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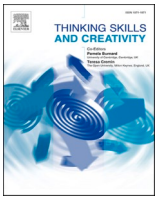

Is video modeling with small group instruction effective? Teaching the skills of using waste materials to individuals with multiple disabilities

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ABSTRACT

Leisure time skills play a crucial role in enhancing the quality of life, social participation, and independence of individuals with multiple disabilities, as they provide meaningful engagement and opportunities for self-expression While some previous studies have focused on teaching leisure skills using video prompting, limited research has explored the use of video modeling combined with waste materials in a small group format. In line with this, this study aims to teach individuals with multiple disabilities the skills of using waste materials using a video modeling with small group instruction. The study involved three participants (ages 11–14) with intellectual disabilities, cerebral palsy, and various health conditions (e.g., epilepsy, etc.). A multiple-probe design across behaviors was used to evaluate video modeling intervention effectiveness. The video modeling sessions were conducted in a small group format, consisting of three students and one practitioner. The effectiveness of the intervention was assessed using visual analysis for PND and an online tool for the statistical analysis of Tau-U effect size. The findings indicated that implementing video modeling in a small group format was effective in teaching the participants of this study how to make a caterpillar from an egg carton, a butterfly using a paper roll, and a tree using pencil scraps. Furthermore, the participants maintained the skills they acquired for 1, 3, and 4 weeks post-intervention and successfully generalized them to different environments and individuals. However, the study is limited by its small number of participants and relatively short follow-up period, necessitating further research to explore long-term effects and broader applicability.

1. Introduction

Leisure time can be defined as the period during which individuals are free from work and responsibilities, engaging in activities that entertain them, facilitate learning, and contribute to their overall happiness (Cohen-Gewerc & Stebbins, 2007; Schulz & Watkins, 2007). However, leisure time is not merely a break from duties and responsibilities; it also encompasses educational, political, social, and health-related activities (Zarotis & Tokarski, 2020). It is stated as an area where individuals plan their lifestyles and daily routines, feel happy and enjoy themselves. Therefore, leisure time has become not only the time individuals have left from work, but also the center of life (Freericks & Brinkmann, 2015). Based on these definitions, leisure time has become important for all individuals with and

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without disabilities (Samara & Loannidi, 2019). However, individuals cannot use this time period, which is significant for every individual, effectively and efficiently (Arslan, 2011).

Spending leisure time doing an activity that individuals like and enjoying mean using this period effectively and efficiently (Çay, 2022). Effective and efficient use of leisure time has positively contributed to both the individual and his/her immediate environment (Kurar & Baltacı, 2014; Süzer, 2000). It helps individuals feel better, have a healthy mood, develop decision-making skills and relieve the individual from distress and stress (Lewis, 2003). How and how individuals with disabilities utilize their leisure time is considered important in terms of their social, cultural, and mental development and quality of life. The participation of individuals with disabilities in leisure time activities, variables related to family and close environment (Georgiadou et al., 2021; Kraemer McIntyre & Blacher, 2003) affect quality of life. Compared to individuals with other disabilities, individuals with multiple disabilities need more support and systematic education. In addition, individuals with multiple disabilities (MD) can acquire new behaviors and skills that can help improve their quality of life (Helps & Herzberg, 2013; Lancioni et al., 2005). For example, previous studies have shown that individuals with MD can use iPads (Helps & Herzberg, 2013) and learn leisure time activities (Kleinert et al., 2007), such as selecting and watching TV programs, playing video tapes, learning computer games, playing card games (Collins et al., 1997) through interaction with typically developing peers. Examples of how leisure skills may contribute to the quality of life for children with disabilities can be observed in studies that have used video prompting to teach functional leisure activities. Graves et al. (2005) demonstrated that students with moderate disabilities could successfully learn cooking skills using video prompting, allowing them to independently use a microwave, stove, and countertop for food preparation. Similarly, Cannella-Malone et al. (2016) found that video prompting was effective in teaching leisure skills such as playing board games, using iPads for recreational purposes, and participating in structured group activities to students with significant disabilities. The findings from both studies indicate that structured leisure skill instruction not only enhances independence and functional skill development but also contributes to overall well-being by promoting meaningful engagement in leisure activities. Therefore, individuals with a child with MD can be encouraged to participate in various leisure activities to support their skill development and overall well-being.

When it comes to leisure time activities, the activities that the individual wants, chooses with his/her own will and does/will do within this period come to mind (Çay & Eratay, 2019). These activities are the activities that the individual chooses with his/her free will, feels happy and gets pleasure when he/she does them (Büküşoğlu & Bayturan, 2005; Leitner & Leitner, 2012; Stebbins, 2005; Sivan & Ruskin, 2000). Individuals with multiple disabilities (MD) can spend their leisure time with various activities (Çay & Eratay, 2019). Activities that provide pleasure and activities that produce products (Çay, 2022) can be given as examples of these leisure time activities. While performing these activities, some individuals with MD may need less help, while others may need more help from their environment (e.g., parents and primary carer) (Mount, 2013).

Individuals with more than one disability and who are severely affected by these disabilities are referred to as individuals with multiple disabilities. During the day, individuals with MD may experience various problems, negative thoughts and stress. Individuals with a child with MD can get rid of the daily troubles of life to some extent by spending their time to the fullest with the leisure time activities they choose. Leisure time activities can help to overcome and reduce these negative situations more easily (Sivan & Ruskin, 2000). In addition, participation in leisure time activities can help individuals with MD to communicate with their social environment and gain self-confidence (Devine, 2016; Gilson & Stacy, 2012; Lundberg et al., 2011; Jessup et al., 2010; Porter et al., 2010). Leisure time activities with multiple benefits can be taught to individuals with MD through one-to-one teaching arrangements, while they can also be taught through small-group teaching arrangements.

Small group instructional arrangement is defined as an instructional arrangement in which at least two children with the same or different learning characteristics are present and similar or different skills are taught (Gürsel et al., 2004). However, small-group teaching is an effective teaching arrangement used in teaching different skills for individuals with different disabilities (Aldemir & Gürsel, 2014; Colozzi et al., 2008; Çattık & Odluyurt, 2017; Ledford et al., 2012). In previous studies (Aldemir & Gürsel, 2014; Aykut et al., 2014; Colozzi et al., 2008; Chai, 2017; Doğan, 2016; Lane et al., 2015; Ledford & Wolery, 2015, 2015; Leaf et al., 2011), it was reported that small group instruction was effective in teaching target skills to individuals with disabilities. Small-group teaching offers several advantages, including reduced costs, increased peer interaction, the ability for teachers to instruct multiple students simultaneously, and opportunities for individuals to learn through observation (Aldemir & Gürsel, 2014; Collins, 2007; GrishamBrown et al., 2006; Mercer & Mercer, 2005). When small-group instruction is structured based on students' similar learning characteristics, it not only fosters an environment that supports the development of social skills but also creates a dynamic learning setting that facilitates the practitioner's work. Moreover, this approach enhances student engagement, allows them to practice their skills in a structured setting, and provides individualized support when needed. Given these advantages, it can be an effective instructional arrangement for practitioners working with students with (MD).

Studies in which skills are taught with a video modeling, including learning by observation, show that individuals learn the skills to be taught and can generalize the skills they have learned (Bellini & Akullian, 2007; Delano, 2007). For example, Sherrow et al. (2016), in their study, taught leisure time skills to individuals with MD using a video modeling. At the end of the study, the participants learnt the target skills to be taught. Aldabas (2023) conducted teaching leisure time activities to individuals with MD via iPad. The participants learnt the target skills at the end of the study and generalized them to different environments and individuals. The fact that it is efficient in terms of time and cost, the required environment can be adjusted easily and quickly, the video can be watched again until the targeted behavior is acquired, teaching can be done with more individuals, the desired features can be added and removed from the video images, and the shots can be repeated as many times as desired (Charlop-Christy et al., 2000). shows that video-model teaching can be used to teach target behaviors to individuals with MD.

