A Picture Is Worth . . .

Video Self-Modeling Applications at School and Home

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Abstract: Video self-modeling (VSM) is a relatively new technique for modifying and training behaviors and has accumulated a relatively impressive track record in the research literature. Using only positive examples, VSM gives persons the opportunity to view themselves performing a task just beyond their present functioning level via creative editing of videos using VCRs or video software. In this article, the author provides instructions on the two primary videotaping strategies for collecting content for self-modeling movies. These are accompanied by case studies illustrating the entire self-modeling process, from selecting behaviors to viewing the videos. The author conducted the case studies in his work with the Restructuring for Inclusive Environments technical assistance project. Suggested applications and caveats on the use of VSM are also presented.

Having students imitate modeled behaviors has long been a mainstay of instructional practice. Adult and, more recently, peer modeling (Maheady, Mallette, & Harper, 2006; Robertson & Weismer, 1997; Scruggs & Richter, 1985) have attained the status of important teaching strategies. Researchers have found that the most effective models tend to be individuals close to the observing child's age, with similar characteristics (gender, personality, race, and mood), and who function only slightly above the level of the observer (Bandura, 1969; Thoresen & Hosford, 1973). Hosford and Mills (1983) have shown that video models who exhibit absolute mastery of a task are not as effective as those who display some task anxiety yet are learning to cope with a situation effectively. These findings, along with other possible benefits experienced by peers when acting as models in the classroom (e.g., increased prestige, improved retention by practicing recently acquired skills, and learning responsibility), lead to the question of whether a child, given the opportunity to view himself or herself performing well at an advanced level, would serve as an even better model. No peer or adult could exhibit characteristics as close and relevant to the child as when he or she serves as both model and observer. Also, children who are having difficulty mastering a task could benefit from the added prestige and confidence attained by observing their own success. According to Bandura (1997), this sense of *self-efficacy*, defined as the belief that one can succeed, is a critical factor in promoting learning. Indeed, the concept of self-efficacy is at the heart of the self-modeling technique. Direct video evidence is provided that the child can succeed. This positive visual imagery thus becomes part of the viewer's memory (Kehle, Bray, Margiano, Theodore, & Zhou, 2002).

The video camera has long been an important part of our culture; however, the editing and production of high-quality videos was typically left to professionals. This situation has changed significantly over the last decade with the advent of camcorders that can plug directly into VCRs and computers. It is now possible for education professionals, parents, and others to use VCR, DVD, and computer technology to create outstanding videos. It is also now possible to edit videos using VCRs or computer editing software to make it appear that a person is accomplishing a task or mastering a behavior that is beyond his or her present functioning level but is developmentally appropriate and attainable. Dowrick (1983) termed this ability to perceive future success *feed-forward*. Establishing this imagery of possible and positive future behavior forms the basis of the emerging method of video self-modeling (VSM).

Video Self-Modeling

Since the 1970s, the efficacy of VSM has been verified in studies across a range of ages and disabling conditions. It has been found to be effective in treating attention disorders (Dowrick & Raeburn, 1977; Woltersdorf, 1992), depression (Kahn, Kehle, Jenson, & Clark, 1990), aggressive or disruptive behaviors (Buggey, 2005; Creer & Miklich, 1970; McCurdy & Shapiro, 1988), elective mutism (Pigott & Gonzales, 1987), responding behaviors in children with autism (Buggey, Toombs, Gardner, & Cervetti, 1999; Wert & Neisworth, 2003), and motor problems (Dowrick, 1983; Dowrick & Dove, 1980). VSM has also been used effectively to train parenting skills (Meharg & Lipsker, 1991), life skills (Dowrick & Hood, 1981; Miklich, Chida, & Danker-Brown, 1977), social skills (Buggey, 2005; Hitchcock, Prater, & Dowrick, 2004), language behaviors (Buggey, 1995, 1996, 2005), and cognitive skills (Schunk & Hanson, 1989). The ages of participants in these studies have ranged from preschool (Buggey, 1995, 1996; Wert & Neisworth, 2003) to adult (Dowrick & Hood, 1981; Meharg & Lipsker, 1991). In virtually all of these studies, VSM produced results that accelerated quickly from baseline performance, were maintained in follow-up assessment, and were effectively generalized across situations, persons, and environments (Bellini & Akullian, 2007). These types of outcomes are exactly what one would hope for in an intervention. The seeming ability of this technique to foster generalization is particularly interesting. With many other strategies, generalization must be taught and can take a great deal of instructional time.

