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Teaching Children with Intellectual Disabilities through Video Prompting: Smartphone vs. Tablet

Abstract

This study aims to determine whether video prompting differs when provided on smartphone compared with tablet in terms of effectiveness and efficiency in teaching leisure skills to children with intellectual disabilities, which types of errors exhibited by participants and the opinions of the mothers on the social validity of the study. Four children with intellectual disabilities, aged 66-81 months participated in the study. An adapted alternating treatments design was used. Results show that video prompting was effective when provided via a smartphone and tablet on teaching leisure skills; however, video prompting presented through the smartphone was more effective than video prompting presented through tablet. There was no significant difference between the efficiency of VP provided on the smartphone and tablet in terms of number of sessions and errors; however, VP provided on the tablet was slightly more efficient in terms of total training time. In addition, the most common errors in probe sessions were sequence and duration errors.Tthe opinions of the participants' mothers regarding the social validity of the study were positive. Implications for future research are discussed.

Keywords: Video Prompting, screen size, smartphone, tablet, Intellectual disabilities, leisure skills.

Introduction

As with all children, it is very important for children with intellectual disabilities to enjoy leisure time. When not engaged in curricular activities, children have various needs that need to be met, such as resting, enjoying leisure time, and taking part in activities in line with their interests, and they need to learn leisure skills to meet these needs (Westling & Fox, 2004). While leisure skills are one of the main indicators of life quality and play an important role in the lives of individuals (Jerome, Frantino, & Sturmey, 2007; Seward, Schuster, Ault, Collins, & Hall, 2014; Wall, Gast, & Royston, 1999), teaching of such skills in schools is limited to activities such as physical education and sports, reading, playing musical instruments, singing, or painting. It is assumed that children with intellectual disabilities fulfil their needs to participate in leisure time activities on their own during the time they spend outside of the school. However, it is difficult for children with intellectual disabilities to find opportunities to build social interactions with their peers, and demonstrate age appropriate leisure skills without systematic education (Fetko, Collins, Hager, & Spriggs, 2013; Westling & Fox, 2004).

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Research has shown that children with intellectual disabilities can be taught various games and free time activities such as board games (e.g. chess, bingo, and dominoes; Keogh, Faw, Whitman, & Reid, 1984; Wall & Gast, 1997).; card games (e.g. UNO and Solitaire; Collins, Hall, & Branson, 1997; Fetko et al., 2013; Seward et al., 2014; Wall & Gast, 1997).; games requiring physical activity (e.g. billiards, bowling, darts, golf, and basketball; Tekin-Iftar et al., 2001; Wall & Gast, 1997).; open air activities (e.g. camping, canoeing, and parachute jumping; McAvoy, Smith, & Rynders, 2006; Yalon-Chamovitz & Weis, 2008).; and leisure time activities (e.g. listening to music, watching television, painting, photography, using computers or tablets, and surfing the Internet; Acungil, 2014; Chan, Lambdin, van Laarhoven, & Johnson, 2013; Collins, Hall, & Branson, 1997; Dollar, Fredrick, Alberto, & Luke, 2012; Edrisinha, O'Reilly, Choi, Sigafoos, & Lancioni, 2011; Jerome, Frantino, & Sturmey, 2007; Kagohara et al., 2011; Wall & Gast, 1997). These studies report that response prompting procedures such as simultaneous prompting, constant time delay, and least-to-most prompting as well as video modeling and video prompting have been effective in teaching leisure skills (Chan et al., 2013; Edrisinha et al., 2011; Kagohara et al., 2011).

Video prompting (VP), a variation of video modeling (VM), is conducted by showing a video clip of a single step from the video of the target skill performed by a model, then allowing the participant perform the step, and re-playing the video clip, when required, or proceeding onto the next clip (Mechling, 2005; Öncül & Yücesoy-Özkan, 2010). While the entire video tape-from beginning to the end-is shown to the individual in VM a video clip of a single step is shown to the individual in VP. In VP, each step of the skill to be taught is recorded as an individual clip. The child watches the clip of the first step and then performs the step. Once the first step of the skill is completed, he/she watches the second step, and performs the second step. This process continues until all the steps of the skill are completed (Bennett, Gutierrez, & Honsberger, 2013; Cannella-Malone et al., 2011; Chan et al., 2013). Depending on the characteristics of the children and facilities of the setting, different technological devices might be selected to play the VP when using this strategy in educational settings. Non-portable devices such as televisions (Graves, Collins, Schuster, & Kleinert, 2005), DVD players (Mechling, Gast, & Fields, 2008), and projection devices (Cihak, Alberto, Taber-Doughty, & Gama, 2006), as well as portable devices such as laptops (Aykut, Dağseven-Emecen, Dayı, & Karasu, 2014; Mechling, Ayres, Foster, & Bryant, 2013), tablets (Bennett et al., 2013; Kaya, 2015), media players (Cannella-Malone, Brooks, & Tullis, 2013; Chan et al., 2013), and smartphones (Bereznak, Ayres, Mechling, & Alexander, 2012) may be used to provide VP. In recent years, portable devices are more commonly preferred for instruction as they can be easily transported between different environments, do not require adult assistance, and can be easily accessed in social settings (Gardner & Wolfe, 2013; Kaya, 2015). In addition to the advantages of portable technological devices, they also have disadvantages such as not being economical, training requirements for use, and usually having to work with a cord. However, it has been noted in the literature that children with intellectual disabilities might have difficulty in recognizing relevant stimulus or noticing some details of the video clips due to the small screens of portable devices, media players, and smartphones in particular, and the video clips on larger screens can be used as effective tools to promote imitation as they do not have the disadvantages of the small screens (Cannella-Malone, Wheaton, Wu, Tullis, & Park, 2012; Miltenberger & Charlop, 2015).

Research has shown that different technological devices are effective for providing VP in teaching different skills (Bereznak et al., 2012; Canella-Malone et al., 2012); however, all these devices have strengths as well as limitations (Kaya, 2015). Considering strengths and limitations of the technological devices, it is necessary to conduct studies that compare the effectiveness and efficiency of VP provided through different technological devices (Cannella-Malone et al., 2012). Although there is not any study in the literature, comparing the effects of screen sizes when using VP, there are several studies which compare the effectiveness of screen sizes when using VM. The results of these studies are mixed. In a study conducted by Mechling and Youhouse (2012), the effects of screen sizes of a personal digital assistants and laptop computer were examined when using VM to teach fine motor skills to

two group children with autism spectrum disorder and intellectual disabilities. The results showed that there are no significant differences in performing skills between the two groups in terms of the screen sizes of devices. While all children with autism spectrum disorder and a child with intellectual disability displayed equal performance using both screens, two children with intellectual disabilities displayed better performance using the device with larger screen, and a child with intellectual disability displayed better performance using the device with smaller screen. In a replication study, Mechling and Ayres (2012), compared screen sizes of personal digital assistants and a laptop computer when using VM for teaching fine motor skills to adults with autism spectrum disorder. The results showed that the performance of the adults was higher when using device with larger screen than smaller screen. In the third study (Miltenberger & Charlop, 2015), the effect of VM was compared using a tablet and television when teaching play and communication skills to children with autism spectrum disorder. The findings indicated that VM on the television (larger screen) provided somewhat faster acquisition of skills than VM on the tablet (smaller screen).