Park et al. (2019) argued that the effectiveness of teaching with video modeling in teaching leisure time skills to individuals with MD in addition to daily life skills, education, vocational skills has not been extensively investigated. However, it is seen that the

effectiveness of teaching with video modeling in teaching leisure time skills to individuals with MD using small-group teaching has not been evaluated. In single-subject research, effect size calculations are used to determine the extent to which an intervention is effective on a specific target behavior (Kazdin, 2011). Although various effect size calculation methods have been proposed, percentage of non-overlapping data (PND), which is based on visual analysis (Scruggs & Mastropieri, 1998), and Tau-U calculations, which rely on statistical analyses (Parker et al., 2011), are widely used in the literature. To assess the effectiveness of video modeling implemented in a small-group format in teaching leisure time skills to children with MD, these effect size calculations are necessary. Thus, this study aimed to determine effective practices for teaching leisure time activities to individuals with MD using the video modeling method in a small-group teaching format, calculate the effect size of the video modeling intervention, and contribute to the literature and stakeholders. The results of the study show that the method is effective in using leisure time efficiently by using waste materials. Also it shows that the method can be used in teaching leisure time skills to individuals with disabilities in future studies and under which conditions it should be done. The fact that previous studies did not teach leisure time skills to individuals with multiple disabilities using sustainable and low-cost materials such as leftover products shows that there is a gap in the literature. By conducting such a study, we aimed to fill the gap in the literature.

Small-group instruction combined with video modeling has been shown to be a practical and effective approach for practitioners, particularly special education teachers, who work with multiple students with multiple disabilities (Bellini & Akullian, 2007; Ledford & Wehby, 2015). Small-group teaching provides opportunities for peer modeling, social interaction, and increased engagement, while video modeling enhances skill acquisition and independence by offering consistent, repeatable demonstrations (Charlop et al., 2010). Integrating these two evidence-based strategies may serve as an efficient way to teach leisure time skills to children with MD in school settings, making instruction more structured and adaptable for diverse learning needs. Based on this framework, this study aims to investigate the effectiveness of the video modeling method in small-group teaching of leisure time activities (utilization of waste materials) to individuals with MD. In line with this general purpose, answers to the following research questions were sought:

1. Is the video modeling teaching method effective in teaching leisure time activities to individuals with MD?
2. Does the permanence of the skills taught to individuals with a MD using the video-model teaching method continue after one, three and four weeks?
3. Can individuals with MD generalize the skills taught using the video-model teaching method to different people and different environments?
4. What are the opinions and suggestions of the parents of individuals with MD who participated in this study about the leisure time skills taught and the video modeling used in teaching these skills?
5. What is the effect size of the video modeling intervention implemented in a small-group format in the context of participants?

2. Method

2.1. Participants and setting

Given the importance of internal validity and the need for an effective small-group instructional setting, three students with MD were included in the study. The researchers identified a public school where students with multiple disabilities were educated and where at least three MD students could be reached. Subsequently applications for ethical approval and research permission were submitted. After obtaining ethical approval from the ethics committee for human research in social sciences for this research, the parents of the participants were asked to fill out the parental consent form in writing voluntarily. The participants consisted of two seventh-grade and one eighth-grade students attending a special education class: two male and one female student, all with a history of MD. During this research, the real names of the participants were not used, the participants were given code names, and these code names were used.

The participants consisted of secondary school students who met the following criteria: a) between the ages of 13 and 16; b) intellectual disability accompanied by an additional disability; c) IQ (WISC-V) scores between 40 and 49 d) having hearing and visual ability according to school records and teachers' observations; e) having hand-eye coordination according to teachers' observations and statements; f) having low leisure time activity skills according to teachers' statements. Demographic information about the participants in this study is given in Table 1.

The study was conducted in a special education classroom of a public school, which was the participants' own classroom. There were 10 student desks and tables, two teacher chairs, one smart board, and one teacher's cupboard in the classroom. This study was conducted in a natural classroom setting, enhancing its ecological validity by ensuring that the intervention was implemented in an authentic learning environment. In line with this, the participants' own classrooms, where they continued their education, were chosen as the research setting to further strengthen ecological validity and ensure that the intervention took place in a familiar and

Table 1
Demographic characteristics of the participants.

Participant (Code Name)	Gender	Age	Type of Disability	IQ (WISC-V)
Serkan	Male	13	Moderate intellectual disability, cerebral palsy (Diplegia), epilepsy	49
Selahattin	Male	14	Moderate intellectual disability, cerebral palsy (Diplegia), epilepsy, speech difficulties	41
Nazife	Girl	16	Moderate intellectual disability, cerebral palsy (Hemiplegia), speech difficulties	40

natural learning environment. Special education classrooms often include multiple students with disabilities. Conducting the study in a small-group format aligns with students' daily routines and supports a natural learning environment.

2.2. Research design

In this study, multiple-probe across three behaviors, one of the single-subject research models, was used to evaluate teaching with the video modeling (Ledford & Gast, 2018). In this model, firstly, baseline data are collected in all three cases. When stable data are obtained at the baseline level of the first situation, the intervention session is started. In the other two cases, baseline data are continued to be collected from time to time. When the criterion is met in the intervention sessions of the first case, baseline data are collected until stable data are obtained in the second case. When stable data are obtained, instructional sessions are continued in the second case and baseline data are continued to be collected intermittently in the third case until the first criterion is met. In the third case, when stable baseline data are obtained, intervention sessions are started. In this case, intervention sessions are continued until stable data are obtained (Ledford & Gast, 2018). In this study, experimental control was provided by the increase in the level and trend of the correct responses of the subjects in the first leisure time skill taught with the video modeling, the absence of a significant change in the leisure time skills that were not taught, and the increase of this effect in the other two leisure time skills as the instruction started (Ledford & Gast, 2018). Multiple-probe designs across behaviors are frequently used to assess the effectiveness of interventions aimed at enhancing desirable behaviors. These designs are particularly effective for evaluating academic skills and trial-based, non-reversible behaviors (Ledford & Gast, 2018). In this study, the multiple-probe design was preferred because the target behaviors identified were non-reversible and trial-based, and the model was more suitable for implementation in a classroom setting.

2.3. Dependent and independent variable

The dependent variables of this study were the participants' level of exhibiting the skills of making caterpillars from egg boxes, making butterflies using paper rolls (toilet paper roll) and making trees using pencil scraps. Before determining these skills, the participants were interviewed, and their opinions were taken. As a result of the interviews, the skills were determined by considering the participants' interests, wishes and suggestions. Task analysis of the skills was created by the researchers by observing someone performing the skill. The task analysis was finalized by taking the opinions of three experts working in special education (see Appendices 1, 2, and 3).

Video modeling served as the independent variable in this study, functioning as an instructional strategy to teach targeted leisure skills. In this study, video modeling was selected as the instructional method due to its evidence-based effectiveness in teaching various skills to individuals with disabilities. Research has shown that video modeling enhances observational learning, supports skill acquisition, and increases the likelihood of independent task completion. Additionally, video modeling is considered a practical and cost-effective approach, as it requires fewer resources and less time compared to traditional in vivo modeling methods. The ability to reuse video materials across various settings further contributes to its efficiency and accessibility. Because of these characteristics, video modeling is considered a highly effective approach for individuals with multiple disabilities (Bellini & Akullian, 2007; Charlop-Christy et al., 2000; Hong et al., 2016; Wynkoop et al., 2019; Graetz et al., 2006). Before teaching the leisure time skills targeted to be acquired by individuals with MD, instructional videos of the skills were filmed. The details of the video modelling teaching method are thoroughly explained under the "Intervention sessions" section.

2.4. Materials

Egg cartons, scissors, playful eyes, glue, and colored paints were used to teach the skill of making caterpillars from egg cartons in leisure time activities. In teaching the skill of making butterflies using paper rolls, paper rolls, colored cardboard, playful eyes, glue, and colored paints were used. To teach the skill of making a tree using pencil scraps, A4 paper, glue, pencil scraps, and thin twigs were used. In addition, an smartphone was used to take the images, and a laptop computer was used to show the videos of the target skills to

Table 2
Sample task analyses for leisure skills (Task analysis of making a butterfly from a paper roll).

1.	Place the paper roll on the table.
2.	Apply glue to the entire surface of the roll.
3	Stick the colored paper onto the roll.
4.	Press the colored paper with your hand.
5.	Apply glue to the bottom part of the roll.
6.	Take the pre-cut wing in your hand.
7.	Attach the wing to the glued area.
8.	Press the wing with your hand.
9.	Apply glue to the top part of the roll.
10.	Stick the googly eyes onto the glued area.
11.	Apply glue to the back of the eyes.
12.	Attach the pre-cut antennas to the glued area.
13.	Paint your butterfly in any color you like.

the participants.

Three videos were prepared for the three target behaviors included in the study. A typically developing student who was familiar with the target behaviors participated as an actor in the videos. Each target behavior was demonstrated step by step according to the task analysis (see Table 2), and no additional details were provided beyond the target behavior itself. The videos were recorded using the point of view (POV) technique, showing only the hands of the student acting in the videos. No subtitles or directional cues were included in the video clips. At the beginning of each video, a voice recording of the main stimulus (e.g., "Make a caterpillar") was recorded by the researchers. The length of the prepared videos ranged from 2.52 to 3.01 min.

