whether a script will increase the likelihood of a successful recording. A script tells the model what they need to say or do during the taping process. If scripts or other supports are needed, they should be prepared beforehand and rehearsed with the peer or adult model [4-7].

Arrange the Environment

The environment should be arranged by the teacher so that the model can clearly and successfully show the targeted behavior. This step involves to:

- Setting up the recording device [4-5].
- Arranging the room or designated space [4-5].
- Organizing necessary items (toys, visuals...) to demonstrate the task [4-5].
- Minimizing distractions [4-5].

Video recording should be done in the most natural environment. In addition, the recording device must be configured in an ideal location to capture the target skill or behavior being performed so that the student can clearly see the steps. It is important to use the equipment during the recording that will be used during the intervention of the target child [6].

Record the Video

The video's length can change depending on targeted behavior or skill and the learner's ability. The length for many recordings is approximately 2-3 minutes; therefore, the initial recording should be 3-4 minutes to allow for editing. However, older learner's or with more complex skills, the final recording may be longer [5,10]. In this step it is important:

- Practicing before recording [4-7].
- Reviewing the script or steps of the task analysis [4-7].
- Stabilizing the video recording device (If possible, using a tripod) [4]
- Starting the recording a few seconds (10-15 seconds) before to show the behavior [4-7, 11].
- When finished, reviewing what has been recorded [5, 10].

Edit the Video

Sometimes the video's edition is needed to delete any errors, especially removing prompts or added cues

(beyond naturally cues). First of all, it's necessary to determine if there is anything that will take away from the focal point of the video, which is an exact model of the targeted behavior or skill [4-5].

The likelihood of successfully learning the modeled behavior can be incremented with two additional features [4].

- Captions, titles or headlines (only useful for readers)
- Voice-overs (adding verbal instructions that parallel the recording) may be used to further support the video and increase student comprehension. They might include narration of the steps (e.g., "I wait in line"), or to describe the target behavior (e.g., raising hand to ask for help).

Upload the Video to the Viewing Device

Once the video is created and edited, it must be available to the student to watch. In some occasions, devices and software are not compatible or the video may be difficult to move from one device to another (e.g., recording with Apple devices may not load on to PC based devices) so will be necessary to assure the video plays successfully after the transference to the device [4, 11].

Introduce Viewing Equipment to the Learner

The student's familiarity and previously use of viewing devices needs to be assessed, not assumed. With some young children or learners who are not familiar with watching videos, the viewing equipment should be presented and given the opportunity to manipulate and watch a video. For that purpose, a video with similar length to the model is selected and an introductory process alike to the one to be used during VM is followed [9].

Train Team Members

It is important to train the school staff on how to use the intervention with fidelity, as much as they have learned to do, since if not, the intervention may be less effective. It is convenient to use a planning worksheet for VM designed as a complement to the planning step. The planning sheet must be completed before using the practice [2].

HOW IMPLEMENT VIDEO MODELING IN THE SCHOOL FOR IMPROVING SOCIAL-COMMUNICATION? A EVIDENCE BASED PRO-POSAL: USE

Arrange the Environment for Viewing of the Video Model

In addition to arranging the environment to record the video, it also must be set up for the student to watch the video and learn how to use the targeted skill. An aspect that must be controlled is the location for viewing the video, which should be as free of distractions as possible, with appropriate and non-glaring lighting. The learner can sit or stand comfortably to view at eye level and the materials needed for showing the skill following the VM session should be set up and ready [4-5, 11].

Show the Video Model

A great number of students with ASD haven't any problem to watch a video; however, some may need additional prompting and reinforcement to attend to a complete video. In the beginning, the adult may have to sit and watch the video with the student. A high level of enthusiasm by the adult is a natural and social way to reinforce the student to sit and attend to the video [31, 45].

The evidence recommends incorporating the video of the task into the student's routine or schedule. For example, if using the video to improve communication in the recess, show the video just prior to. If the VM is going to be used to learn a skill, identify when that skill will occur naturally during the school day and show the video before the skill is required. In each case, the video must be shown before the student demonstrates the specific ability [2, 44-45].

Some important considerations for showing the video are:

- Some students may require a prompt to focus on key behaviors demonstrated by the video [2, 4, 44-46].
- Showing the video will visually demonstrate or teach the target behavior to the student with ASD. If the student is irritable or has difficulty sitting down, may be necessary to find the cause or another moment to show the VM [44-46].
- If the skill is complex, the task analysis may be used. The complete behavior is broken down

into steps and each step should be viewed, and then demonstrated by the student. Finally, the entire behavior or skill sequence can be exhibit once all of the steps are learned [44-46].

Prompt the Learner to Perform the Target Behavior

Once the student watches the video, it's pertinent that the student demonstrates the behavior or skill. For example, if the targeted skill is "raising the hand previously to answer a question in the class", then, the follow-up activity to watching the VM will be the student raising the hand in the same class. The task or targeted skill should match the VM [5, 46]. There are some considerations for the VM prompting:

- The frequency to teach the video depends on some factors. If a discrete skill, the video will be shown once and will be asked the student to perform the skill. This will allow gauging how much of the task can be demonstrated for the learner. For more complexes or for novel skills, show the video model may need a few times before asking the learner to perform the behavior [44-46].
- It may be useful to tell the learner what to look for with the video previously begin to show it. During the video, it's necessary to wait to see if the learners notice the important features. If this not happen, it can search in the video and stress important parts [5, 44-46].
- It's important providing feedback to the learner [2, 4, 44-46]

Reinforce Performance for Part/All of the Target Behavior

At the point as the learner demonstrates the target skill or behavior, the adult will provide immediate reinforcement. At first, reinforcement should be given every time the student performs the behavior or target skill. When the learner uses the skill or behavior more consistently, the reinforcement can be reduced to an intermittent reinforcement schedule. For example, providing reinforcement every other time the skill is performed accurately; then every third time, etcetera [4, 5, 42, 44-46].

If there is a success on the part of the learner, it would be necessary to provide positive reinforcement and continue to offer opportunities for him/her to use the skill until the skill is repeatedly performed successfully [4, 5, 42, 44-46].

Correct Errors

In the event that errors by the student are still detected in certain parts of the target behavior or skill, this method can be used. If this happens, the student revisits the particular scene where the error occurs and practices. For example, if a student correctly performs all the steps necessary to compliment a friend, except previously greet, then the section of the video that shows the model saying hello would be the only piece shown. It may be allowed the learner to continue watching the video and point out specific skills that he may have difficulty mastering. For example, the adult may say, "look at how they are saying hello" when it is demonstrated in the video [7-8, 45].

Fade VM

When the learner is consistently using the target behavior, it's time to fade the use of the VM. By fading the video, students are encouraged to independently use and maintain desirable behaviors and to generalize their newly acquired skills with different people or in new environments or situations. Initially, the implementation of VM intervention sometimes may be slow. It's recommended to be careful not to alter or discontinue sessions too quickly, particularly for new and complex skills and behaviors [2, 4, 44-45].

One technique that can be used it's the delaying start/premature stop. This technique consists of delaying the start of the video or ending it before it is over, showing less of it to the student. This procedure is maintained if the learner continues to use the target behavior successfully. At some point, the video can be stopped entirely. When the new skill is independently performed by the learner, a new video self-model by the student actively performing the task successfully could be reinforcing and substitute the original video [2, 4].

HOW IMPLEMENT VIDEO MODELING IN THE SCHOOL FOR IMPROVING SOCIAL-COMMUNICATION? AN EVIDENCE BASED PROPOSAL: MONITORING

In this step, data will be collected on the learner's performance of the target skill. The evaluator should determine two important things: how often the targeted behavior will be evidenced during the day and the length of time for the evidence (e.g., more length of time than used during baseline observation). Each observation period is an independent event and should be recorded as such. The student may not be successful in their first attempts [2, 4, 43].

When the learner's progress is monitored, it is important to observe and record any contrast that occurs in the accomplishment of the behavior or skill [2, 4, 43]. If there is not an improvement after collecting monitoring data for three to five sessions (events or trials), we should ask questions about the following topics [2, 43-46]:

- The target's behavior definition
- The target's behavior measure and observation
- The target's behavior difficulty and the possibility to use Task Analysis.
- The learner's prerequisite skills for video modeling
- The time devoted to using this strategy
- The video modeling's fidelity used
- The reinforcers motivation

If these topics have been addressed and the student with ASD continues without showing progress, it will be necessary to consider the selection of a different evidence-based practice to start an evaluation and implementation of it [2, 43-46]. In the same way, if only certain steps or a partial sequence of steps that demonstrate a more complex skill seems to improve, the task may need to be simplified [2, 43-46].

In an ideal situation, the learner should watch the entire video and then demonstrate the target behavior. In many cases, the video only is shown once before assessing whether the targeted behavior has been learned. The teacher/adult collect data to see if the learner is successful in demonstrating the targeted skill and record what was reached [2, 43-46]. The steps of the monitoring process would be as follows [2, 4, 43-46]:

- Establishing the goal: for example, one learner has difficulty raising his hand to ask for a turn to answer a question in class. This school readiness skill was identified by the teacher and included as one of his goals.
- Making a baseline data collection, without any kind of support.
- Analyzing data after VM intervention: After watching the video showing the learner the expected behavior, monitor the data changed (for example, frequency increase or decrease).

- Determining next steps based on learner progress: The members of the learner's educational team will determine if sufficient progress is being made based upon the data collected. If the learner with ASD is showing progress, then will be necessary to continue using VM until the skill or behavior is completed independently. New video models could be used to address new target skills or behaviors for the learner. Once VM has been used successfully, the learner's other teachers or paraprofessionals will be enlisted to continue using the VM in other settings. The student will learn how to perform the skill or task in other environments and with other individuals (generalization).

SUMMARIZING THE RESEARCH

Research and clinical experience suggest that VM, may be a useful practice for teaching certain social-pragmatic skills –such as greetings and farewells– and conversational skills –such as initiation and turn-taking– and to support comprehension of spoken directives, as an instrument for teaching language concepts and a way to show task expectations or upcoming events. However, there is often confusion among teachers regarding the choice and implementation of psychoeducational practices like this for students with ASD.

For this reason, it is important to raise an evidence-based proposal like the one in this paper to facilitate the implementation of VM in school settings, forming part of individual intervention programs or "eclectic technical programs" aimed at students with ASD which promoting greater possibilities for school success.

Therefore, this article has proposed a sequence of implementation of VM, after reviewing previous research on this practice in the educational environment. In this way, some important objectives related to social-communicative development, like increasing social initiations, increasing social interaction skills or understanding the task or activity expected to complete will be more likely to be achieved since a "science to practice" approach is being followed, thus transferring the advancement of research to the educational field.

ACKNOWLEDGEMENT

The author wishes to express his gratitude to the educational community of CPEE Latores (Oviedo, Asturias).