As stated above, there are several studies which compare the effectiveness of screen sizes of different devices such as personal digital assistants, tablets, laptop computers, and televisions when using VM for teaching different skills to children and adults with autism spectrum disorder and intellectual disabilities. However, the literature does not contain any study comparing the effects of screen sizes of different devices when using VP. Therefore, it is necessary to conduct studies to compare the effects of screen sizes of different devices when using VP (Cannella-Malone et al., 2012). On the basis of this need, the purpose of this study is to determine whether VP differs when provided on tablet compared with smartphone in terms of effectiveness and efficiency in teaching leisure skills to children withintellectual disabilities, which types of errors exhibited by participants in the probe sessions, and the opinions of the mothers on the social validity of the study.

Method

Participants

Children. Four children with mild to moderate intellectual disabilities, aged between 5 and 6 years old participated in the study. All children received ongoing part-time group special education in a research center (segregated) in weekdays. In addition, all children received one-to-one supportive special education services 2 hours a week. Two of the children also attended to a preschool classroom on a half-day basis. Participating children were required to have the following prerequisite behaviors: (a) participating in activities for at least 5 min, (b) following verbal instructions, (c) imitating motor behaviors, and (d) watching the video clip for 1 min. In order to determine whether the children met prerequisite behaviors, they were provided with verbal instructions such as “Paint.”, “Do this.”, “Imitate.” or “Watch the cartoon.” and observed to see whether they were able to participate in activities for at least 5 min, follow verbal instructions, imitate motor behaviors, and watch a video clip for 1 min. All four children met the prerequisite behaviors. Furthermore, the second author, classroom teacher of the children, confirmed the children’s ability to meet the prerequisite behaviors. As daily class instruction is performed by the means of an interactive whiteboard, smartphone, or tablet all the children are familiar with video-based instruction. All names of the participants have been changed in order to maintain their anonymity. Table 1 presents child characteristics and assessment results.

Bulut was a 66-months-old boy diagnosed with moderate intellectual disability. His WISC-R’s verbal score, performance score, and overall scores were 43, 47, and 43, respectively. He could throw and catch a ball, hop on one foot or both feet, and climb up the stairs using one foot or both feet. He was able to paint within the lines and cut out and past shapes using scissors and glue. Bulut was able to follow instructions that refer to two actions and consist of four words and express himself with sentences composed of two words. He could name the objects around him, recite the days of the week and the seasons, and count rhythmically from 1 to 20.

Table 1.
Characteristics and Assessment Results of Participants

Demographic Information					**WISC-R**		
Name	Age	Gender	Diagnose	Ethnicity	VS	PS	OS
Bulut	66 m	Male	Moderate intellectual disabilities	Turkish	43	47	43
Ata	67 m	Male	Down Syndrome	Turkish	52	47	46
Irmak	68 m	Female	Mild intellectual disabilities	Turkish	56	61	55
Murat	81 m	Male	Down Syndrome	Turkish	43	55	46

VS: Verbal Score; PS: Performance Score; OS: Overall Score

Ata was a 67-months-old boy with Down syndrome. His WISC-R's verbal score, performance score, and overall scores were 52, 47, and 46, respectively. He could throw and catch a ball, hop on one foot or both feet, run, play with a ball, and climb up and down the stairs using one foot or both feet. He was able to paint within the lines, cut out and past shapes using scissors and glue, and draw horizontal, vertical, and diagonal lines. Ata was able to follow instructions that refer to three actions and consist of six words, and express himself with sentences composed of four words. He could name the objects around him, recite the days of the week, and count rhythmically from 1 to 20.

Irmak was a 68-months-old girl diagnosed with mild intellectual disability. Her WISC-R's verbal score, performance score, and overall scores were 56, 61, and 55, respectively. She could throw and catch a ball, walk straight and laterally on a balance board, and tricycle. She was able to tie shoelaces, pain within the lines, and draw horizontal, vertical, and diagonal lines. Irmak was able to follow instructions that refer to three actions and consist of six words and express herself with sentences composed of four words. She could recite the days of the week, count rhythmically from 1 to 30, identify the members of the family, name vegetables and fruits, describe occupations and related tasks, and match animals with their habitats.

Murat was an 81-months-old boyt with Down syndrome. His WISC-R's verbal score, performance score, and overall scores were 43, 55, and 46, respectively. He could climb up the stairs, hop on one foot or both feet, throw and catch a ball, and grasp and lift objects with one or two hands. He could cut and paste, paint within the lines, cut out shapes using scissors, and draw diagonal and straight lines. Murat was able to follow instructions that refer to two actions and consist of three words and express himself with sentences composed of two words. He could recite the days of the week and the seasons and count rhythmically from 1 to 15.

Model. A peer model with typical development was chosen to appear in the VP. The model was a 7-year-old male in second grade. The peer model was preferred because of his similar characteristics to participants, modeling experience, competency in motor skills, and volunteering. Before the preparation of the VP, the model rehearsed the steps of bowling and golf, and then took part in the preparation of the VP by performing the steps of both skills. As the VP was prepared using third person perspective, the model was completely visible in the video clips. No narration was used to express the steps of the skill.

Mothers. Social validation data were obtained from the mothers (aged between 30 and 43; *M*=38) of the participants through subjective evaluation. One mother was a primary school graduate, two were high school graduates, and the other had an associate degree.

Instructor and observer. All sessions of the study were conducted by the second author who was the classroom teacher of participating children. The inter-observer agreement (IOA) and treatment integrity (TI) data were collected by the third author a doctoral student in special education.

Setting

All sessions were conducted in the research center where the children were attending, on weekdays between 1pm-5pm, by means of one-on-one instructional design. The classroom was 4m x 5m and the floor was carpeted. The smartphone and tablet were brought to each session and held by the instructor when showing the

Table 2.
Task Analyses of Playing Bowling and Golf

Step	Bowling	Step	Golf
1.	Takes the first pin out of the box and puts it on the last line.	1.	Takes the ball out of the golf bag.
2.	Takes the second pin out of the box and puts it on the last line.	2.	Puts the ball on the start line.
3.	Takes the third pin out of the box and puts it on the last line.	3.	Takes the golf club out of the golf bag.
4.	Takes the fourth pin out of the box and puts it on the middle line.	4.	Goes behind the start line.
5.	Takes the fifth pin out of the box and puts it on the middle line.	5.	Bends till the golf club touches the floor and hits the ball with the golf club.
6.	Takes the sixth pin out of the box and puts it on the first line.	6.	Tries to complete the hole in three strokes.
7.	Takes the ball out of the box.	7.	Takes the flag out of the golf bag when the hole is completed.
8.	Goes behind the start line.	8.	Puts the flag into the flag hole.
9.	Bends forward and rolls the bowl toward the pins.	9.	Returns back to the start line.

video clips to the children. The camera was mounted on a tripod and placed in a corner of the classroom. During the training sessions, the instructor and child stood side by side and watched the video clip played by the instructor. While the children performed the steps of the skill in baseline, probe, and maintenance sessions, the instructor observed them from a distance and approached the children upon their completion of the steps to provide verbal reinforcement for their participation.