2.5. Data collection and procedure

The entire implementation process of this study was conducted by the second author, who has teaching experience in the field of special education and a PhD degree in special education. In this study, the implementation process was carried out with three participants with a child with MD. In this process, baseline, intervention, daily probe, generalization and maintenance sessions were included. In the implementation process, all sessions except the intervention sessions were worked one-on-one with the participants. Intervention sessions were carried out with small-group teaching. However, apart from the generalization sessions, the other sessions were conducted in the classroom where the participants were studying. Five working days of the week were worked with the participants, and one intervention session was conducted per day. One trial was included in a session, and the response interval was set as five seconds. In all sessions of this study, three participant responses (correct response, incorrect response and no response) were observed, and these responses were recorded in the data recording form.

2.5.1. Baseline sessions

Data were collected for probe trials in the baseline phase to determine the participants' performance of the skills. While collecting the data, single-opportunity method was used. In the single-opportunity method, the assessment is terminated when the participant responds incorrectly or does not respond to the behaviors in the task analysis. Other steps are recorded as (-) in the data collection form. Before starting the baseline sessions, the environment is made ready by making the environment arrangement. The performances of the participants were evaluated without watching the images prepared for the skills. The skill instruction "Make a caterpillar, make a butterfly, make a tree" was determined as the target stimulus. The first participant, Nazife, was asked, "Now we are going to practise caterpillar making skill with you. Are you ready?" and when any gesture, mimic or sound was taken to show that the participant was ready, the skill instruction was presented and the participant was expected to respond within five seconds. The correct response given by the participant within the specified time was recorded as (+) in the data collection form, and the wrong response or non-reaction behavior was recorded as (-). The session was terminated after the first incorrect response of the participant.

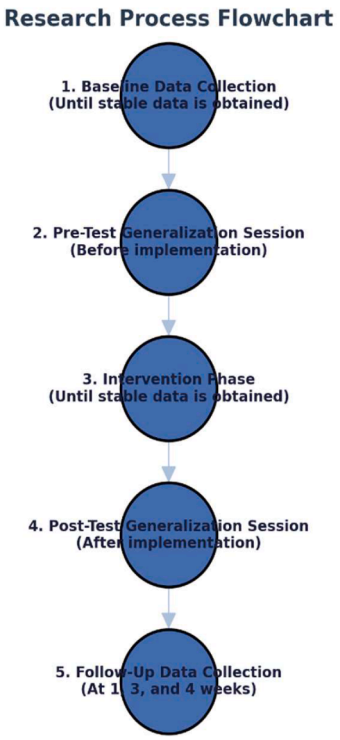

Fig. 1. The above process was implemented identically for each participant and target behavior in accordance with the study's design.

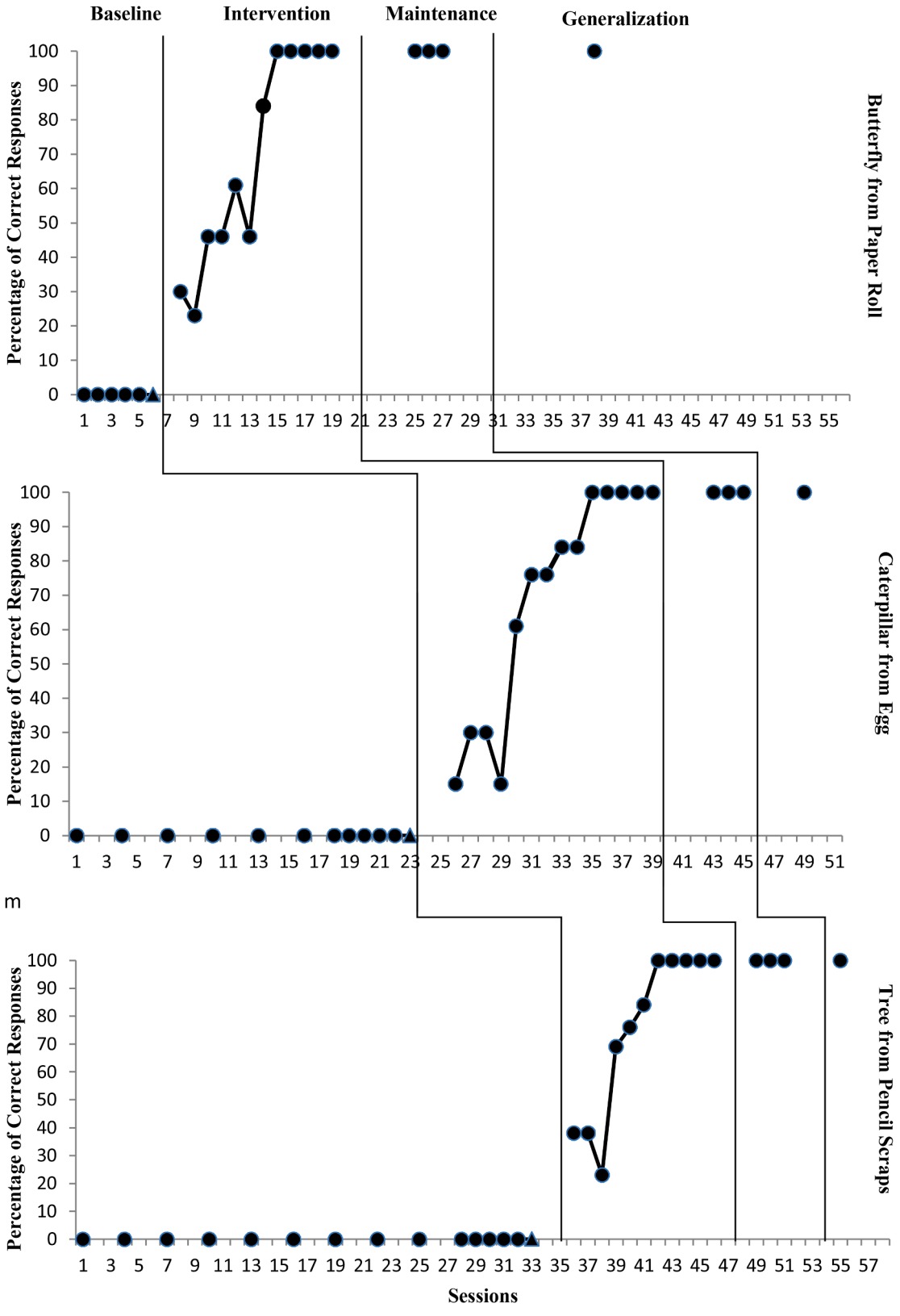

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Fig. 2. Nazife's percentage of responses during baseline, intervention, maintenance, and generalization sessions for the skills of making a butterfly from a paper roll, making a caterpillar from an egg carton, and making a tree from pencil scraps.The triangle data point represents the pre-test data of the generalization session.

With Nazife, baseline data were collected for five consecutive sessions for the first behavior (making a caterpillar), while baseline data were collected for one session each for the second behavior (making a butterfly) and the third behavior (making a tree). When stable data were obtained consecutively for the first behavior, intervention sessions were started, and probe trials were taken every three sessions for the other two behaviors. As soon as the first criterion was met in the first behavior, baseline data were collected until stable data were obtained in the second behavior. In the third behavior, probe trials continued to be taken every three sessions. When the first criterion was met in the second behavior, baseline data were collected until stable data were obtained for the third behavior. Similar processes were followed for the second participant (Selahattin) and the third participant (Serkan) and baseline data were collected.

2.5.2. Intervention sessions

The intervention session of the study was carried out in the form of group instruction with three participants. After obtaining stable data at the baseline level in the first behavior (making a caterpillar) in all three participants, the intervention session took place.

The implementer placed the laptop computer on the table so that the participants could see it. To attract the attention of the participants, he said, "Now we will watch with you how to make a caterpillar from a paper roll. Are you ready?" and after the reactions from the participants, he opened the video of the caterpillar making skill and showed it from beginning to end without any clue. The implementer watched the approximately three-minute instructional video with the participants. The implementer directed the participants to watch the video when necessary. When the participants watched the video appropriately during this time, the watching behavior was verbally reinforced. Then, when the instructional video was over, the implementer switched off the laptop computer. At the end of the instruction, the participants were thanked and reinforced for participating in the study and working harmoniously in the group. When five stable data of 80 % and above were obtained in all three participants, the intervention session of the first situation was terminated. Similar processes were applied in the intervention sessions of the other two conditions (butterfly making and tree making skills). Participants' correct responses were reinforced using verbal reinforcements on a continuous reinforcement schedule.

2.5.3. Daily probe sessions

Daily probe sessions were conducted to determine participant performance for the skill being taught. In the daily probe sessions, the participants were worked one-on-one in order not to affect their performance. Data were collected on the performance of three participants for the skill of making caterpillars. Daily probe sessions were conducted as baseline sessions. Daily probe sessions were continued until the participants obtained five stable data of 80 % and above. Similar processes were followed in the second behavior (making a butterfly) and the third behavior (making a tree) of this study.

2.5.4. Generalization and maintenance sessions

Generalization sessions were conducted to test whether the participants were able to generalize the behaviors they learned about leisure time activities to different people and environments. The generalization sessions of the study were conducted in another special education classroom at the school and in the presence of a special education teacher in a pretest-posttest format. The pretest was conducted before the instruction started and the posttest was conducted after the instruction ended. The generalization sessions were implemented following the same procedure as the baseline and daily probe sessions, with no video footage recorded. Neither instruction nor reinforcement was provided in generalization sessions. Participant performances were verbally reinforced at the end of the sessions (e.g., well done and how well you worked).

Maintenance sessions were conducted to assess the extent to which participants maintained the leisure skills they had acquired over time. Maintenance sessions were conducted in the 1st, 3rd, and 4th weeks after instruction, following the same procedure as the generalization and baseline sessions. Participant performances were verbally reinforced at the end of the sessions, as in the generalization session (Fig. 1).

2.5.5. Interobserver agreement and procedural fidelity data

In this study, two types of reliability data were collected: interobserver agreement and procedural fidelity. These data were collected by a researcher experienced in gathering interobserver agreement and procedural fidelity data in previous single-subject research designs. The observer was informed about the study's topic, purpose, methodology, and data collection process. Interobserver agreement was calculated using the formula "agreement/[agreement + disagreement] X 100" (Alberto & Troutman, 2009). Reliability calculations were made in at least 30 % of the baseline, instruction, maintenance and generalization sessions of the study. In the baseline session, the average percentage of interobserver agreement was 97 %, the average percentage of interobserver agreement for daily assessment sessions was 96 %, the average percentage of interobserver agreement for maintenance sessions was 100 %, and the average percentage of interobserver agreement for generalization sessions was 96 %.

The data collected for the procedural fidelity of this study were calculated using the formula "observed practitioner behavior/planned practitioner behavior X 100" (Alberto & Troutman, 2009). In this study, procedural fidelity data were collected in all sessions (100 %). Interobserver agreement data were collected by another researcher who has experience in delivering instruction with video

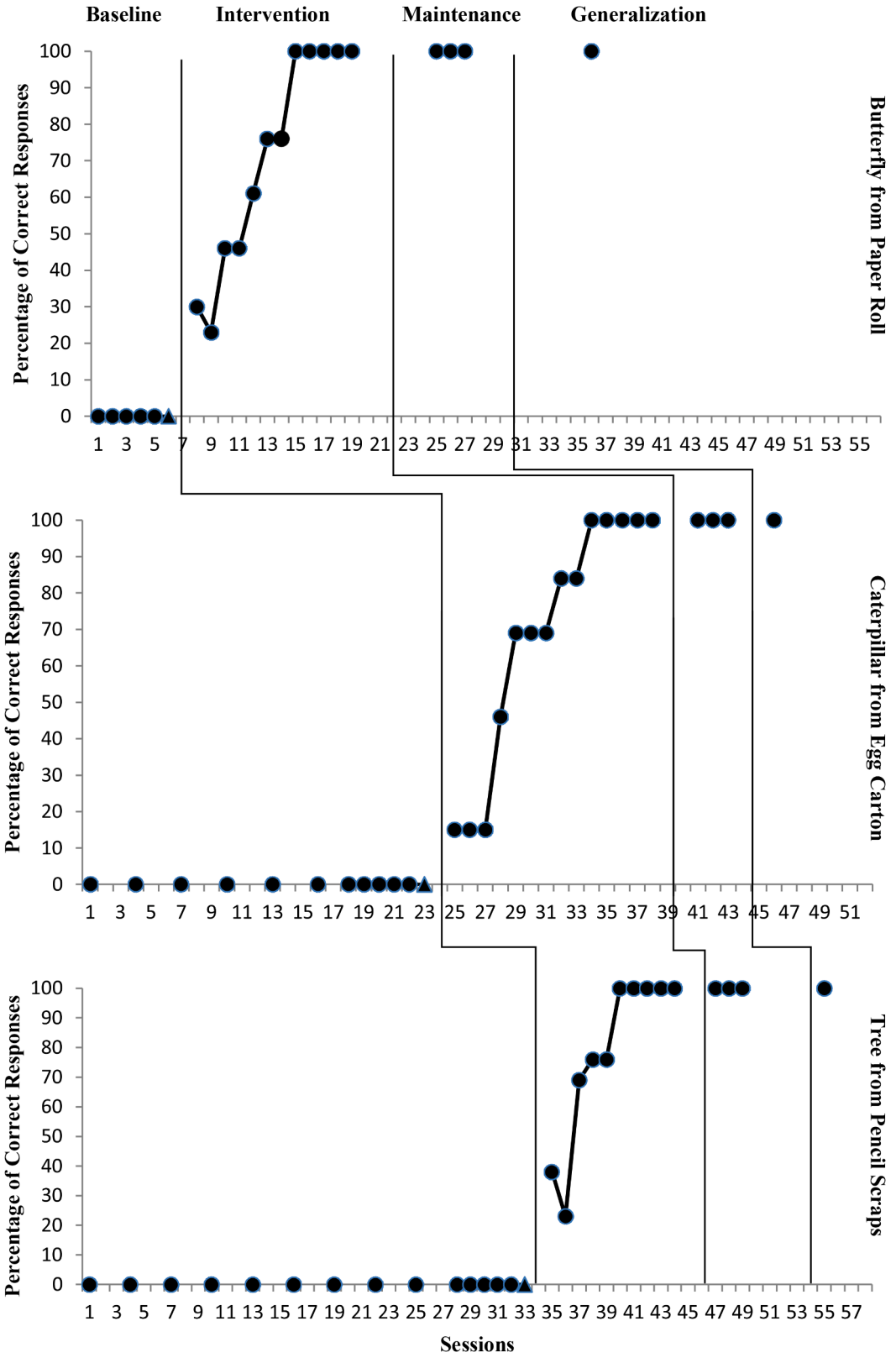

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Fig. 3. Selahattin's percentage of responses during baseline, intervention, maintenance and generalization sessions for the skills of making a butterfly from a paper roll, making a caterpillar from an egg carton, and making a tree from pencil scraps.The triangle data point represents the pre-test data of the generalization session.

modeling and has a PhD in special education. Similar to the first observer, the observer was informed about the study's topic, purpose, methodology, and data collection process. The procedural integrity for all participants was 100 %.

2.5.6. Social validity

Social validity is a critical component of single-case research, as it ensures that the intervention is not only effective but also meaningful and acceptable to stakeholders, such as participants, caregivers, and educators (Wolf, 1978; Kennedy, 1992). Assessing social validity enhances the practical implications of the findings and provides insight into the feasibility of implementing the intervention in everyday life conditions.

In this study, social validity data were collected through semi-structured interviews with the parents of the participants. The aim was to gather their perspectives on the importance of the targeted skills, the appropriateness and effectiveness of the method used, and the significance of the findings obtained. During the data analysis process, frequency and percentage calculations were conducted, and the parents' responses were evaluated and analyzed descriptively.

3. Data analysis

The data were analyzed using graphical analysis. In the prepared graphs, all research sessions were plotted on the horizontal axis, while the percentage of correct behaviors displayed by the participants was shown on the vertical axis, with equal intervals ranging from 0 to 100. Experimental control was determined by assessing whether changes in the dependent variable occurred as a result of implementing only the independent variable at successive time points.

In this study, the data obtained in the generalization sessions were analyzed by presenting the pretest-posttest data on a line graph, as shown in Figs. 2, 3, and 4. Paired *t*-tests were conducted to compare pre- and post-intervention performance for generalization across all participants and behaviors. Mean and value range calculations. Traditional parametric effect size measures, such as Cohen's d and ANOVA, rely on assumptions of normality and homogeneity of variance, which are often not met in single-case research (Kazdin, 2011). Since single-case designs typically involve small sample sizes and individualized interventions, non-parametric methods like PND and Tau-U are more appropriate and reliable (Parker et al., 2011; Pustejovsky, 2019).

Percentage of Non-Overlapping Data (PND) and Tau-U effect size calculations were made to analyze the data. PND is a widely used non-parametric effect size measure in single-case research. It quantifies the proportion of intervention phase data points that exceed the most extreme baseline data point. The calculation involves several steps: (1) identifying the highest data point in the baseline phase for increasing behaviors (or the lowest for decreasing behaviors); (2) counting the number of data points in the intervention phase that exceed (or fall below for decreasing behaviors) this benchmark; and (3) dividing this count by the total number of data points in the intervention phase, then multiplying by 100 to express the result as a percentage (Scruggs & Mastropieri, 2013). A PND value above 90 % is considered highly effective, 70–90 % is moderately effective, 50–70 % suggests questionable effectiveness, and below 50 % indicates ineffective intervention (Scruggs et al., 1987). While PND is easy to compute and interpret, it has limitations, such as being sensitive to extreme values in the baseline and failing to account for trends within phases (Parker et al., 2007).

Tau-U is a more refined non-parametric effect size metric that combines non-overlap between baseline and intervention phases while accounting for trends within phases. The calculation follows these steps: (1) performing pairwise comparisons between each intervention phase data point and all baseline data points to measure non-overlap; (2) assessing the presence of trends within each phase; (3) applying a trend correction if there is an increasing or decreasing trend in the baseline phase to ensure an accurate effect size; and (4) computing the Tau-U value by summing the non-overlap and trend correction components (Parker et al., 2011). Compared to PND, Tau-U provides a more comprehensive analysis by considering baseline trends, making it a more reliable measure of intervention effects in single-case experimental designs (Pustejovsky, 2019). According to Parker et al. (2011), Tau-U effect size values are classified into different categories to interpret intervention effectiveness in single-case research. The classification is as follows: 0.93 – 1.00 indicates a strong effect, 0.66 – 0.92 represents a moderate effect, and 0.65 or below suggests a weak effect. These thresholds help researchers assess the impact of interventions while considering the study context and data characteristics.

3.1. Findings

The effectiveness of the video modeling (independent variable) in the small-group format was evaluated across behaviors and repeated with a total of 3 participants. The effectiveness of the independent variable in teaching target leisure time skills is clearly evident when Figs. 2, 3, and 4 are considered. Additionally, in situations where no intervention was applied, it is observed that the independent variable was not influenced by any external factors, and there was an increase in both level and trend only when the independent variable was implemented. In addition to the effect of the independent variable being observed in multiple conditions and participants, the extent of its impact has also been determined.

The effect size was calculated to determine the extent to which the video modeling method, the independent variable of the study, was effective in teaching the target leisure time skills. For this purpose, the PND calculation was prioritized (Scruggs & Mastropieri, 1998). As recommended in the literature, the PND was calculated manually. The average PND score for the three behaviors in the study

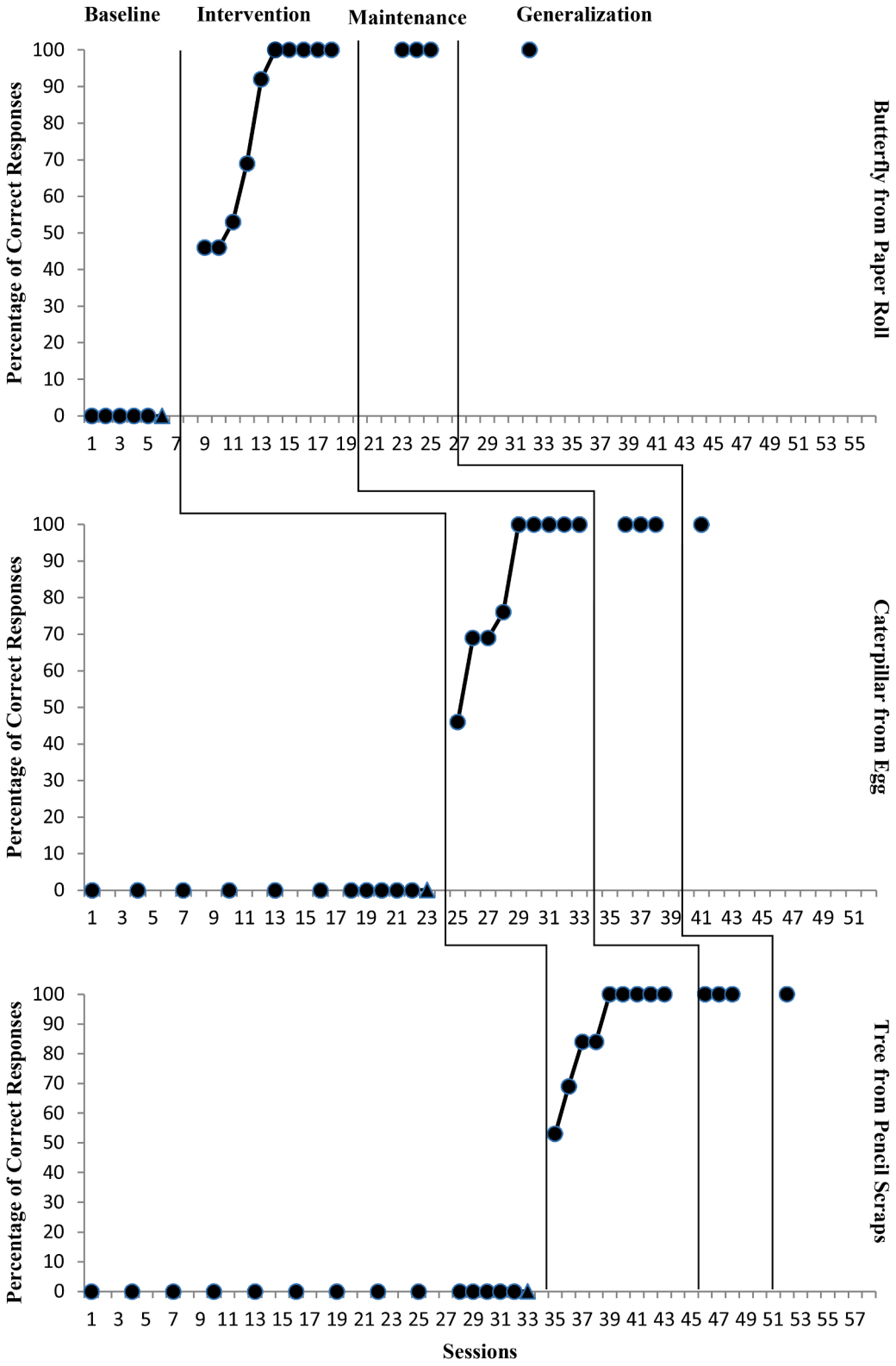

Fig. 4. Serkan's percentage of responses during baseline, intervention, maintenance and generalization sessions for the skills of making a butterfly from a paper roll, making a caterpillar from an egg carton, and making a tree from pencil scraps.The triangle data point represents the pre-test data of the generalization session.

was calculated to be 100 %. This score is defined as a very effective practice in the literature (Scruggs & Mastropieri, 1998).

The Tau-U calculation, as suggested by Parker et al. (2011), was used to calculate the effect size of this study. The across-behavior (weighted average) Tau-U effect size of the intervention was calculated to be 1.00, using the calculation tool available at the online calculator: https://singlecaseresearch.org/calculators/tau-u/. When the Tau-U effect size was analyzed, a statistically significant effect size ($p < 0.01$) was found. The results indicated that the video modeling method had a strong effect size across all three behaviors and participants in this study.

3.2. Baseline and intervention findings

At the baseline, Nazife showed 0 % performance (see Table 3) in making butterflies from paper rolls, caterpillars from egg cartons, and trees from pencil scraps. During the intervention phases, her performance improved significantly across all three skills, with progress observed in making butterflies ($M = 69.6$ %), caterpillars ($M = 69.3$ %), and trees ($M = 75.2$ %), showing increases in both level and trend.

At baseline, Selahattin's performance (see Table 4) in making butterflies from paper rolls, making caterpillars from egg cartons, and making trees from pencil scraps was very low ($M = 0$ %). During the intervention phases, his performance showed significant improvement in making butterflies ($M = 71.5$ %), caterpillars ($M = 69$ %), and trees ($M = 78.2$ %), with progress observed in both level and trend.

Serkan was the participant who achieved the criterion level with the fewest sessions compared to the other participants. At baseline, his performance in making butterflies from paper rolls, making caterpillars from egg cartons, and making trees from pencil scraps was similar to the others ($M = 0$ %). During the intervention phases, he showed significant progress in all skills: butterflies ($M = 80.6$ %), caterpillars ($M = 84.4$ %), and trees ($M = 78.2$ %), with substantial increases in both level and trend (see Table 5).

Table 6 presents the Tau-U effect sizes and 90 % confidence intervals for all participants and behaviors, calculated using singlecaseresearch.org. The Tau-U values were found to be 1.00 for all behaviors, indicating a perfect and statistically significant effect of the intervention. The 90 % confidence intervals further support the robustness of these findings, with all intervals ranging from 0.472 to 1.00.

Table 3
Summarizes Nazife's performance from the baseline to the intervention phase across the three target skills.

Target Skills	Baseline Performance (M)	Intervention Phase (M)	Range	PND	Tau-U
Making Butterflies from Paper Rolls	0 %	69.6 %	23 % - 100 %	100 %	1.00
Making Caterpillars from Egg Boxes	0 %	69.3 %	15 % - 100 %	100 %	1.00
Making Trees from Pencil Scraps	0 %	75.2 %	23 % - 100 %	100 %	1.00

Table 4
Summarizes Selahattin's performance from the baseline to the intervention phase across the three target skills.

Target Skills	Baseline Performance (M)	Intervention Phase (M)	Range	PND	Tau-U
Making Butterflies from Paper Rolls	0 %	71.5 %	23 % - 100 %	100 %	1.00
Making Caterpillars from Egg Boxes	0 %	69 %	15 % - 100 %	100 %	1.00
Making Trees from Pencil Scraps	0 %	78.2 %	23 % - 100 %	100 %	1.00

Table 5
Summarizes Serkan's performance from the baseline to the intervention phase across the three target skills.

Target Skills	Baseline Performance (M)	Intervention Phase (M)	Range	PND	Tau-U
Making Butterflies from Paper Rolls	0 %	80.6 %	46 %- 100 %	100 %	1.00
Making Caterpillars from Egg Boxes	0 %	84.4 %	46 %- 100 %	100 %	1.00
Making Trees from Pencil Scraps	0 %	78.2 %	23 %- 100 %	100 %	1.00

Table 6
Tau-U effect sizes and 90 % confidence intervals.

Participant	Behavior	Tau-U	90 % *CIs*
1. Nazife	Behavior 1 (butterfly from paper roll)	1.00	[0.472, 1.00]
	Behavior 2 (caterpillar from egg carton)	1.00	[0.480, 1.00]
	Behavior 3 (tree from pencil scraps)	1.00	[0.472, 1.00]
2.Selahattin	Behavior 1 (butterfly from paper roll)	1.00	[0.472, 1.00]
	Behavior 2 (caterpillar from egg carton)	1.00	[0.480, 1.00]
	Behavior 3 (tree from pencil scraps)	1.00	[0.472, 1.00]
3. Serkan	Behavior 1 (butterfly from paper roll)	1.00	[0.480, 1.00]
	Behavior 2 (caterpillar from egg carton)	1.00	[0.480, 1.00]
	Behavior 3 (tree from pencil scraps)	1.00	[0.472, 1.00]

These findings suggest that small group video modeling may be an effective method for teaching leisure skills, and that such interventions can lead to meaningful improvements in target skills within the context of the study's participants. Tau-U indicates that the skill development initiated by the intervention is statistically significant, while the high PND scores demonstrate that the intervention resulted in a noticeable improvement in target skills, creating a significant difference compared to baseline data.

3.3. Maintenance and generalization

Following the completion of the intervention phase, it was observed that the acquired target skills were maintained to a certain extent over time. Specifically, all three participants continued to demonstrate 100 % accuracy in performing the three target skills during the maintenance sessions. The consistent performance observed at 1, 3, and 4 weeks post-intervention suggests that the intervention may have been effective in supporting short- and mid-term skill retention. These findings provide evidence that the independent variable may have contributed to the continued use of the acquired skills for a certain period and indicate that the learned behaviors could remain sustainable beyond the structured intervention phase.

Furthermore, the results of the generalization sessions indicate a significant improvement in participants' ability to transfer the learned skills to novel contexts. In the pre-test of the generalization phase, all participants exhibited 0 % accuracy, indicating an initial lack of generalization prior to instruction. However, in the post-test sessions, all participants successfully completed 100 % of the steps required to perform the target skills, demonstrating full mastery in novel settings. Paired *t*-tests were conducted to compare pre- and post-intervention performance for generalization across all participants and behaviors. The results indicated a statistically significant increase in performance for all behaviors ($p < 0.05$), demonstrating the effectiveness of the intervention in promoting generalization. These findings suggest that the independent variable not only facilitated skill acquisition but also effectively promoted generalization across different contexts.

3.3. Social validity

To collect the social validity data of this research, interviews were conducted with the parents of the participants. The findings obtained from these interviews were observed to be highly positive. Regarding the importance of the target skills, parents frequently stated that these skills were valuable in terms of utilizing waste materials and engaging in meaningful leisure activities. One parent expressed this sentiment as follows:

> *"I am very happy that my child is creating something out of waste materials. Now, they are using their free time more productively and improving their fine motor skills."*

Concerning the suitability of the video modeling method, parents often mentioned that their children enjoy learning by watching videos. One parent emphasized the effectiveness of this approach by saying:

> *"Normally, my child struggles when learning something new, but when they watch videos, they grasp the concepts much faster and are eager to apply what they have learned."*

Finally, parents frequently expressed their satisfaction with their children's successful acquisition of the targeted skills. One parent's remarks highlight this sense of achievement:

> *"After making the butterfly, my son proudly showed it to me. It was amazing to see him so happy!"*

These statements indicate that the intervention was not only effective in an academic sense but was also perceived by parents as a meaningful and valuable skill acquisition in daily life.

4. Discussion

This study aimed to examine the effectiveness of video modeling in a small-group format for teaching leisure time skills (creating a butterfly from a paper roll, a caterpillar from an egg carton, and a tree from pencil scraps) to individuals with MD. Additionally, the study sought to assess the generalization of these skills to different environments and individuals, as well as the maintenance of these skills at 1, 3, and 4 weeks after the intervention. The transparent explanation of each stage of the research (implementation of the independent variable, research materials, setting, participants, data recording methods, and data analysis methods), the delivery of consistent and standardized instruction to participants through video modeling, the inclusion of repeated measurements, and the continuous plotting of these measurements on graphs have resulted in a highly replicable intervention. Additionally, although individuals with multiple disabilities constitute a highly heterogeneous group, the selection of participants from students with similar disabilities and learning characteristics has minimized the impact of the participants' specific traits on the results.

An analysis of the study's findings indicates that video modeling has a strong effect on teaching target skills, as demonstrated by both statistical and visual analysis results (Weighted average Tau-$U = 1.00$). Examination of the baseline phase across all three target behaviors reveals a stable performance at 0 %. However, following the introduction of the independent variable during the

intervention phase, performance on the target skills showed a clear increase in both level and trend. This situation was similar for all three participants and the current situation was repeated. With the intervention of the independent variable, all three participants performed at a level that met the criterion (100 %). This also shows that a strong experimental control was provided. Additionally, all three participants successfully generalized the target skills across different environments and individuals and maintained these skills for a certain period following the conclusion of the study. The high Tau-U and Data (PND) values strongly support the intervention's effectiveness and feasibility. The intervention was tested with three participants across three different skills (Select independent yet functionally similar behaviors), resulting in both high internal validity and a large effect size. These findings suggest that the method has significant potential to be effective for individuals with similar characteristics. Previous studies in the literature (e.g., Chen & Yakubova, 2023; Hong et al., 2016; Hughes & Yakubova, 2019; Satsangi et al., 2019) frequently use effect size calculations such as PND and Tau-U to demonstrate the effect sizes of specific interventions. In this study, the target skills were taught to participants using video modeling in a small group format. This combination offers significant advantages, including time efficiency and improved skill retention. Additionally, utilizing recycled materials and the inherently low-cost nature of video modeling make this intervention practitioner-friendly and cost-effective. Particularly in inclusive education and special education classroom settings, this method can serve as an effective tool for both educators and researchers.

The present study examined the effectiveness of video modeling instruction in teaching leisure time skills to individuals with MD in a small-group format. In the study, the effect of video-based instruction was demonstrated in three different behaviors and replicated in three participants. Video-based instruction is a scientifically based practice for children in the developmental disability spectrum with MD, as in many disability groups in the literature (Alasmari et al., 2024; Browder, 2014; Sturmey, 2014). With this study, which is strong in terms of both internal validity and external validity, the scientific basis of video modeling instruction was supported. At the same time, this study also supports the literature on video-based instruction in teaching leisure time skills to individuals with MD. There are a limited number of studies on video-based instruction in teaching leisure time skills to individuals with MD. In these limited studies, video prompting method, which is a video modeling sub- intervention, was used (e.g., Aldabas, 2023; Cannella-Malone et al., 2016; Chan et al., 2013) and the use of video modeling method (Cannella-Malone et al., 2013) is even more limited.

It is stated in the previous literature that instruction with video prompting may be more effective in teaching some skills and in individuals with moderate, severe, and severe MD compared to the video model method (Cannella-Malone et al., 2006, 2011, 2013). However, video modelling method was preferred in the current study. The first reason for this is to expand the literature on the video model in teaching leisure time skills to individuals with MD. In the study, another reason for choosing the video modeling method is that the intervention was conducted in a small group format. When working with small groups, the video modeling method offers a more accessible and practical option for practitioners. The combination of these two approaches allows for effective instruction to multiple students simultaneously, while modeling skills consistently in a single session, thereby saving time. Additionally, the method's repeatability and consistency can significantly enhance the learning process, making it more effective and lasting. Indeed, when examining the results of the current study, a significant functional relationship was established between the dependent and independent variables, and the participants met the criteria for the target skills. Although the study's results may not be generalizable, they demonstrate the potential effectiveness of the method for similar skills and participants. Considering the high effect size calculations obtained, it can be concluded that video modeling and small group instruction are feasible and applicable under real-life conditions. The fact that the study was conducted in the participants' own schools and classrooms supports this conclusion.

Aldabas (2023) examined the effect of video prompting on leisure skills in students with multiple disabilities (MD). The findings revealed that participants exhibited low levels of performance related to the target skill during the baseline phase. However, following the onset of the intervention phase, there was a sudden increase in performance, resulting in an immediate effect. When compared to the findings of the current study, a key difference emerges regarding the immediate effect. Although the current study does not show an immediate effect, it demonstrates similarity in terms of the effectiveness of the independent variable. Additionally, the number of sessions required to meet the criterion was deemed acceptable.

Cannella-Malone et al. (2016) examined the effectiveness of video prompting in teaching leisure time skills to individuals with MD with video prompting method. Unlike Aldabas (2023) and the current study, they made a preference assessment to the participants and compared the leisure time activities before and after learning new skills. In total, 8 of the 9 participants of this study were reported to have learnt the target skills. It was also reported that participants' activity preferences changed significantly after learning new leisure time skills. The current research supports the study of Cannella-Malone et al. (2016) in terms of effectiveness and shows promise in teaching leisure time skills to individuals with MD through video-based intervention in the classroom environment. It can be said that both studies have findings that support each other in terms of both internal and external validity, participants' permanent learning of target skills, and participants' successful generalization of target skills to different environments.

Chan et al. (2013) investigated the effectiveness of an intervention package combining video prompting and least-to-most prompting to teach three target skills: music listening, drawing, and picture taking. The study involved one participant, and the findings revealed behavioral covariation in the third case. This outcome was attributed to the fact that the target skills were not selected as functionally independent, which may have compromised the experimental control of the study. However, when the graphs for the first and second cases were analyzed, a clear increase in the level and trend of the target skills was observed following the implementation of the independent variable. From this perspective, the findings of Chan et al. (2013) appear to support the results of the current study.

Cannella-Malone et al. (2013) investigated the effectiveness of video modeling in teaching physical activity skills, which can also be considered leisure activities, to three individuals with MD (Muscular Dystrophy). While this study shares similarities with the current research, its findings differ. Cannella-Malone et al. reported that only one of the three participants mastered the target skills to a criterion level, while the others showed progress. In contrast, in the present study, all participants successfully acquired the target skills. In this regard, the current study differs from the study conducted by Cannella-Malone et al. (2013). Cannella-Malone et al. implemented error correction alongside video modeling. This difference in outcomes may be attributed to various factors, such as student performance, problem behaviors, and the selection of target behaviors appropriate to the individual's abilities.

In this research, the skills of evaluating waste materials were taught. Sustainable materials that students can easily access were used. Egg cartons, pencil scraps and paper rolls are leftover materials that students can easily access. Thus, the participants both utilized the waste materials and spent their leisure time in a quality and productive way. With the research, it can be said that the individuals with MD were also given awareness of how they can evaluate the waste materials.

5. Conclusion

The findings of the current study contribute to the literature in several significant ways. Firstly, the use of a video model, as opposed to video prompting, has demonstrated considerable efficacy. While video prompting involves presenting the target skill step-by-step and expecting the participant to perform immediately after viewing each step, the video model presents the entire skill at once before the participant is asked to perform (Bellini & Akullian, 2007). This study's intervention followed the video model approach, and the results indicate a high effect size in teaching target skills, alongside robust experimental control. This underscores the video model's potential as a reliable method for the acquisition of leisure-time skills

Secondly, this study expanded the literature by implementing the video model intervention in a small-group format. The findings suggest that the video model is a practitioner-friendly method that can effectively teach leisure-time skills to children with disabilities in small groups. Additionally, participants successfully generalized the target skills to different environments, highlighting the ecological validity of the intervention. This supports the notion that interventions designed with real-world applicability facilitate the generalization of newly acquired skills.

Thirdly, the study introduced an innovative dimension by utilizing waste materials to teach leisure-time skills, a novel approach not previously explored in the literature. This aspect not only promotes sustainability but also provides practical, low-cost resources for practitioners and caregivers. It opens new avenues for research and practice, encouraging the exploration of creative and accessible teaching materials.

In summary, this study highlights the efficacy of video modeling as a powerful tool for teaching leisure-time skills, while also pioneering innovative approaches such as small-group instruction and the use of sustainable materials. These contributions not only enrich the existing literature but also offer practical, cost-effective strategies for educators and caregivers. By acknowledging the study's limitations and leveraging its strengths, future research can build on these findings to explore new dimensions, refine methodologies, and ultimately enhance the quality of life for individuals with disabilities through effective skill acquisition.

6. Suggestions and limitations

Providing quality education to individuals with MD can sometimes pose challenges for teachers and researchers. One such challenge is the individualization of instruction in special education classrooms where multiple students with varying needs are taught simultaneously. Leisure-time activities, however, can serve as common and meaningful tasks that accommodate students with different performance levels within the same classroom. The current study was conducted in the students' own classrooms and schools, utilizing a small-group format. This format was found to be highly suitable for research in special education settings, as it allows for personalized attention while maintaining a collaborative learning environment. Additionally, the video model was chosen as the teaching method due to its practicality and effectiveness for practitioners. Therefore, the small-group format combined with video modeling is strongly recommended for teaching leisure-time skills to individuals with MD.

The literature reveals a limited number of studies focusing on teaching leisure-time skills to individuals with MD using video modeling. However, the findings of this study suggest that video-based instruction can be an effective, user-friendly, and versatile method for teaching a wide range of leisure-time activities to this population.

Another key recommendation is the use of waste materials as teaching tools. When utilized functionally, waste materials can be transformed into engaging and effective leisure-time activities. This approach not only promotes sustainability but also helps expand the positive behavior repertoire of individuals with MD by encouraging creativity and resourcefulness. Practitioners are encouraged to explore the potential of waste materials in designing low-cost, accessible, and meaningful leisure-time activities. To further expand on the findings of this study, future research could:

- Investigate the effectiveness of video modeling across different demographic groups, including individuals of varying age ranges and disability types, to enhance the generalizability of the intervention.

- Examine alternative instructional formats, such as one-on-one instruction or larger group settings, to assess the scalability and adaptability of video modeling in diverse educational contexts.
- Assess the long-term maintenance and generalization of skills acquired through video modeling by conducting follow-up studies over extended periods.
- Explore the integration of sustainable and low-cost materials in the teaching of other functional and daily living skills to promote accessibility and ecological validity.

This study has several limitations that should be noted. First, as a multiple-probe design was employed, the findings should be interpreted within the context of the study's specific conditions and participant characteristics, rather than being generalized to broader populations. Second, a systematic preference assessment was not conducted to identify the leisure-time skills participants wished to learn; instead, target skills were determined based on input from families and teachers. Third, generalization sessions were limited to new individuals and environments, and were not extended to home settings or tested with different materials. Fourth, maintenance data were collected only up to 4 weeks, leaving the long-term sustainability of the acquired skills unexplored. Finally, the small participant sample, inherent to single-subject research, limits the generalizability of the findings. Future studies could address these limitations by involving larger and more diverse participant groups, including individuals with varying disability profiles. Finally, for video modeling, practitioners need to have certain technological tools and be proficient in using them at a certain level. When teaching in a group setting, keeping multiple students focused on instruction can be challenging for practitioners.

CRediT authorship contribution statement

Evgin Çay: Writing – review & editing, Writing – original draft, Methodology, Investigation, Conceptualization. **Burak Bozak:** Writing – review & editing, Visualization, Supervision, Methodology, Investigation, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix 1

DATA COLLECTION FORM FOR MAKING A BUTTERFLY FROM PAPER ROLL WITH VIDEO MODEL
Participant Name
Session
Instructor:

	Task analysis steps	**DATE**
1.	Place the paper roll on the table.	
2.	Apply glue to the entire surface of the roll.	
3.	Stick the colored paper onto the roll.	
4.	Press the colored paper with your hand.	
5.	Apply glue to the bottom part of the roll.	
6.	Take the pre-cut wing in your hand.	
7.	Attach the wing to the glued area.	
8.	Press the wing with your hand.	
9.	Apply glue to the top part of the roll.	
10.	Stick the googly eyes onto the glued area.	
11.	Apply glue to the back of the eyes.	
12.	Attach the pre-cut antennas to the glued area.	
13.	Paint your butterfly in any color you like.	
Total Correct Response		
Percentage of steps completed correctly		
Total incorrect response		
Percentage of steps completed incorrectly		
Correct: (+) Incorrect: (-)		

Appendix 2

DATA COLLECTION FORM FOR MAKİNG A CATERPILLARS FROM EGG BOXES WITH VIDEO MODEL
Participant Name:
Session:
Instructor:

	Task analysis steps	Date
1.	Place the pre-cut egg carton on the table.	
2.	Place the brush and paint on the table.	
3.	Paint the entire egg carton and wait for it to dry.	
4.	Place the googly eyes on the table.	
5.	Apply glue to the back of the googly eyes.	
6.	Attach the googly eyes to the front surface of the caterpillar.	
7.	Press the eyes with your finger.	
8.	Take the straw and scissors.	
9.	Cut two pieces from the straw using the scissors.	
10.	Bend the ends of the cut pieces to shape them into antennas.	
11.	Apply glue to the antennas.	
12.	Attach the antennas to the head of the caterpillar.	
13.	Press the antennas with your finger.	
Total Correct Response		
Percentage of steps completed correctly		
Total incorrect response		
Percentage of steps completed incorrectly		
Correct: (+) Incorrect: (-)		

Appendix 3

DATA COLLECTION FORM FOR MAKING A TREE FROM PENCİL SCRAPS ROLL WITH VIDEO MODEL
Participant Name:
Session:
Instructor:

	Task analysis steps	DATE
1.	Place the paper on the table.	
2.	Pick up the brown paint/crayon.	
3.	Draw a tree trunk in the center of the paper.	
4.	Draw three branches extending from the top of the trunk.	
5.	Color the bottom part of the trunk green.	
6.	Pick up the glue.	
7.	Apply dots of glue around the branches.	
8.	Pick up the pencil scraps.	
9.	Break the pencil scraps into leaf-sized pieces.	
10.	Carefully place the pencil scraps onto the glued areas.	
11.	Press down on the pencil scraps to secure them.	
12.	Repeat the process until all branches have enough pencil scraps.	
13.	Clean up any pencil scraps that did not stick.	
Total Correct Response		
Percentage of steps completed correctly		
Total incorrect response		
Percentage of steps completed incorrectly		
Correct: (+) Incorrect: (-)		

Data availability

The data that has been used is confidential.

References

Alasmari, A. M., Brock, M. E., & Alsultan, A. S. (2024). Utilizing video prompting with people with severe disabilities: A systematic literature review. *Children and Youth Services Review, 161*, 107652. https://doi.org/10.1016/j.childyouth.2024.107652

Alberto, P. A., & Troutman, A. C. (2009). *Applied behavior analysis for teachers* (8thed.). Upper Saddle River, NJ: Merrill.

Aldabas, R. (2023). Effects of video-prompting using iPad on teaching leisure activities to students with multiple disabilities: A single-case experimental design study. *Children and Youth Services Review, 144*, Article 106695. https://doi.org/10.1016/j.childyouth.2022.106695

Aldemir, Ö., & Gürsel, O. (2014). The effectiveness of the constant time delay procedure in teaching pre-school academic skills to children with developmental disabilities in a small group teaching arrangement. *Educational Sciences: Theory & Practice, 14*(2), 733–740. https://doi.org/10.12738/estp.2014.2.1976

Arslan, S. (2011). Serbest zaman kullanımı: Sıradan serbest zaman etkinlikleri ve sistemli serbest zaman etkinlikleri. *Erzincan Eğitim Fakültesi Dergisi, 13*(2), 1–10.

Aykut, Ç., Dağseven Emecen, D., Dayi, E., & Karasu, N. (2014). Teaching chained tasks to students with intellectual disabilities by using video prompting in small group instruction. *Kuram ve Uygulamada Eğitim Bilimleri, 14*(3), 1082–1087. https://doi.org/10.12738/estp.2014.3.1984

Bellini, S., & Akullian, J. (2007). A meta-analysis of video modeling and video self-modeling interventions for children and adolescents with autism spectrum disorders. *Exceptional children, 73*(3), 264–287. https://doi.org/10.1177/001440290707300301

Browder, D. M., Wood, L., Thompson, J., & Ribuffo, C. (2014). *Evidence-based practices for students with severe disabilities (Document no. IC-3)*. University of Florida, Collaboration for Effective Educator Development, Accountability, and Reform Center. https://ceedar.education.ufl.edu/wp-content/uploads/2014/09/IC-3_FINAL_03-03-15.pdf.

Büküşoğlu, N., & Bayturan, A. F. (2005). The role of leisure activities on young people's perception of their psychosocial situation (Serbest zaman etkinliklerinin gençlerin psiko-sosyal durumlarına ilişkin algısı üzerindeki rolü). *Ege Tıp Dergisi, 44*(3), 173–177.

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 video prompting to video modeling. *Journal of Positive Behavior Interventions, 13*(3), 144–153. https://doi.org/10.1177/1098300710366

Cannella-Malone, H. I., Miller, O., Schaefer, J. M., Jimenez, E. D., Page, E. J., & Sabielny, L. M. (2016). Using video prompting to teach leisure skills to students with significant disabilities. *Exceptional Children, 82*(4), 463–478. https://doi.org/10.1177/0014402915598778

Cannella-Malone, H. I., Mizrachi, S. B., Sabielny, L. M., & Jimenez, E. D. (2013). Teaching physical activities to students with significant disabilities using video modeling. *Developmental Neurorehabilitation, 16*(3), 145–154. https://doi.org/10.3109/17518423.2012.763192

Cannella-Malone, H., Sigafoos, J., O'Reilly, M., de la Cruz, B., Edrisinha, C., & Lancioni, G. E. (2006). Comparing video prompting to video modeling for teaching daily living skills to six adults with developmental disabilities. *Education and Training in Developmental Disabilities, 41*(4), 344–356. https://www.jstor.org/stable/23879661.

Chai, Z. (2017). Improving early reading skills in young children through an iPad App: Small-group instruction and observational learning. *Rural Special Education Quarterly, 36*(2), 101–111. https://doi.org/10.1177/8756870517712491

Chan, J., Lambdin, L., Laarhoven, T., & Johnson, J. (2013). Teaching leisure skills to an adult with developmental disabilities using a video prompting intervention package. *Education and Training in Autism and Developmental Disabilities, 48*(3), 412–420. https://www.jstor.org/stable/23880997.

Charlop, M. H., Dennis, B., Carpenter, M. H., & Greenberg, A. L. (2010). Teaching socially expressive behaviors to children with autism through video modeling. *Education and Treatment of Children, 33*(3), 371–393. https://www.jstor.org/stable/42900075.

Chen, B. B., & Yakubova, G. (2023). Evaluating the effects of video-based intervention to teach vocational skills to transition-age youth with autism spectrum disorder: An evidence-based systematic review. *Review Journal of Autism and Developmental Disorders, 10*(1), 22–37. https://doi.org/10.1007/s40489-021-00282-7

Cohen-Gewerc, E., & Stebbins, R. A. (2007). *The pivotal role of leisure education: Finding personal fulfillment in this century*. Venture Publishin.

Collins, B. C. (2007). *Moderate and severe disabilities: A foundational approach*. New Jersey: Pearson Prentice Hall.

Collins, B. C., Hall, M., & Branson, T. A. (1997). Teaching leisure skills to adolescents with moderate disabilities. *Exceptional Children, 63*(4), 499–512. https://doi.org/10.1177/001440299706300405

Charlop-Christy, M. H., Le, L., & Freeman, K. A. (2000). A comparison of video modeling with in vivo modeling for teaching children with autism. *Journal of autism and developmental disorders, 30*, 537–552. https://doi.org/10.1023/A:1005635326276

Colozzi, G. A., Ward, L. W., & