J Behav Educ (2011) 20:33–43
DOI 10.1007/s10864-010-9115-4

ORIGINAL PAPER

Three Students with Developmental Disabilities Learn to Operate an iPod to Access Age-Appropriate Entertainment Videos

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Published online: 21 November 2010
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Abstract Students with developmental disabilities may not have the necessary skills or the same opportunities to access multimedia-based leisure materials as their typical peers. Portable multimedia devices such as the iPod Touch® may provide them with a useful tool for accessing age-appropriate leisure material. The present study examined the feasibility of teaching 3 students with developmental disabilities to independently operate an iPod to watch age-appropriate entertainment videos. A delayed multiple-probe design across participants was implemented with baseline, intervention, fading, and follow-up phases. Video modeling and least-to-most response prompting were successfully used to teach these 3 students to operate an iPod Touch® to watch preferred videos without adult assistance. The results complement previous findings supporting the use of video modeling as an instructional strategy and add to the literature by using portable multimedia devices as assistive technology for teaching an age-appropriate leisure skill.

Keywords Assistive technology · Developmental disability · Portable multimedia device · iPod Touch · Leisure · Video modeling

Introduction

Students with developmental disabilities have impairments that may prevent them from learning age-appropriate leisure skills when compared to their typically developing peers. Such students often do not have the necessary skills or

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opportunities to engage in the same leisure activities as typically developing peers (Coyne and Fullerton 2004; Patterson 2004; Thompson et al. 2009). Leisure and recreation activities are an important part of a person's development and quality of life (Iwasaki 2007; Schleien et al. 1995). Caldwell (2005) reviewed evidence suggesting that leisure engagement can have a positive effect on a person's social, emotional, physical, and cognitive health. Consistent with this conclusion, in a survey examining the quality of life of young adults with severe intellectual disabilities, most mothers mentioned leisure activities as an important component of their child's quality of life (McIntyre et al. 2004). Therefore, the development of age-appropriate leisure skills could be seen to be an important educational objective for many young people with developmental disabilities.

A few studies have attempted to teach leisure skills to individuals with developmental disabilities. For instance, Luyben et al. (1986) taught three adults with severe intellectual disability to play soccer. The participants learned to perform a side-of-the-foot soccer pass through forward chaining and decreasing levels of physical prompts. Follow-up and generalization data demonstrate the skill was successfully learned and maintained over time. Matson and Marchetti (1980) compared different treatment procedures to teach adults with intellectual disability to operate a stereo to listen to music. Participants who received one of the interventions performed significantly better than participants in the control groups. These studies provide evidence that participants with developmental disabilities are able to learn leisure skills. Overall, however, existing literature has tended to focus more on the provision of leisure opportunities to this population than on teaching them the necessary skills to engage in leisure activities (Coyne and Fullerton 2004; Schleien and Ray 1988, p. 1).

Given the benefits of recreation, it is important to provide young people with developmental disabilities the skills to independently engage in age-appropriate leisure activities that would be available to the general population (Jerome et al. 2007). Age-appropriate leisure skills are important because they have the potential to promote community inclusion while providing individuals with developmental disabilities with a constructive way of spending their free time (Schleien et al. 1981).

Currently, a large proportion of people's leisure time involves technology including television, computers, and more recently, portable multimedia devices such as mp3 players and iPods. With respect to this new technology, Jerome et al. (2007) taught three men with developmental disabilities to access their preferred Internet sites to access video games and listen to music on a desktop computer. Given the promising results of Jerome et al., it would seem that off-the-shelf technology such as iPods could enable students with developmental disabilities to access a range of age-appropriate leisure content, such as enabling them to listen to music and watch entertainment videos.

To date, however, there appears to be no studies that have attempted to teach students with developmental disabilities to use iPods to access age-appropriate entertainment videos. The present study examines whether students with developmental disabilities can learn to self-operate an iPod Touch® to watch entertaining videos with video modeling and response prompting.