REFERENCES

- [1] Wong C, Odom SL, Hume K, Cox AW, Fettig A, Kucharczyk S, *et al.* Evidence-based practices for children, youth, and young adults with autism spectrum disorder. Chapel Hill: The University of North Carolina, Frank Porter Graham Child Development Institute; 2014 [cited 2019 Oct 1]: Available from: <http://autismpdc.fpg.unc.edu/sites/autismpdc.fpg.unc.edu/files/imce/documents/2014-EBP-Report.pdf>
- [2] Franzone E, Collet-Klingenberg L. Overview of video modeling. Madison, WI: The National Professional Development Center on Autism Spectrum Disorders, Waisman Center, University of Wisconsin; 2008 [cited 2019 Oct 8]: Available from: https://csesa.fpg.unc.edu/sites/csesa.fpg.unc.edu/files/ebpbriefs/VideoModeling_Overview_1.pdf
- [3] ECRI Institute. Focal Educational and Behavioral Interventions for the Treatment of Autism Spectrum Disorders. Plymouth, Pennsylvania: ECRI Institute 2009
- [4] Sigafoos J, O'Reilly M, de la Cruz B. How to use video modeling and video prompting. Austin, TX: Pro-Ed. 2007.
- [5] Hitchcock SH, Dowrick PW, Prater MA. Video self-modeling intervention in school-based settings: A review. Remedial Spec Educ 2003; 24: 34-45. <https://doi.org/10.1177/074193250302400104>
- [6] Coyle C, Cole P. A videotaped self-modelling and self-monitoring treatment program to decrease off-task behaviour in children with autism. J Intellect Dev Disabil 2004; 29(1): 3-16. <https://doi.org/10.1080/08927020410001662642>
- [7] Marcus A, Wilder DA. A comparison of peer video modeling and self video modeling to teach textual responses in children with autism. J Appl Behav Anal 2009; 42(2): 335-341. <https://doi.org/10.1901/jaba.2009.42-335>
- [8] Apple AL, Billingsley F, Schwartz IS, Carr EG. Effects of video modeling alone and with self-management on compliment-giving behaviors of children with high-functioning ASD. J Posit Behav Interv 2005; 7(1): 33-46. <https://doi.org/10.1177/10983007050070010401>
- [9] Hine JF, Wolery M. Using point-of-view video modeling to teach play to preschoolers with autism. Topics Early Child Spec Educ 2006; 26(2): 83-93. <https://doi.org/10.1177/02711214060260020301>
- [10] Miltenberger C, Charlop M. The comparative effectiveness of portable video modeling vs. traditional videomodeling interventions with children with autism spectrum disorders. J Dev Phys Disabil 2015; 27(3): 341-358. <https://doi.org/10.1007/s10882-014-9416-y>
- [11] Cannella-Malone HI, Fleming C, Chung YC, Wheeler GM, Basbagill AR, Singh AH. Teaching daily living skills to seven individuals with severe intellectual disabilities: A comparison of video prompting to video modeling. J Posit Behav Interv 2011; 13(3): 144-153. <https://doi.org/10.1177/1098300710366593>
- [12] Rayner C. Teaching students with autism to tie a shoelace knot using video prompting and backward chaining. Dev Neurorehabil 2011; 14(6): 339-347. <https://doi.org/10.3109/17518423.2011.606508>
- [13] Althaus M, De Sonneville LMJ, Minderaa RB, Hensen LGN, Til RB. (1996). Information processing and aspects of visual attention in children with the DSM-III-R diagnosis "Pervasive developmental disorder not otherwise specified" (PDDNOS): I. Sustained attention. Child Neuropsychol 2: 30-38. <https://doi.org/10.1080/09297049608401348>
- [14] Shah A, Frith U. Why do autistic individuals show superior performance on the block design task? J Child Psychol Psychiatry 1993; 34(8): 1351-1364. <https://doi.org/10.1111/j.1469-7610.1993.tb02095.x>
- [15] Koegel RL, Schreibman L, Good A, Cerniglia L, Murphy C, Koegel LK. How to teach pivotal behaviors to children with autism: A training manual. Santa Barbara, California: University of California 1989.
- [16] Shane HC, Laubscher E, Schlosser R, Fadie HL, Sorce JF, Abramson JS, *et al.* Enhancing communication for individuals with autism: A guide to the visual immersion system. Baltimore MA, Brookes: VISTM 2014.
- [17] Lasater MW, Brady MP. Effects of video self-modeling and feedback on task fluency: A home-based intervention. Educ Treat Children 1995; 18: 389-408.
- [18] Kinney EM, Vedora J, Stromer R. Computer-presented video models to teach generative spelling to a child with an autism spectrum disorder. J Posit Behav Interv 2003; 5: 22-29. <https://doi.org/10.1177/10983007030050010301>
- [19] Shane H, Albert P. Electronic screen media for persons with autism spectrum disorders: Results of a survey. J Autism Dev Disord 2008; 38(8): 1499-1508. <https://doi.org/10.1007/s10803-007-0527-5>
- [20] Charlop-Christy MH, Le L, Freeman KA. A comparison of video modeling with *in vivo* modeling for teaching children with autism. J Autism Dev Disord 2000; 30(6): 537-552. <https://doi.org/10.1023/A:1005635326276>
- [21] Buggley T, Hoopes G, Sherberger ME, Williams S. Facilitating social initiations of preschoolers with autism spectrum disorders using video self-modeling. Focus Autism Other Dev Disabil 2011; 26(1): 25-36. <https://doi.org/10.1177/1088357609344430>
- [22] Plavnick JB, Ferreri SJ. Establishing verbal repertoires in children with autism using function-based video modeling. J Appl Behav Anal 2011; 44 (4): 747-766. <https://doi.org/10.1901/jaba.2011.44-747>
- [23] Nikopoulos, CK, Keenan, M. Promoting social initiation in children with autism using video modeling. Behav Interv 2003; 18(2): 87-108. <https://doi.org/10.1002/bin.129>
- [24] Cihak D, Fahrenkrog C, Ayres KM, Smith C. The use of video modeling via a video iPod and a system of least prompts to improve transitional behaviors for students with autism spectrum disorders in the general education classroom. J Posit Behav Interv 2010; 12(2): 103-115. <https://doi.org/10.1177/1098300709332346>
- [25] Reeve SA, Reeve KF, Townsend DB, Poulson CL. Establishing a generalized repertoire of helping behavior in children with autism. J Appl Behav Anal 2007; 40(1): 123-136. <https://doi.org/10.1901/jaba.2007.11-05>
- [26] Allen KD, Wallace DP, Greene DJ, Bowen SL, Burke RV. Community-based vocational instruction using videotaped modeling for young adults with autism spectrum disorders performing in air-inflated mascots. Focus Autism Other Dev Disabil 2010; 25(3): 186-192. <https://doi.org/10.1177/1088357610377318>
- [27] Sherer M, Pierce KL, Paredes S, Kisacky KL, Ingersoll B, Schreibman L. Enhancing conversation skills in children with autism via video technology: Which is better, "self" or "other" as a model? Behav Modif 2001; 25(1): 140-158. <https://doi.org/10.1177/0145445501251008>
- [28] Haring TG, Breen CG, Weiner J, Kennedy CH, Bednersh, F. Using videotape modeling to facilitate generalized purchasing skills. J Behav Educ 1995; 5(1): 29-53. <https://doi.org/10.1007/BF02110213>
- [29] Taylor BA, Levin L, Jasper S. Increasing play-related statements in children with autism toward their siblings: Effects of video modeling. J Dev Phys Disabil 1999; 11(3): 253-264. <https://doi.org/10.1023/A:1021800716392>

- [30] Kroeger KA, Schultz JR, Newsom CA. Comparison of two group-delivered social skills programs for young children with autism. *J Autism Dev Disord* 2007; 37(5): 808-817. <https://doi.org/10.1007/s10803-006-0207-x>
- [31] D'Ateno P, Mangiapanello K, Taylor BA. Using video modeling to teach complex play sequences to a preschooler with autism. *J Posit Behav Interv* 2003; 5(1): 5-11. <https://doi.org/10.1177/10983007030050010801>
- [32] Kleeberger V, Mirenda P. Teaching generalized imitation skills to a preschooler with autism using video modeling. *J Posit Behav Interv* 2010; 12(2): 116-127. <https://doi.org/10.1177/1098300708329279>
- [33] Larraceleta A. Intervenciones focalizadas basadas en la evidencia dirigidas al alumnado con Trastorno del Espectro Autista. *Siglo Cero* 2018; 49 (2): 266- 73-87. <https://doi.org/10.14201/scero20184927387>
- [34] Salvadó-Salvadó B, Palau-Baduell M, Clofent-Torrentó M, Montero-Camacho M, Hernández-Latorre MA. Modelos de intervención global en personas con trastorno del espectro autista. *Rev Neurol* 2012; 54 (1): 63-71. <https://doi.org/10.33588/rn.54S01.2011710>
- [35] Güemes I, Martín MC, Canal R, Posada M. Evaluación de la eficacia de las intervenciones psicoeducativas en los Trastornos del Espectro Autista. Madrid: IIER-Instituto de Salud Carlos III 2009.
- [36] Collaborative Work Group on Autistic Spectrum Disorders. Best practices for designing and delivering effective programs for individuals with autism spectrum disorders. California: California Departments of Education and Developmental Services 1997.
- [37] Anderson SR, Romanczyk RG. Early intervention for young children with autism: Continuum based behavioral models. *J Assoc Pers Sev Handicaps* 1999; 24: 162-73. <https://doi.org/10.2511/rpsd.24.3.162>
- [38] Ministries of Health and Education. Autism Spectrum Disorder Guideline. Wellington: New Zealand, Ministry of Health; 2008 [cited 2019 Oct 10]: Available from: http://www.health.govt.nz/system/files/documents/publication/s/nz-asd-guideline-aug16v2_0.pdf
- [39] ECRI INSTITUTE. Comprehensive Educational and Behavioral Interventions for the Treatment of Autism Spectrum Disorders. Plymouth, Pensilvania: ECRI Institute 2009
- [40] National Collaborating Centre for Women's and Children's Health. Autism: recognition, referral and diagnosis of children and young people on the Autism Spectrum. London: RCOG Press; 2011 [cited 2019 Oct 10]: Available from: https://www.ncbi.nlm.nih.gov/books/NBK92985/pdf/Bookshelf_NBK92985.pdf
- [41] Cooper JO, Heron TE, Heward WL. Applied behavior analysis. 2nd ed. New Jersey: Prentice Hall 2007.
- [42] McCoy K, Hermansen E. Video modeling for individuals with autism: a review of model types and effects. *Educ Treat Child* 2007; 30(4): 183-213. <https://doi.org/10.1353/etc.2007.0029>
- [43] Rush KS, Mortenson BP, Birch SE. Evaluation of preference assessment procedures for use with infants and toddlers. *Int J Behav Consult Ther* 2010; 6(1): 2. <https://doi.org/10.1037/h0100893>
- [44] LeBlanc LA, Coates AM, Daneshvar S, Charlop Christy MH, Morris C, Lancaster B. M. Using video modeling and reinforcement to teach perspective taking skills to children with autism. *J Appl Behav Anal* 2003; 36 (2): 253-257. <https://doi.org/10.1901/jaba.2003.36-253>
- [45] MacDonald RF, Dickson C., Martineau M, Ahearn WH. Prerequisite skills that support learning through video modeling. *Education and Treatment of Children* 2015; 38(1): 33-48. <https://doi.org/10.1353/etc.2015.0004>
- [46] Maione L, Mirenda, P. Effects of video modeling and video feedback on peer-directed social language skills of a child with autism. *J Posit Behav Interv* 2006; 8(2): 106-118. <https://doi.org/10.1177/10983007060080020201>

Received on 30-10-2019

Accepted on 11-11-2018

Published on 12-12-2019

DOI: <https://doi.org/10.12970/2311-1917.2019.07.01>

© 2019 Aitor Larraceleta González; Licensee Synergy Publishers.

This is an open access article licensed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>) which permits unrestricted, non-commercial use, distribution and reproduction in any medium, provided the work is properly cited.