Given these results, it is interesting to speculate as to why VSM is not more widely used. One reason might be that professionals and parents are not comfortable with videotaping and editing. In this article, the author will discuss several relatively easy methods for planning a VSM performance, videotaping it, and editing and creating the movies. A series of practical applications based on actual case studies across a range of behaviors is also presented. Some of these case studies were not conducted under ideal experimental conditions, and it is possible that other factors influenced outcomes; the results should be interpreted with this in mind. However, most of the case studies were part of larger studies with formal experimental designs that controlled for multiple variables. These will be pointed out. Still, it is important to understand that VSM is an emerging strategy and that research concerning its efficacy is still rather limited.

CREATING TAPES WITH A VCR

A possible barrier to the adoption of VSM by more professionals and parents is lack of understanding of the technology needed to carry out the procedure. Two elements are needed for children to function as their own models: (a) audiovisual technology that allows children to view themselves and (b) the ability to manipulate children's behavior so that they can function (or appear to function) beyond their present level. Teachers and parents who have access to a camcorder and a VCR have the necessary technology to produce VSM tapes. Techniques involved in producing videotapes for VSM are not complicated. In the studies conducted by Buggey (1995, 1996), a camcorder plugged into a VCR was used for editing. By pressing the *record*, *play*, or *pause* button on the VCR, the user can scan the videotape for the appropriate behaviors. When the camcorder tape is at a point just before where the behavior begins, he or she can press *play* on the camcorder and release the *pause* button on the VCR to capture the behavior. Using the *pause* button rather than *stop* limits break-up between edited segments and makes for much cleaner transitions between segments. Buggey found that the average time needed to select video segments, edit the tape, and produce a finished self-modeling tape, using this method, was less than 1 hr.

CREATING TAPES OR CDS USING COMPUTER SOFTWARE

Self-modeling tapes created using the VCR method are adequate, although the quality is often less than perfect. Recent developments in computer software, such as iMovie for the Macintosh and similar programs for Windows, have made the production of high-quality precision videos possible even for the person with modest computer skills. The editing of videotapes becomes a matter of connecting the camcorder to the computer, downloading the video, and cutting and pasting the positive behaviors into a movie. Transitions between video segments can be added simply by clicking and dragging the desired format to the space between the segments. This greatly enhances the quality of the video. Buggey (2005) provided an example of the capabilities of these programs. In this study, Buggey used multiple-baseline designs across behaviors and persons. One of the target behaviors for a study participant was expanded sentence use in expressive language. The 5-year-old child rarely initiated language and only used one-word utterances. The child was asked to imitate words prompted by his mother and teacher, and his responses were then recorded. Using iMovie, the researcher was able to cut individual words and paste them into sentences. In addition, a voiceover drawing attention to the behavior ("Let's listen to Bob talking really nicely") and applause were added to the tape. Buggey waited a week following the taping before allowing the student to view the movie to ensure that the filming activity did not result in a change in language behavior. The child was then given the VHS tape to watch in the morning between arrival and the start of classes. This was done for one week. The results were very positive in terms of increasing initiations and increasing

sentence length. Nevertheless, it was uncertain whether these outcomes were the result of the positive reinforcement on the tape, a time-delayed response to the filming process, the actual self-modeling, or some combination of factors.

Once a movie is finished, it can be made into a DVD on the computer or recorded directly onto a VHS tape using a VCR. (The movie file is exported back to the camcorder, which is then plugged into the VCR to make the final tape.)

Dowrick and Raeburn (1977) have stated that self-modeling tapes need not be longer than $2\frac{1}{2}$ to 3 min to get the desired effects. Longer tapes seem to produce negligible improvements compared to shorter tapes. The actual videotaping of the behaviors can be time consuming, depending on several variables, including the ability of the student to follow directions and the experience of the camera operator (the author has more than once discarded video because of poor quality and has had to retape entire sessions).

FILMING

Once the technology is in place, all that is needed is a method for arranging and videotaping positive child behaviors. Two major methods have been used in VSM research to manipulate students so that they are performing (or appear to be performing) beyond their present developmental levels or behaving in a more acceptable manner.