Methods

Participants and Setting

Three students were selected for this study. They all attended the same classroom in a specialized school for adolescents and young adults with a range of disabilities. This convenience sample was chosen because their teacher indicated they would benefit from learning to independently engage in age-appropriate leisure activities and they were all of comparable cognitive abilities. Age and gender were not expected to influence their learning.

Sarah was a 19-year-old girl with severe intellectual disability and epilepsy. On the Vineland-II Adaptive Behavior Scales (Sparrow et al. 2005) with the teacher as the interviewee, Sarah received an overall standard score of 38, which is approximately four standard deviations below the mean on the Vineland and indicative of an extremely low level of adaptive behavior functioning. She was said to be capable of understanding simple commands and had a good vocabulary, but was not able to carry an age-appropriate conversation. Her motor skills and visual and hearing abilities appeared to be in the normal range. She had no previous experience with iPods or any other portable media players.

Mary was a 16-year-old girl with cerebral palsy and severe intellectual disability. Her overall Vineland-II standard score was 52, which is approximately three standard deviations below the mean on the Vineland and indicative of a low level of adaptive behavior functioning. She understood simple commands and had a good vocabulary, but her speech was difficult to understand. Her motor skills were somewhat affected by cerebral palsy, but she was able to manipulate small objects effectively. Her visual and hearing abilities were in the normal range. She had no previous experience with iPods or any other portable media players.

Jim was a 15-year-old boy with Klinefelter syndrome and severe intellectual disability. His overall standard score on the Vineland-II was 43, which is approximately 3.5 standard deviations below the mean on the Vineland and indicative of low level of adaptive behavior functioning. He understood simple commands, but had a limited vocabulary and rarely spoke unless prompted to do so by an adult. His motor skill and visual and hearing abilities were in the normal range. Jim had limited experience with iPods. He was previously taught to tap the screen to make simple requests on an iPod programmed as a speech-generating device.

These three students attended a public school classroom that catered to 5 students with developmental disabilities. The classroom was staffed by a teacher and a teaching assistant. All sessions associated with this study were conducted in the participants' classroom. The participants sat at the table with the primary observer, who also acted as the interventionist, on the participant's left. For sessions where reliability data were collected, a second and third independent observer sat opposite the first observer. The observers were not blind to the purpose or phase of the study. They were trained on how to complete the datasheets and how behaviors should be recorded.

Stakeholder Questionnaire

A questionnaire was created to give the participants, as stakeholders, an opportunity to consent to their involvement in the study and to identify preferred stimuli for use in the study. Specifically, participants were informally interviewed and asked a set of questions: (a) would you like to learn how to use the iPod, (b) what do you enjoy watching, and (c) how would you like to learn (i.e. reading instructions, looking at pictures, watching a video, someone showing the steps, someone giving physical prompts). All participants indicated that they were interested in learning how to use the iPod and provided a list of what they liked to watch. They also indicated that watching a video was one of their preferred methods for learning, and so this method of teaching was incorporated into the intervention phase of the study.

Entertainment Video

The aim of the study was to teach the three students to operate the iPod to watch preferred entertainment videos. Sarah indicated that she preferred animation movies the most but was entertained by any of the videos available. Mary had first indicated the same preference as Sarah, but was more motivated by videos of her classroom and school playground added to suit her changed preference. Jim enjoyed videos of sports such as rugby, soccer, and basketball. Several video clips of 30-s duration that corresponded to these preferences were therefore loaded onto the iPods. New videos were added on a regular basis to prevent boredom.

Task Analysis

A task analysis was constructed of the steps necessary to successfully watch a video on the iPod (see Table 1). The 7-step task analysis was validated by having three iPod-inexperienced users follow the steps in order. Once validated, a 38-s video of a person completing the steps of the task analysis was made for use as a teaching tool in the video modeling phase of the study. The video was recorded from the subjective viewpoint (as if seen by the participant) using an iPhone®, edited on iMovies®, and uploaded on a 16 GB iPod Touch®.