Materials

Six pins in different colors (25cm x 5cm), a bowling ball (8cm x 8cm), and colored plastic tape were used for the bowling activity, while a golf club (55cm), golf ball, flag, golf bag (45cm), golf carpet, and colored plastic tape were used for the golf activity. Colored plastic tape was applied to the carpet to indicate where to place the pins and roll the bowling ball for the bowling activity, and to show the start line for the golf activity. An iPad Air 2 (24cm x 16,9cm) and iPhone 5 (12,3cm x 5,8cm) were used for displaying VP. The following process was followed for the preparation of the VP. Task analysis of bowling and golf skills were written (Table 2), examined, and re-arranged by two specialists. The skills were described by the researcher to the peer model thoroughly, and the peer model performed the skills until he had mastered them. While the peer model performed the skills, he was recorded until the best sample of each step was obtained. Then, video clips were prepared for VP. For bowling, a video prompt of 58 s was prepared including nine steps, ranging from 4 s to 8 s in length. For golf, a video prompt of 53 s was prepared including nine steps, ranging from 3 s to 14 s in length.

Experimental Design

An adapted alternating treatments design replicated across four children was used in the present study (Sindelar, Rosenberg, & Wilson, 1985). The dependent variables of the study were the bowling and golf playing and independent variable was VP provided with a tablet (large screen) and smartphone (small screen). For bowling, Bulut and Ata were instructed through VP shown on the smartphone, whereas Irmak and Murat were taught using VP shown on the tablet. For golf, Bulut and Ata were instructed through VP shown on the tablet, whereas Irmak and Murat were instructed through VP shown on the smartphone. Experimental control was demonstrated as the change occurring for an independent variable at the tendency or level of a related dependent variable was faster than the change occurring for another independent variable at the tendency or level of a related dependent variable (Sindelar, Rosenberg, & Wilson, 1985).

Procedures

Baseline sessions. In the baseline sessions, children were introduced to the setting once the setting and materials were been prepared. First, the child's attention was captured, and then the target

stimuli of "Play bowling/golf." was given as soon as they paid attention. Each child was allowed 10 s to start the first step of task analysis. The responses were recorded in the data collection form as a correct response (+) if the child performed the first step of task analysis correctly, and as an incorrect response (-) if the child performed the first step incorrectly or did not perform at all. Single opportunity technique was used for data collection. If the child's response is wrong, or he/she did not respond at all, the session was ended after thanking him/her for their participation. Once four stable data points were obtained from the baseline sessions, we proceeded with the training sessions.

Training sessions. In the training sessions, bowling and golf playing skills were taught by VP shown on a smartphone and tablet. Training sessions for the VP using both devices were delivered in the same way. The only difference between the two sessions was that VP was provided through a different technological device in terms of screen sizes. Training sessions were repeated until the children performed 100% correct responses for the skills in three consecutive sessions.

In the training sessions, children were introduced to the setting once the setting and materials were prepared. Once children's attention was secured, the video clip for the first step of the related skill was started on the tablet or smartphone. When the video clip was started, a target stimulus of "Watch." was given to the child, and he/she was expected to watch the video clip. If the child was distracted during this process, he/she was reinstructed to watch. Upon the completion of the video clip, the child was instructed to perform the step by the instructor's command, "Do the same." In addition, the child was expected to start the step within 10 s flowing the instruction and complete it within 30 s. Once the first step was completed, the video clip for the second step was started, and the child was expected to watch the video clip and perform the step. This process was continued until all the steps were completed. When the child performed the step incorrectly or was unable to finish within the specified time, he/she was asked to re-watch the video clip of that step. When the child performed the step incorrectly or was unable to finish within the specified time for the second time, that step was performed by the instructor out of sight of the child, and the video for the next step was shown to the child. During the training session, no prompts, feedback or reinforcement were given to the children apart from the VP; however, their participation was positively reinforced by thanking them at the end of the session.

Probe sessions. Throughout the study, probe sessions were carried out after each training session in order to see whether the children had learned the skills that were taught. Probe sessions were conducted in the same way as the baseline sessions. In the probe sessions, the children were introduced to the setting once the setting and materials were prepared. First, the child's attention was captured, and then the target stimuli of "Play bowling/golf." was given as soon as he/she paid attention. Each child was allowed 10 s to start the first step of task analysis and the responses were recorded in the data collection form as a correct response (+) if the child performed the first step of task analysis correctly, and as an incorrect response (-) if the child performed the first step incorrectly or did not perform at all. Single opportunity technique was used for data collection. If the child gave the wrong response, or did not respond at all, the session was ended after thanking the child for his/her participation. During the probe sessions, no prompts, feedback, or reinforcement were given to the children apart from the VP; however, their participation was positively reinforced by thanking them at the end of session.

Maintenance sessions. Maintenance sessions were conducted to determine if the children maintained the skills they learned during the training. Maintenance sessions were held 2, 4, and 9 weeks after the end of the training and conducted in the same way as the baseline sessions. During the maintenance sessions, no prompts, feedback, or reinforcement was given to the children apart from the VP; however, their participation was positively reinforced by thanking them at the end of session.

Data Collection and Analysis

Effectiveness. In the current study, task analysis records were kept for collecting effectiveness data. The percentage of correct responses was calculated using

the formula "(Number of correct steps/Total number of steps) x 100" and transposed into a graph. The data processed on the graph were analyzed using visual analysis and effect size calculation. Visual analysis is based on investigation the level, trend, and stability in a phase and between successive phases (Kazdin, 1982); the effect sizes were calculated using Tau-*U* (Parker, Vannest, Davis, & Sauber, 2011, Rakap, 2015; Rakap, Yücesoy-Özkan, & Kalkan, 2018) and Nonoverlap All Pairs (NAP; Parker & Vannest, 2009; Rakap et al., 2018). The Tau-*U* and NAP estimates were calcualated using an online calculator at http://www.singlecaseresearch.org/ (Vannest, Parker, Gonen, & Adiguzel, 2016).

Efficiency. Efficiency data were collected about the number of sessions, the number of errors, training time, probe time, and total time required to meet criterion for VP provided with a smartphone and tablet. In this repsect, the number of sessions and errors, training time, probe time, and total time required to meet criterion were recorded. When the children met the criteria, the efficiency data were analyzed descriptively.

Error pattern analysis. In order to determine the error patterns of the children, data were collected in probe sessions. The number and types of errors (duration, sequence, and topographical error) made by children in probe sessions were recorded. When the children met the criteria, the error pattern was analyzed descriptively.

Social validation. To collect social validaty data, the mother's of participating children were asked about the importance of the study purposes, the acceptability of interventions, and the significance of the results (Kazdin, 1982; Schwartz & Baer, 1991). Video clips of the baseline, training, and probe sessions where the children met the criterion related to both dependent variables were shown to the mothers after all sessions were completed. The mothers were then asked to respond to questions based on these video clips. A social validty questionnaire and two open-ended questions was used to collect the data. Data were analyzed quantitatively by the first and the second author through descriptive analysis. The inter-rater agreement was

calculated using the following formula: "[Agreement / (Agreement + Disagreement) × 100] (Erbaş, 2012). The inter-rater agreement was 100%.

Reliability. IOA data were collected in at least 30% of all sessions during the study. IOA was calculated using the following formula: "[Agreement/(Agreement + Disagreement) × 100]" (Erbaş, 2012; Kazdin, 1982). Accordingly, IOA percentages for bowling skills were 100%, 99%, and 100% in baseline, probe, and maintenance sessions, respectively. For golf skills, the IAO were 100%, 98%, and 94% in baseline, probe, and maintenance sessions, respectively.

TI data were collected in at least 30% of all sessions during the study. TI was calculated using the following formula: "[(Observed instructor behavior/Planned instructor behavior) × 100]" (Billingsley, White, & Munson, 1980). In baseline, probe, and maintenance sessions, treatment integrity data were collected for the following instructor behaviors: (a) preparing/controlling the materials, (b) securingthe child's attention, (c) providing target stimuli, (d) waiting for the response interval, (e) waiting for the completion of the skill step in the case of a correct response or ending the session in the case of an incorrect response, and (f) positively reinforcing (by thanking) participation at the end of the session. In training sessions, treatment integrity data were collected for the following instructor behaviors: (a) preparing/controlling the materials, (b) securing the child's attention, (c) providing target stimuli, (d) starting the video clip, (e) waiting for the period of watching the video clip, (f) waiting during the response interval for starting the skill step, (g) waiting for the completion of the skill step in the case of a correct response or re-showing the video in the case of an incorrect or no response, (h) showing the next video clip once the skill step was completed or performaning the skill step out of the child's sight after the second incorrect response, (i) ending the session once all steps were completed, and (j) positively reinforcing participation at the end of the session. Treatment integrity data was found to be 100% for all behaviors across all sessions.

Results

Effectiveness

Bulut demonstrated 0% correct and stable response during baseline. There was no variability or trend (increasing or decreasing) in the baseline. After the presentation of VP provided with smartphone, level of Bulut's correct response was 0% during first two probe sessions. Starting with the third probe session, level of his correct response increased to 55, 88, 100, 100, and 100% respectively. An increasing trend was observed during this condition. It took seven training sessions to reach the criterion level (100% correct response for three consecutive sessions) for VP provided with smartphone. After the presentation of VP provided with tablet, level of Bulut's correct response was 0% during first four probe session. Starting with the fifth probe session, level of his correct response increased to 25, 50, 100, 100, and 100% respectively. An increasing trend was also observed during this condition. It took nine training sessions to reach the criterion level (100% correct response for three consecutive sessions) for VP provided with tablet. During the maintenance sessions carried out 1, 4, and 9 weeks after training completed, Bulut's correct response was 100% for both VP. The effect sizes estimated by comparing baseline and training data were 0.71 (Tau-*U*) and 0.85 (NAP) for VP provided with smartphone; 0.55 (Tau-*U*) and 0.77 (NAP) for VP provided with tablet (Table 3).

Ata demonstrated 0% correct and stable response during baseline. There was no variability or trend (increasing or decreasing) in the baseline. After the presentation of VP provided with smartphone, level of Ata's correct response was 0% during first probe session. Starting with the second probe session, level of his correct response increased to 22, 22, 11, 22, 44, 100, 100, and 100% respectively. An increasing trend was observed during this condition. It took nine training sessions to reach the criterion level (100% correct response for three consecutive sessions) for VP provided with smartphone. After the presentation of VP provided with tablet, level of Ata's correct response was 0% during first four probe sessions. Starting with the fifth probe session, level of his correct response increased to 13, 63, 88, 100, 100, and 100%, respectively. An increasing trend was also observed during this condition. It took 10 training sessions to reach the criterion level (100% correct response for three consecutive sessions) for VP provided with tablet. During the maintenance sessions carried out 1, 4, and 9 weeks after training completed, Ata's correct response was 100% for both VP. The effect sizes estimated by comparing baseline and training data were .88 (Tau-*U*) and .94 (NAP) for VP provided with smartphone; .42 (Tau-*U*) and .71 (NAP) for VPprovided with tablet.

Irmak demonstrated 0% correct and stable response during baseline. There was no variability or trend (increasing or decreasing) in the baseline. After the presentation of VP provided with smartphone, level of Irmak's correct response increased to 13, 63, 88, 88, 100, 100, and 100% respectively. An increasing trend was observed during this condition. It took seven training sessions for VP provided with smartphone to reach the criterion level (100% correct response) for VP provided with smartphone. After the presentation of VP provided with tablet, level of Irmak's correct response increased to 33, 33, 100, 100, and 100% respectively. An increasing trend was also observed during this condition. It took five training sessions to reach the criterion level (100% correct response) VP provided with tablet. During the maintenance sessions carried out 1, 4, and 9 weeks after training completed, her correct response was 100% for both VP. The effect sizes estimated by comparing baseline and training data were 1.0 (Tau-*U*) and 1.0 (NAP) for VP provided with smartphone; 1.0 (Tau-*U*) and 1.0 (NAP) for VP provided with tablet.

Murat demonstrated 0% correct and stable response during baseline. There was no variability or trend (increasing or decreasing) in the baseline. After the presentation of VP provided with smartphone, level of Murat's correct response was 0% during first five probe session. Starting with the sixth probe session, level of his correct response increased to 63, 63, 100, 100, and 100% respectively. An increasing trend was observed during this condition.

It took 10 training sessions for to reach the criterion level (100% correct response for three consecutive sessions) for VP provided with smartphone. After the presentation of VP provided with tablet, level of Murat's correct response was 0% during first six probe session. Starting with

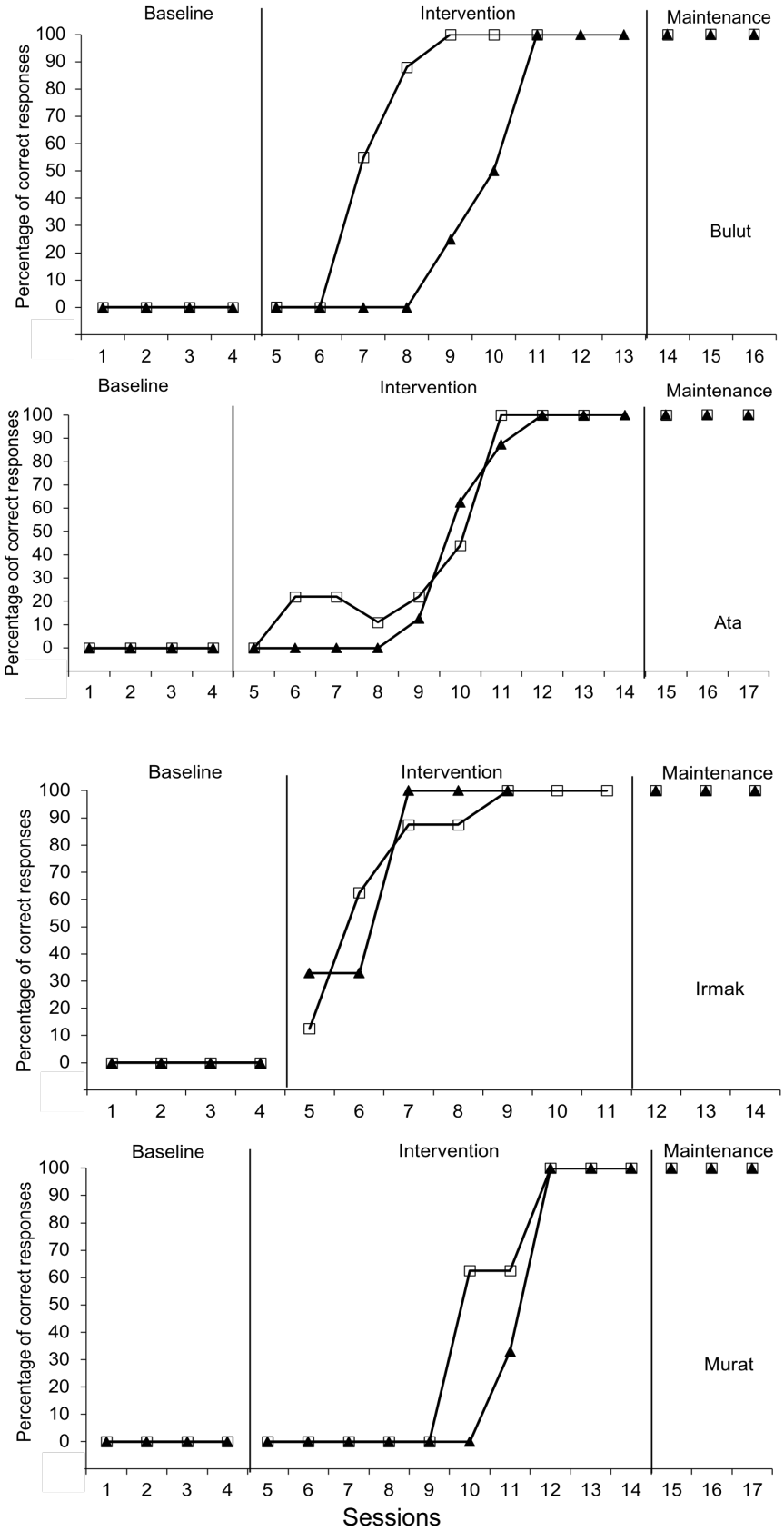

Figure 1.
Percentage of correct responses for VP provided with smartphone (unfilled square) and tablet (filled triangle) for Bulut, Ata, Irmak, and Murat across all sessions.

Table 3.
Effect Size Estimates for VP Provided with Smartphone and Tablet

Child	Tau-U				NAP			
	Smartphone		Tablet		Smartphone		Tablet	
Bulut	0.71	Effective	0.55	Questionable	0.85	Effective	0.77	Questionable
Ata	0.88	Very effective	0.42	Questionable	0.94	Effective	0.71	Questionable
Irmak	1.00	Very effective	1.00	Very effective	1.00	Effective	1.00	Effective
Murat	0.37	Questionable	0.40	Questionable	0.68	Questionable	0.70	Questionable

the seventh probe session, level of his correct response increased to 33, 100, 100, and 100% respectively. An increasing trend was also observed during this condition. It took 10 training sessions to reach the criterion level (100% correct response for three consecutive sessions) for VP provided with tablet. During the maintenance sessions carried out 1, 4, and 9 weeks after training completed, Murat's correct response was 100% for both VP. The effect sizes estimated by comparing baseline and training data were .37 (Tau-*U*) and .68 (NAP) for VP provided with smartphone; .40 (Tau-*U*) and .70 (NAP) for VP provided with tablet.

Figures 1 shows the percentages of correct response of Bulut, Ata, Irmak, and Murat, respectively, across the study sessions and phases. As shown in Figure 1, the percentages of correct response of participants were 0% in baseline sessions. Participants met the criterion by performing 100% after the use of VP by means of the tablet or the smartphone and sustained their performance in the maintenance sessions. Therefore, the results suggest that VP provided on tablet (larger screen) and smartphone (smaller screen) is effective at varying levels (from questionable to very effective) and there is not a significant difference between VP provided on smartphone and tablet.

Efficiency

Data on the number of sessions and errors, and the total training time required by the children to meet the criterion is shown in Table 4 for the VP provided on the smartphone and tablet. For all of the children, in the VP provided via the smartphone, these figures were 33 sessions in total, 21 errors, and 2 hrs., 52 min and 43 s of training time. Meanwhile, in the VP provided via the tablet, the total number of sessions was 34, the number of errors was 22, and the training time was 2 hrs., 40 min, and 20 s. Based on data, we can say that there is no significant difference between the VP provided on the smartphone and tablet in terms of the number of sessions, and errors; however, there is small differences in terms of total time in favor of VP provided via tablet

Error Pattern Analysis

Errors occurred before children met the criterion are shown in Table 5. According to Table 5, 19 errors occurred in the bowling and 24 errors occurred in the golf. Out of the 19 errors that occurred in the bowling, 11 were sequence errors, 6 were duration errors, and 2 were topographic errors. Meanwhile, out of the 24 errors that occurred in the golf, 9 were sequence errors, 9 were duration errors, and 6 were topographic errors. The greatest number of errors (50%) occurred in the first step of both skills.

Social Validation

All mothers answered the first question affirmatively, which asked whether leisure skills are important for children with intellectual disabilities. In the second and third questions, which asked if the mothers liked the use of a smartphone and tablet for teaching their children, three mothers responded affirmatively, while one remained undecided, as she had difficulty in limiting her child's smartphone and tablet use.

For the fourth question, which asked if they would prepare teaching materials by means of a tablet or smartphone, two mothers gave affirmative responses, one responded negatively, and one remained undecided. All mothers responded affirmatively to the fifth and sixth questions, which asked if they liked and were going to use VP, and the seventh and eighth questions, which asked if VP provided via smartphone and tablet were effective. In the tenth question, which asked the mothers to give their preference for either tablet or smartphone in the use of VP, two mothers responded that they preferred tablet, while the other two preferred smartphones. Finally, for the eleventh question asking whether tablet or smartphone are more

Table 4.
Efficiency Data

Child	Independent Variables	Dependent Variables	Number of sessions*	Number of errors*	Training time* (h:min:s)	Probe time* (h:min:s)	Total time* (h:min:s)
Bulut	Smartphone	Bowling	7	4	00:19:01	00:03:37	00:22:38
	Tablet	Golf	9	6	00:30:00	00:07:33	00:37:33
Ata	Smartphone	Bowling	9	6	00:46:35	00:15:20	01:01:55
	Tablet	Golf	10	7	00:43:15	00:07:43	00:50:58
Irmak	Smartphone	Golf	7	4	00:22:25	00:07:55	00:30:20
	Tablet	Bowling	5	2	00:14:32	00:04:24	00:18:56
Murat	Smartphone	Golf	10	7	00:46:47	00:11:03	00:57:50
	Tablet	Bowling	10	7	00:43:30	00:09:23	00:52:53

* … required to meet criteria

effective for VP, three mothers preferred tablet and one opted for smartphone. The mothers found the study positive in general terms, with no negative opinions expressed. According to the results, opinions of the participants' mothers regarding the importance of the purposes, the acceptability of the intervention, and the significance of the results were positive.

Discussion

Rapid developments in technology allow the use of different portable technological devices in presenting VP. VP could be presented with technological devices such as tablets, televisions, laptop computers, and smartphone with different screen sizes. Research has shown that the screen sizes and preferred technological devices influence learning (Miltenberger & Charlop, 2015). The purpose of this study was to compare the effect of VP provided on smartphone and tablet in terms of effectiveness and efficiency on teaching leisure skills to children with intellectual disabilities.

Results of the study show that VP was effective at varying levels (from questionable to very effective) on both the smartphone and tablet on teaching leisure skills to children with intellectual disabilities. Moreover, children sustained acquired skills during the maintenance sessions conducted 1, 4, and 9 weeks after training completed. These results support the findings of previous studies in which leisure skills were taught to children with intellectual disabilities using VP (Chan et al., 2013; Edrisinha et al., 2011). Based on the visual analysis and effect size estimates, VP provided with smartphone was effective or very effective for three children and questionable for the fourth (Murat); VP provided with tablet was effective for a child (Irmak) and questionable for remaining three children. According to these comparative results, it can be concluded that VP on the smartphone (smaller screen) was more effective for three children than the tablet (larger screen) and there was no difference in terms of effectiveness between the VP provided with a smartphone and tablet for the last child. In sum, the findings of the current study indicated that VP provided through smartphone (smaller screen) was more effective.

There are contradictory results in the literature about the effectiveness of screen sizes of technological devices. For instance, Mechling and Youhouse (2012), found that two devices with different screen sizes almost were equally effective but there were small differences for some children individually. On the other hand, the results of two other studies (Mechling & Ayres, 2012; Miltenberger & Charlop, 2015) indicate that the device with larger screen was more effective than smaller screen. Contrary to previous studies, in the current study, it is found that the smaller screen was more effective than the larger screen. These mixed results may be explained by the preferences and characteristics of participants. For instance, while some children prefer the larger screen to differentiate the details, others may prefer smaller screen.

There is no significant difference between the efficiency of VP provided on the smartphone (smaller screen) and tablet (larger screen) in terms of number of sessions and errors; however, VP provided on the tablet (larger screen) was slightly more efficient in terms of total training time. Three of the participants (Ata, Irmak, and Murat) learned the skills provided on tablet

more quickly than provided on smartphone but one of the participants (Bulut) learned more quickly the skill provided on smartphone. In both skills, out of the 43 total errors made by children, 20 were sequence errors, 15 were duration errors, and eight were topographic errors. The greatest number of errors (50%) was seen in the first step of both skills. This could be attributed to the failure to give opportunities to the children in the next steps due to the use of the single opportunity technique in the probe sessions to evaluate the performance of children (Mechling & Ayres, 2012; Mechling & Youhouse, 2012; Miltenberger & Charlop, 2015).

Opinions of the participating children's mothers regarding the importance of the study purposes, the acceptability of the intervention, and the significance of the results were positive. All mothers stated that leisure skills are important for their children and three of mothers satisfied with the use of a smartphone and tablet to teach their children but one mother remained undecided, as she had difficulty limiting her child's smartphone and tablet use. Two mothers stated that they would prepare teaching materials by means of a tablet or smartphone, one responded negatively, and one was undecided. Mother's negative and undecided responses might be resulted from the difficulties they have experienced in using technological devices. As shown in the previous studies teaching staff have more positive opinions about the use of the smaller screen (Mechling & Ayres, 2012; Mechling & Youhouse, 2012). However, in the present study, two of the mothers preferred larger screen and the others preferred smaller screen. Moreover, three mothers stated that larger screen was more effective than the smaller screen. Consequently, these results contribute to the literature by extending the findings of previous studies in which opinions of the teaching staff about the screen sizes of devices was examined.

There are some considerations of this study that should be discussed. The first of these considerations is that although VP provided via smaller screen was more effective than larger screen for three children with intellectual disabilities in this study, in the literature, it has been suggested that it may be difficult for children to notice some details in the video clips played by devices with small screens, (i.e., media players and smartphone), and that children can imitate the skills more easily when they watch video clips on larger screens (Cannella-Malone et al., 2012). However, the results of the current study show that the smaller size of the screen, and thus the technological device with smaller screen could be more effective than technological device with larger screen. In future studies, the use of technological devices with larger screens, such as televisions and interactive whiteboards, and those with smaller screens, such as media players and smartphone, could be compared. The second consideration is that Irmak acquired both skills faster and in a shorter time compared to the other children. This can be attributed to Irmak's higher intelligence score and performance level compared to those of the other children (Mechling & Youhouse, 2012). The third consideration is that three of the children, learned playing bowling in a short time, varying between 5 to 15 min, regardless of the technological device used for playing the VP. Such differences in the performances of the childrens can be attributed to the fact that playing bowling skills consisted of repetitive steps when compared to playing golf.

The current study contributes to the literature in several ways. The first contribution is that although there are several studies comparing the effectiveness and efficiency of VM in devices with different screen sizes, the literature did not contain any studies comparing the effectiveness and efficiency of VP in devices with different screen sizes.

The second contribution is the lack of prompts, feedback, or reinforcements, in addition to VP provided via a smartphone and tablet. Previous studies have used various arrangements or adaptations in addition to VP (Chan et al., 2013; Payne, Cannella-Malone, Tullis, & Sabielny, 2012). However, this obscures the effectiveness of VP by failing to clearly reveal whether the change in dependent variables results from the VP or the other arrangement or adaptation. Therefore, it can be stated that the lack of any prompts, feedback, or reinforcement, apart from the VP in this study, increases the internal validity, strengthening its findings (Kaya, 2015). The third contribution is about the use of portable technological devices in two different types and sizes to play the VP in the study. It is believed that portable devices increase the satisfaction of both the instructor and participants as they can be carried to several

Table 5.
Error Patterns for Children During Probe Sessions

Child	Bulut		Ata		Irmak		Murat		
Step of task analysis	Number of errors	Type of error	Number of errors	Type of error	Number of errors	Type of error	Number of errors	Type of error	Total
Bowling									
1	2	Sequence	1	Topographic			6	Duration	9
2			1	Sequence					1
3			3	Sequence					3
4					2	Sequence	1	Topographic	3
5			1	Sequence					1
6	1	Sequence							1
7									
8									
9	1	Sequence							1
Total	4		6		2		7		19
Golf									
1	4	Duration	4	Sequence			5	Duration	13
2			1	Sequence	1	Topographic			2
3	1	Sequence							1
4									
5									1
6	1	Sequence							
7			1	Sequence	1	Topographic	2	Topographic	4
8									
9			1	Sequence	2	Topographic			3
Total	6		7		4		7		24

DOI: 10.20489/intjecse.454433

settings easily, are user-friendly, easily accessible, and preferred by the children. Portable devices can be convenient to be used in video-based instruction in community as well (Mechling & Ayres, 2012). This affected the social validity of the study positively, making a further contribution to the literature (Cannella-Malone et al., 2012; Chan et al., 2013; Gardner & Wolfe, 2013). The fourth contribution is related to social validity data collected from the mothers of participants who are the indirect consumers of intervention. In the previous studies comparing the screen sizes of technological devices (Mechling & Ayres, 2012; Mechling & Youhouse, 2012; Miltenberger & Charlop, 2015), social validity data were collected from teaching staff and therapists. Thus, this study differs from previous studies due to social validity and it contributes to the literature by expanding previous findings. The fifth contribution is the decision to teach leisure skills in the study. Given that participation in leisure activities is a fundamental human right and an important indicator of life quality, and that children with intellectual disabilities can only participate in such activities at a limited level, the study contributes to the literature in terms of improving the life quality of children with intellectual disabilities (Westling & Fox, 2004; Yalon-Chamovitz & Weiss, 2008). The last contribution is that the specified leisure skills to be taught were selected from among skills that require active participation, rather than skills that require passive participation, such as listening to music or watching television (Shivers, 2000).

Aside from its strengths, the current study has some limitations. The first limitation is that VP provided in the present study was instructor-directed rather than self-directed, as participating children are very young and the skills taught were not suitable for self-direction. As self-directed VP would increase the children's participation and contribute to the development of independence, the effectiveness of self-directed VP could be examined or self-directed VP and instructor-directed VP could be compared. The second limitation is that social validity data were not collected from the children who were the direct consumers of intervention. In the current study, we did not ask children for their preferences about the type and size of devices before and after intervention. However, in order to strengthen social validity data, it is very important to determine the preferences and views of direct consumers about intervention. So, in the future studies, the preferences and opinions of the participants could be addressed before and after the intervention.

Conclusion

Children with intellectual disabilities fulfill their needs to participate in leisure time activities on their own however, it is hard for children with intellectual disabilities to meet these needs without systematic instruction. In the current study, leisure skills to children with intellectual disabilities were taught through VP displayed by a smartphone and tablet. According to the results, VP provided via device with smaller screen was more effective than device with larger screen. There was no significant difference between the efficiency of VP provided on the smartphone and tablet in terms of number of sessions and errors. However, VP provided on the tablet was slightly more efficient in terms of total training time. In addition, the most common errors in probe sessions were sequence and duration errors, and the opinions of the participants' mothers regarding the social validity of the study were positive. As a results, smartphones or tablets can be used to deliver VP to teach leisure time skills to children with intellectual disabilities.

References

Acungil, A. T. (2014). *Effectiveness of tablet computer instruction programs presented via audio-visual technologies on teaching the use of tablet to students with intellectual disabilities.* Unpublished master's thesis. Anadolu University Institute of Educational Sciences, Eskişehir. Obtained from https://tez.yok.gov.tr/UlusalTezMerkezi/

Aykut, Ç., Dağseven-Emecen, D., Dayı, E., & Karasu, N. (2014). Teaching chained tasks to students with intellectual disabilities by using VP in small group instruction. *Educational Science: Theory and Practice, 14*, 1082-1087.

Bennett, K. D., Gutierrez, A., & Honsberger, T. (2013). A comparison of VP with and without voice-over narration on the clerical skills of adoles-

cents with autism. *Research in Autism Spectrum Disorders*, *7*, 1273-1281.

Bereznak, S., Ayres, K. M., Mechling, L. C., & Alexander, J. L. (2012). Video self-prompting and mobile technology to increase daily living and vocational independence for students with autism spectrum disorders. *Journal of Developmental and Physical Disabilities*, *24*, 269-285.

Billingsley, F. F., White, O. R., & Munson, R. (1980). Procedural reliability: A rationale and an example. *Behavioral Assessment*, *2*, 229-241.

Cannella-Malone, H. I., Brooks, D. G., & Tullis, C. A. (2013). Using self-directed VP to teach students with intellectual disabilities. *Journal of Behavioral Education*, *22*, 169-189.

Cannella-Malone, H. I., Fleming, C., Chung, Y. C., Wheeler, G. M., Basbagill, A. R., & Singh, A. H. (2011). Teaching daily living skills to seven individuals with severe intellectual disabilities: A comparison of VP to VM. *Journal of Positive Behavior Interventions*, *13*, 144-153.

Cannella-Malone, H. I., Wheaton, J. E., Wu, P., Tullis, C. A., & Park, J. H. (2012). Comparing the effects of VP with and without error correction on skill acquisition for students with intellectual disability*. Education and Training in Autism and Developmental Disabilities, 47*, 332-344.

Chan, J. M., Lambdin, L., van Laarhoven, T., & Johnson, J. W. (2013). Teaching leisure skills to an adult with developmental disabilities using a VP intervention package. *Education and Training in Autism and Developmental Disabilities, 48*, 412-420.

Cihak, D., Alberto, P. A., Taber-Doughty, T., & Gama, R.I. (2006). A comparison of static picture prompting and VP simulation strategies using group instructional procedures. *Focus on Autism and Other Developmental Disabilities, 21,* 89-99.

Collins, B. C., Hall, M., & Branson, T. A. (1997). Teaching leisure skills to adolescents with moderate disabilities. *Exceptional Children*, *63*, 499-512.

Dollar, C. A., Fredrick, L. D., Alberto, P. A., & Luke, J. K. (2012). Using simultaneous prompting to teach independent living and leisure skills to adults with severe intellectual disabilities. *Research in Developmental Disabilities*, *33*, 189-195.

Edrisinha, C., O'Reilly, M. F., Choi, H. Y., Sigafoos, J., & Lancioni, G. E. (2011). "Say Cheese": Teaching photography skills to adults with developmental disabilities. *Research in Developmental Disabilities*, *32*, 636-642.

Erbaş, D. (2012). Güvenirlik [Reliability]. In E. Tekin-İftar (Ed.), *Eğitim ve davranış bilimlerinde tek-denekli araştırmalar [Single subject designs in educational and behavioral sciences]* (pp. 109-132). Ankara: Turkish Psychological Association.

Fetko, E. E., Collins, B. C., Hager, K. D., & Spriggs, A. D. (2013). Embedding science facts in leisure skill instruction conducted by peer tutors. *Education and Training in Autism and Developmental Disabilities*, *48*, 400-411.

Gardner, S., & Wolfe, P. (2013). Use of VM and VP interventions for teaching daily living skills to individuals with autism spectrum disorders: A review. *Research and Practice for Persons with Severe Disabilities*, *38*, 73-87.

Graves, T. B., Collins, B. C., Schuster, J. W., & Kleinert, H. (2005). Using VP to teach cooking skills to secondary students with moderate disabilities. *Education and Training in Developmental Disabilities*, *40*, 34-46.

Jerome, J., Frantino, E. P., & Sturmey, P. (2007). The effects of errorless learning and backward chaining on the acquisition of Internet skills in adults with developmental disabilities. *Journal of Applied Behavior Analysis*, *40*, 185-189.

Kagohara, D. M., Sigafoos, J., Achmadi, D., van der Meer, L., O'Reilly, M. F., & Lancioni, G. E. (2011). Teaching students with developmental disabilities to operate an iPod Touch® to listen to music. *Research in Developmental Disabilities*, *32*, 2987-2992.

Kaya, F. (2015). *A comparison of VP with and without voice-over narration on teaching daily life skills to students with autism spectrum disorders.* Unpublished master's thesis. Anadolu University Institute of Educational Sciences, Eskişehir. Obtained from https://tez.yok.gov.tr/UlusalTezMerkezi/

Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings.* New York: Oxford University Press.

Keogh, D. A., Faw, G. D., Whitman, T. L., & Reid, D. H. (1984). Enhancing leisure skills in severely retarded adolescents through a self-instructional treatment package. *Analysis and Intervention in Developmental Disabilities*, *4*, 333-351.

McAvoy, L., Smith, J. G., & Rynders, J. E. (2006). Outdoor adventure programming for individuals with cognitive disabilities who present serious accommodation challenges. *Therapeutic Recreation Journal*, *40*, 182-199.

Mechling, L. (2005). The effect of instructor-created video programs to teach students with disabilities: A literature review. *Journal of Special Education Technology*, *20*, 25-36.

Mechling, L. C., & Ayres, K. M. (2012). A comparative study: Completion of fine motor office related tasks by high school students with autism using video models on large and small screen sizes. *Journal of Autism and Developmental Disorders*, *42*, 2364-2373.

Mechling, L. C., & Youhouse, I. R. (2012). Comparison of task performance by students with autism and moderate intellectual disabilities when presenting video models on large and small screen sizes. *Journal of Special Education Technology*, *27*, 1-14.

Mechling, L. C., Ayres, K. M., Foster, A. L., & Bryant, K. J. (2013). Comparing the effects of commercially available and custom-made VP for teaching cooking skills to high school students with autism. *Remedial and Special Education*, *34*, 371-383.

Mechling, L. C., Gast, D. L., & Fields, E. A. (2008). Evaluation of a portable DVD player and system of least prompts to self-prompt cooking task completion by young adults with moderate intellectual disabilities. *The Journal of Special Education*, *42*, 179-190.

Miltenberger, C. A., & Charlop, M. H. (2015). The comparative effectiveness of portable VM vs. traditional VM interventions with children with autism spectrum disorders. *Journal of Developmental and Physical Disabilities*, *27*, 341-358.

Öncül, N., & Yücesoy-Özkan, Ş. (2010). Teaching the daily living skills to adults with moderate and severe intellectual disabilities using video modelling. *Anadolu University Journal of Social Sciences*, *10*, 143-156.

Parker, R. I., & Vannest, K. J. (2009). An improved effect size for single case research: Nonoverlap of all pairs (NAP). *Behavior Therapy, 40*(4), 357-367.

Parker, R. I., Vannest, K. J., Davis, J. L., & Sauber, S. B. (2011). Combining nonoverlap and trend for single-case research: Tau-U. *Behavior Therapy*, *42*, 284-299.

Payne, D., Cannella-Malone, H. I., Tullis, C. A., & Sabielny, L. M. (2012). The effects of self-directed VP with two students with intellectual and developmental disabilities. *Journal of Developmental and Physical Disabilities*, *24*, 617-634.

Rakap, S. (2015). Effect sizes as result interpretation aids in single-subject experimental research: description and application of four nonoverlap methods. *British Journal of Special Education*, *42*(1), 11-33. doi: 10.1111/1467-8578.12091

Rakap, S., Yücesoy-Özkan, Ş., & Kalkan, S. (2018). *Tek denekli deneysel araştırmalarda etki büyüklüğü hesaplama: Örtüşmeyen veri temelli yöntemlerin incelenmesi.* (In review).

Schwartz, I. S., & Baer, D. M. (1991). Social validity assessments: Is current practice state of the art? *Journal of Applied Behavior Analysis*, *24*, 189-204.

Seward, J., Schuster, J.W., Ault, M. J., Collins, B. C., & Hall, M. (2014). Comparing simultaneous prompting and constant time delay to teach leisure skills to students with moderate intellectual disability. *Education and Training in Autism and Developmental Disabilities*, *49*, 381- 395.

Shivers, J. (2000). Leisure opportunities for persons with disabilities. In A. Sivan & H. Ruskin (Eds.), *Leisure education, community, development and populations with special needs* (pp. 85-93). New York, NY: CABI Publishing.

Sindelar, P.T., Rosenberg, M.S., & Wilson, R.J. (1985). An adapted alternating treatments design for instructional

research. *Education and Treatment of Children, 8*, 67-76.

Tekin-Iftar, E., Kircaali-Iftar, G., Birkan, B., Uysal, A., Yildirim, S., & Kurt, O. (2001). Using a constant delay to teach leisure skills to children with developmental disabilities. *Revista Mexicana de Análisis de la Conducta*. *27,* 337-362.

Wall, M. E., & Gast, D. L. (1997). Caregivers' use of constant time delay to teach leisure skills to adolescents or young adults with moderate or severe intellectual disabilities. *Education and Training in Mental Retardation and Developmental Disabilities*, *32,* 340-356.

Wall, M. E., Gast, D. L., & Royston, P. A. (1999). Leisure skills instruction for adolescents with severe or profound developmental disabilities. *Journal of Developmental and Physical Disabilities*, *11*, 193-219.

Westling, D. L., & Fox, L. (2004). *Teaching students with severe disabilities* (3rd Ed.). Upper Saddle River, NJ: Pearson Prentice-Hall, Inc.

Yalon-Chamovitz, S., & Weiss, P. L. T. (2008). Virtual reality as a leisure activity for young adults with physical and intellectual disabilities. *Research in Developmental Disabilities*, *29*, 273-287.