Role Playing and Imitation

The less time consuming of these methods is to have the student role-play or imitate the target behavior. Role-playing and imitation are especially effective when working with language and social behaviors. Children can often imitate correct language forms before they adopt them into everyday use. Similarly, children who exhibit behavior difficulties can usually role-play correct responses to social situations that they do not typically perform. Role-playing strategies, such as Social Skills Stories (Johnson & Susnik, 1995), are commonly used to promote social behavior change. This method requires students to role-play specific social situations and responses that are problematic for them. Videotaping the role-playing activity would provide a record of the student successfully performing the behavior. Adding a self-observation component to the role-playing might be a way to strengthen the effect.

As part of their mission of technical assistance and support to schools, the staff at the Restructuring for Inclusive School Environments (RISE) project instructs school professionals and parents in the use of video self-modeling and often recommends this method in positive behavior support planning. The staff has found VSM to be especially effective with students with mild autism and attention-deficit disorder. Most of the time, these students cooperate enthusiastically in the role-playing activity, can participate in the planning stages of the videotaping, and view their movies with excitement.

An example of the role-playing form of self-modeling involved a 10-year-old boy, Ivan, who had been diagnosed with Asperger syndrome and oppositional-defiant disorder. He was a Russian orphan who had been adopted and brought to the United States when he was 5. Ivan's problems were manifesting more at home than at school; thus the intervention was carried out in his home. His parents were asked to identify the behavior that caused them the most frustration. This turned out to be getting ready for school. Prior to intervention, the parents were asked to time the child and to record the number of prompts they used during that time period. Over a 3-day period, Ivan took an average of 60 min from wake-up to being ready to go out the door and the parents averaged about 10 prompts that mainly involved telling him to hurry up. They reported that this was typical.

The parents were asked to tell Ivan and his younger sister that someone was coming to make some movies with them. Upon arrival, the researcher made movies of the children posing and doing several fun activities of their choosing. The children were able to view the videos immediately on the camcorder. This was designed to break the ice and get the boy accustomed to the camera and the presence of the researcher (the author).

The parents, the researcher, and the boy sat down at the kitchen table to plan the video. The time from waking to leaving the house was task analyzed and then arranged in scenes on a storyboard, a plain sheet of paper divided into six rectangles. Each rectangle represented a scene, and stick figures and crude representations of the environment were drawn for each scene. Ivan's storyboard is shown in Figure 1.

The filming proceeded almost flawlessly. Ivan enjoyed the role-playing and cooperated and performed extremely well. It was a Sunday afternoon, but he gladly changed into his pajamas for the first few scenes. Prior to filming each scene, we went over the script and sometimes did a brief rehearsal. We discussed the dressing and bathroom scenes and came up with solutions that Ivan felt comfortable with. The raw footage was edited at the house using the camcorder–VCR method. There were only two scenes where editing was necessary, and these were merely skipped over during the recording. A brief recording of the researcher stating the behavior ("Let's watch Ivan get ready for school") was added to the beginning by covering the lens and using audio only. The parents were instructed to let Ivan watch the tape whenever he wanted and to refrain from urging him to watch. They were also asked not to compare his actual behavior to that appearing on the tape. Finally, they were asked to continue timing his getting ready behavior and recording the number of prompts.

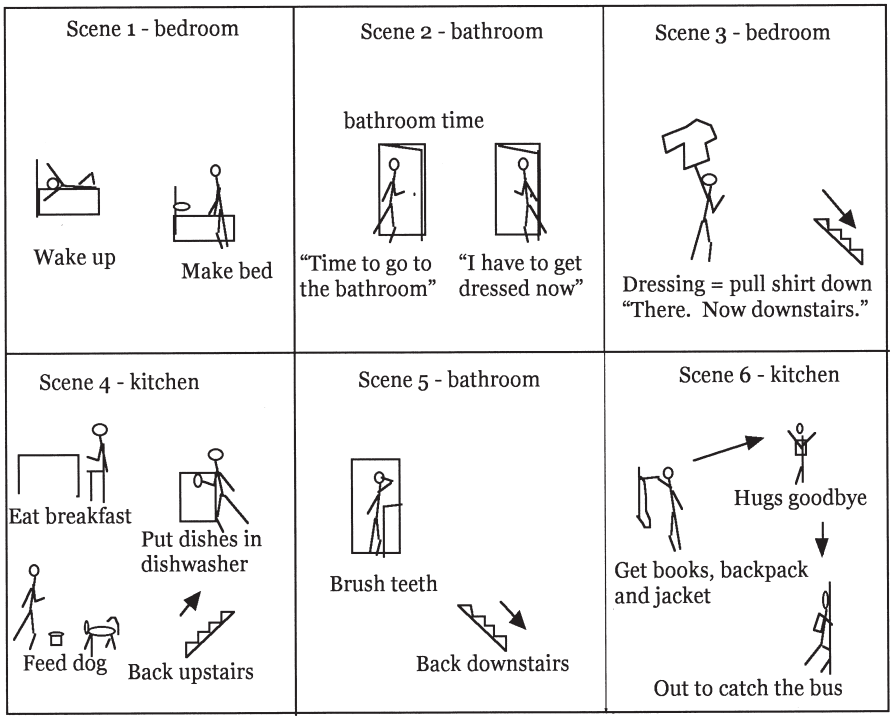

Figure 1. Storyboard for Ivan's morning routine.

Ivan watched the tape once just after completion and once that evening before bed. The next day the researcher was awakened by a call from Ivan's father, who asked, "Okay, now what do we do for the remaining 40 minutes?" Ivan had completed his normal morning routine in slightly over 20 min. The only prompt given was waking him up. His parents reported that he viewed the tape daily for a week before his interest began to wane. He maintained the improved rate over an extended period. Four months later the parents called the researcher for a copy of the master tape. The parents had taped over their copy, and they said Ivan had regressed somewhat. It is unclear how effective this booster shot was because the family relocated soon after. Little can be said as to whether results were a product of VSM, the filming process, or parent and adult attention. However, the author has carried out other studies in which variables were much better controlled.

Capturing Rare or Emerging Behaviors

For students with more severe autism, the role-playing method may not be appropriate, and it may be necessary to tape a child until he or she demonstrates the behavior enough times to constitute a tape. Of course, this requires the student to have a baseline rate of behavior. Waiting for the behavior to be exhibited can often be time consuming. Buggey, Toombs, Gardner, and Cerveti (1999) used this method to address language response behaviors with three middle school students described as having moderate to severe autism. The researchers conducted play sessions in the students' homes in which the participants were asked frequent questions. Responses were rare, but these were collected for inclusion in the tape. After six 2-hr sessions, one student had only responded three times. These three responses were looped continuously to produce a 2-min tape. The other students responded more frequently; thus, their movies contained much more variety. A multiple-baseline design across persons was used to analyze results. The authors reported that following intervention the students doubled their rate of responding, and with some specific questions (e.g., "What color is this?" "How many ____ are there?") the results were significantly better than that, in several cases rising from 0% to 100%. The authors noted that the intensity of time needed for taping in this manner would be problematic in school and clinic settings.

There are behaviors where gathering raw footage would not be nearly as time consuming. The staff of RISE worked with an 8-year-old child with moderate autism who never finished his lunch. It was early November, and the child had not had any free-play time, which was allowed when students finished eating and cleaning up. Ronnie was very distractible and needed frequent prompts to attend to his lunch. He was often heard mumbling to himself, laughing aloud for no apparent reason, and self-stimulating by twirling his silverware. A video camera with a tripod was placed in the lunch room and focused on Ronnie. It was turned on, and two 30-min lunch periods were taped. One of the RISE staff members took the raw footage home and transferred it directly to his computer.

Using iMovie on a Macintosh computer, he cut every incidence of Ronnie's putting his spoon to his mouth and chewing and pasted them into a continuous sequence. Using fast forward, 60 min of raw tape were analyzed in 20 min. The staff member then chose a flattering shot of Ronnie, created a still frame, and placed it at the beginning of the movie. On this frame both voice and written attention were given to the behavior (i.e., "Ronnie's movie! Here's Ronnie eating at lunchtime!"). Crowd cheering was added from a menu of sound effects available in iMovie. Last, transitions were added between scenes (behaviors), giving the movie the look and feel of a professional video.

Ronnie's response to the video was probably the most dramatic personnel have seen using this method. He watched the film on a Thursday afternoon, the first day after it was completed. He was absent Friday and Monday and returned to school late in the morning on Tuesday. Thus, he had not had the opportunity to watch the tape since the initial viewing. This first day back Ronnie finished his lunch with minimal prompting, cleaned up his space, and had a few minutes of free time. Ronnie watched his tape over the next week. His self-stimulating behavior virtually ceased, and he consistently finished his lunch and had free time. The behavior maintained throughout the school year. This student and the students discussed later in this article were part of a larger research project (Buggey, 2005). Their results were not included in the original article because only those who had participated in multiple-baseline designs were included. Nevertheless, control of variables was undertaken with these students, including delaying VSM intervention until after filming and gathering interobserver reliability data. Each case study was evaluated using protocol for single-subject designs recommended by Tawny and Gast (1984).

Ivan and Ronnie are cases with results that were immediate and seemingly dramatic. Both had been on intensive ABA regimens targeting the behaviors in question, with little or no progress. These rapid changes in behavior were not expected. Although the author and RISE staff have had seen impressive gains across an array of behaviors for children exhibiting various degrees of autism, none were as dramatic as these two cases. Nevertheless, we found VSM to be very effective with many of these students, with the number and duration of tantrums decreasing rapidly, social initiations and language usage increasing (Buggey, 2005), and the number of negative behaviors during classroom transitions decreasing.

INSIGHTS INTO HOW VSM WORKS

Buggey's work with children and their tantrum behaviors may have provided some insight into how some children process or recall the VSM process. Two children from the same classroom, both of whom were diagnosed with Asperger syndrome, exhibited very similar behaviors leading up to and during tantrums. Both folded their arms across their chests, sat on the floor, and either remained motionless with a pouty look on their faces or cried uncontrollably. The planning for their movies involved identifying tantrum triggers, which included not getting called on when they knew an answer, not being first in line, and having behavior verbally corrected. Examples of these triggering situations became the scenes in the movies. The teachers, together with some of the classmates, set up situations that normally triggered tantrums. The students were instructed in appropriate responses, and these were scripted for their performance. During the filming process the students performed well, although each occasionally started the prebehaviors to the tantrums before being reminded that they were in a movie. The videos were easy to edit as most of the scenes went as planned. The students were shown the videos following a delay of several days to determine whether the role-playing and filming alone might cause changes. Almost immediately the number and durations of tantrums decreased markedly.

What impressed the teachers most was what often happened shortly after the students began their typical pretantrum behavior. On several occasions the students made comments like "Whoops," "Forgot," or "Darn;" ceased the behavior; and returned to what they had been doing. It seemed as if they were referring to the memory of the tape. Both students exhibited this type of behavior. If these memories are that easily accessed, it might explain the generalization effects so often reported in the VSM literature: Students may carry the memories wherever they go, and thus they may not need other stimulus-control mechanisms. In this study, the two students seemed to overcome conditioned responses to environmental triggers. The results generalized to other conditions not included in the videos, including the home environment, as reported by parents. Parents were unaware of the behaviors targeted but were able to identify tantrums as a behavior that had changed in the home.

The precision that can be attained using editing software has opened up methods of use that were never possible with the VCR method, including frame-by-frame editing. We have taken advantage of this feature in our work in language development. As stated previously, it is possible to cut individual words spoken by the students and paste them into sentences. We have used this with great impact with two students: a 5-year-old boy with mild autism (Buggey, 2005) and a 7-year-old boy with Down syndrome. In both instances, the students used one-word verbalizations and rarely initiated conversation. Parents and teachers were recruited to prompt verbalizations from the students. Words were cut and pasted onto the work area of iMovie, where they could be selected and pasted into two-, three-, and four-word sentences. The resulting movies had excellent audio quality. We used a wireless microphone for one student and a camera microphone for

the other. The camera microphone was sufficient in recording the voice, but the wireless model was far superior. When the viewer's eyes were closed, the sentences sounded almost perfect. The video was somewhat jerky as the students' positions changed with each word. Reports from home and school were immediately positive for the child with Down syndrome. Both mother and teacher reported increases in initiations, responding, and sentence length. Although not scientifically validated, considerable improvement was indicated, with the child's mother reporting utterances of up to four words.

The boy with autism showed similar gains to the one with Down syndrome, but not at first. His video emphasized responding behaviors; thus, video clips of his schoolmates and teacher asking questions were embedded prior to his responses. He did show some improvement in responding to questions, but this did not generalize to verbal initiations as hoped. RISE staff members hypothesized that the inclusion of peers who were asking questions might have distracted from the salient feature of the movie: the boy's talking. A second movie was created with the peers edited out. The results were much more positive following this revision, with the boy showing accelerated gains in responding and good gains in initiations. Two days after first viewing the tape, he met this researcher at the door to the school with a "Hi, Dr. Tom." Only Buggey (2005) has reported this form of language intervention in the literature; it is certainly worthy of more research.

Video self-modeling allows children to take center stage on television. They become the stars. Participation in VSM is usually highly motivating to the student and can serve to increase self-esteem and confidence, according to Bandura (1997) the necessary elements of self-efficacy. One last example of video self-modeling illustrates this process. In this case study, staff worked with three fourth graders from separate classrooms who were 2 years behind in reading achievement and were being referred for special education services. The teacher stated that the students acted defeated, never volunteered to read, and rarely completed homework assignments. We worked on one story from their present text using multiple techniques until the students mastered the content. We then taped the students reading with accuracy, speed, and appropriate intonation. The first day the students saw their tapes, two of the teachers contacted us wanting to know exactly what we did. Both students had volunteered to read out loud for the first time that school year. What impressed us most was that scores in reading fluency for the three participants averaged 10 words per minute higher immediately after intervention and maintained that level for at least 1 month, at which time data collection stopped. None of the students ended up being referred for special education. The only explanation that seems to fit the facts is that the images of success resulted in increased self-efficacy, which immediately translated into improved performance. As in most of the other cases reported here, there was a week-long gap between filming and the introduction of the videotapes. As in the other cases, little or no movement in performance was seen following the filming.

UNSUCCESSFUL APPLICATIONS: IT DOES NOT ALWAYS WORK

However positive the results of VSM studies may appear, it is clearly not a panacea and does not seem to be effective with all students. The RISE staff has used VSM with two children with more severe autism with no positive results. Both of these students were in their mid-teens and exhibited intensive perseverative and self-stimulating behaviors, including hand-flapping, pacing, and echolalia. The target behaviors for both students were verbal initiations and responding. Both students were asked to repeat statements read by a RISE staff member, which they did. The students' responses were edited, combined with appropriate questions read by an adult, and then embedded into personal movies. Both students initially watched the tapes with interest, but their attention rarely lasted the entire 3-min duration of the movie. No changes in verbal behaviors were noted in either student. It is possible that the target behaviors were too advanced for the students or that the students did not have the cognitive or attention skills necessary for the intervention. Certainly, more research needs to be conducted to determine possible limitations of VSM interventions and to find ways to enhance positive effects. Nevertheless, the number of successful applications has far outnumbered the failures, in both the research and RISE's experiences.

Conclusion

Thanks to the rapid development of computer and camcorder technology, creating and editing high-quality videos are becoming easier and less expensive. The Apple program iMovie, which was used for all of the computer applications of VSM in this article, may be downloaded free of charge and comes with all new Macintosh computers. iMovie has spawned similar programs now available for Windows users.

Our experiences with VSM have been, for the most part, successful, and in some cases extraordinary. Even if the method does not cause spontaneous improvement, there seems to be little downside to its application, if one ensures that the targeted behaviors are within the student's ability limits. VSM by its very definition focuses on the positive. Negative behaviors are eliminated during the editing process. In light of positive behavior support elements required in the Individuals with Disabilities Education Act, VSM might be a viable solution for meeting the behavioral intervention needs of some students. The use of videotaped self-modeling appears to be a logical extension

of the established methodologies of adult and peer modeling and uses a medium of instruction in which children have been immersed for most of their lives. For students with autism, the possibilities of working with a two-dimensional medium may reduce anxiety and some of the defenses set up against human social interaction, making this a particularly effective intervention for this group.

There are two caveats that must always be kept in mind when videotaping in schools. The first is confidentiality. The written consent of families is necessary, and they must agree to the disposition of the recordings once the intervention has been completed. Care must be taken so that other students in the classroom who have not agreed or whose parents have not given consent are excluded from the videos.

Second, it is important that the target behaviors be developmentally appropriate. In our experiences with VSM, we have never encountered a student who did not enjoy the taping process and viewing the videos. It is possible, however, that if videos are edited to show the student completing a task far beyond his or her capabilities, frustration and false hope may be the result. Creating such a video might be difficult using the VCR method because either the student is already exhibiting a baseline rate of the behavior or he or she is able to imitate it. However, the video editing possibilities using computer software are much more sophisticated. Thus, it is important to be aware of developmental levels and developmental sequences when planning VSM movies. Having persons view videos in which they are depicted in a manner beyond what could reasonably be achieved could cause serious harm.

Further research is needed to validate self-modeling's efficacy; however, the research done to date is compelling. The research findings indicate the potential for powerful maintenance and generalization across a range of ages and types of disabilities. RISE's experiences using this method support these findings.

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