Table 1 Task analysis: how to watch a video on the iPod

1. Turn on the iPod—press the "home" button
2. Unlock the screen—slide the button with the arrow to the right
3. Launch the video application—tap the "video" icon
4. Select the video—find the video you wish to watch and tap on its name/picture
5. Watch movie—when the video starts, turn the iPod horizontally
6. Leave the video application—press "home" button
7. Turn off the iPod—press the "on/off" button on the top left of the iPod

Design

A delayed multiple-probe design across participants was used in this study (Kennedy 2005). In this design, the independent variable is sequentially introduced across participants. A functional relation is demonstrated if the behavior changes occur when the intervention starts while the baseline for the subsequent participants remains low and stable. The baseline phase was followed by a video modeling (VM) and prompting phase. VM was faded out in the next phase, and follow-up sessions were conducted a few weeks later. The order in which participants progressed from baseline to VM and prompting was based on their availability. Sarah was the first to receive treatment because Mary was engaged in other classroom activities and Jim was participating in an unrelated study.

Configuration of Sessions

All sessions started with the interventionist giving the iPod Touch®, which was turned off, to the participant and saying "Can you turn the iPod on and watch a video?" The only reinforcers were the videos the participants could choose to watch and verbal praise for attending and attempting to perform any of the steps. The independent variable was the VM and prompting procedure, while the dependent variables were the number of steps in the task analysis performed correctly and the level of prompting used. Sessions were conducted twice a week during the morning break. The students had access to the iPod only during the sessions to ensure they did not learn by trial and error or from external instruction between training sessions.

Data Collection

Data were collected on the number of steps in the task analysis that were completed independently by the participants. To be counted as independent, a step had to be performed correctly without prompts.

Procedures

Baseline 1

During the initial baseline phase, if a step was performed within 10 s of the initial request to turn on the iPod or the completion of the previous step, it was recorded as a correct response. If the participants made no correct attempts within 2 min of the initial request, the session was terminated. The child was verbally praised for trying and was shown a preferred video on the iPod.

Baseline 2

During Baseline 2, the participants were given 10 s to perform each step in the sequence. The timeframe was deemed appropriate as it would give new learners

sufficient time to complete each step. Proficient users were timed performing the entire task in less than 10 s. If the participants did not perform a step, the trainer completed the step out of sight and returned the iPod to the participant. He or she was then asked to perform the subsequent step, but not instructed on how to do it (e.g. "Can you select a video?"). This process continued until the task was completed.

Intervention

For the VM and prompting phase, the participants were shown the instructional video before the session started. A least-to-most prompting procedure was used if participants did not perform a step. After 10 s with no correct attempts, the primary observer verbally instructed the participant (e.g. "Can you push the off button?"), followed by a gestural prompt (e.g. pointing at the button and repeating the question) and finally physical guidance (e.g. taking the participants' hand and pushing the button). During the intervention, if the participant performed a step that was not part of the task analysis or accidentally chose a video they did not want to watch, the iPod was set back to the previous correct step out of the participants' sight and returned to them so they had a chance to make another selection.

Video Fading

In the video-fading phase, the video was no longer shown but the prompting procedure remained the same as in the video intervention phase. The video was removed when participants did not seem interested in watching it any longer or when they appeared to have learned what they could from it.

Symbol Discrimination

A discrimination test was conducted (from sessions 30, 27, and 28 for Sarah, Mary, and Jim, respectively) to investigate whether the participants could discern the video icon or were just used to its location. The icon was moved from the center to the left on the lower part of the screen. The video instruction continued to show the icon in the original position. The videos available also changed position on the list as new options were added.

Follow-Up

Two follow-up sessions were conducted 2 and 11 weeks after the last intervention session (Session 34 for Sarah and Session 13 for Jim). The follow-up sessions for Mary were conducted 2 and 10 weeks after her final session (Session 22). The procedures for the follow-up sessions were identical to those of Baseline 1.

Interobserver Agreement

Interobserver agreement (IOA) was gathered independently by the second observer on 80% of all sessions to ascertain the reliability of the recorded data. IOA was calculated by dividing the smallest number of correctly performed steps recorded by the largest and multiplying the result by 100%. IOA ranged from 86 to 100% with an overall mean of 99%.

Treatment Integrity

Treatment integrity was measured on 79% of sessions using a checklist to record if procedures were followed as specified. Data indicate procedures were followed correctly 100% of times. The third observer independently collected interobserver data on treatment integrity for all 79% of sessions where treatment integrity was measured with 100% agreement.

Results

The data for Sarah, Mary, and Jim's sessions are depicted in Fig. 1. During Baseline 1, Sarah correctly performed one step in the sequence (14% correct). During Baseline 2, she correctly performed a maximum of two correct steps (28%). When VM and prompting was introduced, the number of steps performed increased steadily up to 86% correct. When VM was removed, the number of steps performed correctly fluctuated between five (71%) and seven (86%) and reached criterion of three consecutive sessions with 100% correct responses on Session 34. Sarah required some prompting but it seldom increased to the physical level.

Mary correctly completed only one step on the first session and none on the second during Baseline 1. During Baseline 2, the number of steps performed correctly ranged between 0 and 28%. When intervention was introduced, the number of steps performed correctly increased up to six (86%), but her improvement was variable. On the VM fading phase, the number of steps completed quickly reached criterion. Mary needed physical prompts early in the intervention because she was not used to handling the iPod. Motor difficulties due to cerebral palsy had an influence on the level of prompting, but once Mary was used to the iPod, she could perform the steps with no assistance.

Jim correctly performed two steps (28%) of the task during Baseline 1. During Baseline 2, the number of steps performed correctly increased and remained constant at 4 (57%). During the VM and prompting phase, the number of correct steps increased to 100%. On the VM fading phase, Jim reached criterion in 4 sessions. He never required a physical prompt to complete a step.

All participants continued to successfully use the iPod when icon discrimination was tested. Follow-up data show they could still operate the iPod with over 80% of steps being performed correctly after intervention was completely removed. Sarah performed over 80% on the first follow-up and 100% on the last. Mary performed at

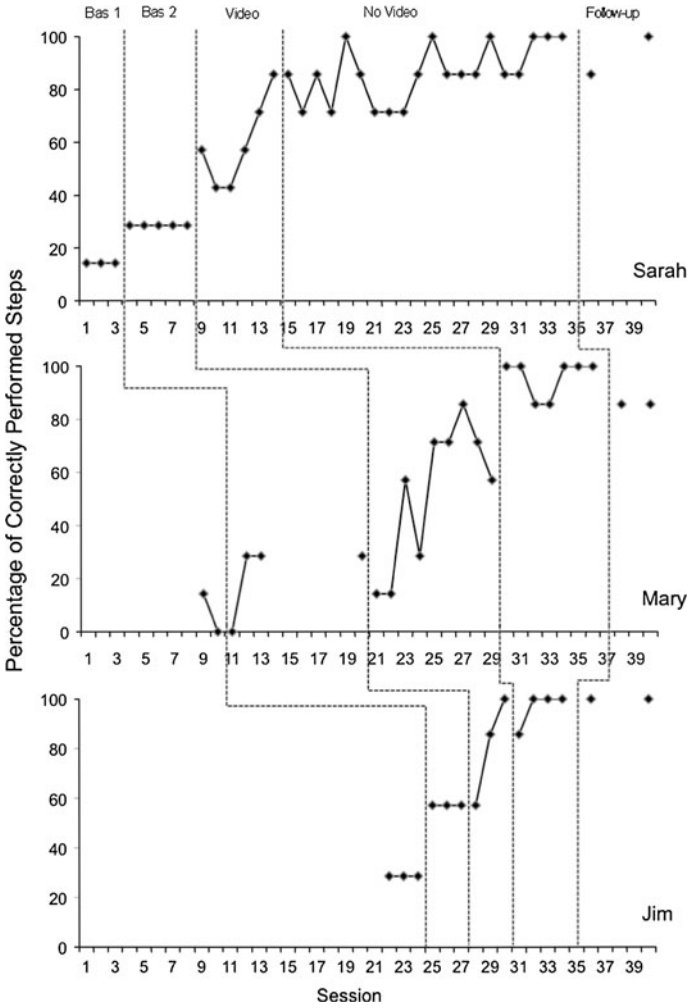

Fig. 1 Percentage of correctly performed steps

over 80% on both follow-up sessions. Jim was able to perform all steps correctly on both follow-up sessions.

Discussion

The results suggest that the instructional procedures were effective in teaching these three students to independently operate a portable media player to watch entertainment videos. These results suggest that functional use of an iPod can be taught relatively quickly and thus such devices would appear to represent a viable technological resource for some students with developmental disabilities. Learning

to use such devices may enable the individual to access entertainment videos, which, for young people, could be seen as an age-appropriate leisure skill.

Skill acquisition was generally rapid, which suggests that watching the entertainment videos was motivating for the participants. Anecdotally, the participants also appeared to enjoy taking part in the sessions and learning to use the iPod. The stakeholder questionnaire may have had a positive influence in this regard. It allowed participants to indicate how they would like to learn and what they would like to watch. This degree of self-determination may explain the rapid skill acquisition because the participants had an active role in choosing to participate in the study. Also, the stimuli presented via the iPod were likely to be reinforcing as they were selected by the participants themselves. Thus, this approach of assessing stakeholder perspectives seems useful in the design of the intervention.

While acquisition was generally rapid, there were some persisting errors evident in the data. Sarah, for example, consistently made errors related to skipping the second-to-last step (returning to the home page) before turning off the iPod. It appeared that this error stemmed from her being easily distracted by her surroundings. While this step was not essential for the operation of the iPod, it was an important step in the task analysis because the other applications available on the iPod are only accessible from the home page. Anecdotally, Sarah appeared to be happy (smiling, laughing) while watching the video, but at times was distracted scrolling through the video list and had to be reminded to make a selection.

Mary also appeared to enjoy watching the videos, but at times appeared more motivated to participate in the school's activities with her peers. To accommodate her needs, the sessions were kept short and only essential probe sessions were conducted during the baseline phase. She did not miss the school activities she enjoyed but the fear of missing them was apparent in the variability of her data throughout the sessions. At the beginning of the study, Mary appeared to know what was required to complete a step but was not able to physically do it due to her restricted motor skill. She quickly learned how to handle the iPod and was able to perform the steps correctly.

Jim also appeared to enjoy watching the sports videos and would say their name before choosing the appropriate videos. At times, he would be reluctant to turn off the iPod and would try to watch a new video before being told to finish the task. He appeared to be very interested in the device and would navigate through the different applications at the end of the sessions.

One of the limitations of this study is the introduction of VM and response prompting simultaneously. It is possible that either VM or prompting alone could account for the demonstrated intervention effects. The participants had severe intellectual disabilities and were not familiar with intervention studies. The two techniques were introduced together to maximize learning for this sample. The participants were possibly more motivated to work and enjoyed the process more by learning the new skills quickly. Another limitation is the small number of participants and the fact that generalization data were not collected.

Future research should aim to determine whether participants might be differentially sensitive to direct response prompting versus VM when learning other iPod-based leisure skills, such as playing video games or listening to music.

Future research could also examine the use of VM or direct response prompting on the use of portable media players for teaching other more complex skills. This study assessed a relatively easy skill but VM has been shown suitable for a range of skills that can be more complex. These skills could benefit from the flexibility iPods provide. Portability means participants could have access to the required instruction when and where it is needed. The material could be reviewed in the setting where the task or behavior is to be performed, possibly making transference of skills easier. Participants could, for instance, use the iPod in their community library to watch a video instruction on how to find and borrow a book. Future research could also examine if VM alone is effective in teaching new skills to children with developmental disabilities. In this case, interventions could be more efficient because they would not require the constant presence of an adult to provide prompts.

Despite its limitations, the present study makes a contribution to the literature by showing that students with developmental disabilities quickly learned a new leisure activity that is suited to their age on new technology that is becoming a pervasive part of society. It also gave the students the choice of whether or not they would like to participate in the study and what their reinforcers would be. The students were perhaps more motivated to participate because they felt empowered by having a say in their learning experience. For teachers or care providers, it demonstrates that students with developmental disabilities can successfully learn appropriate leisure skills with techniques that are easy to implement.

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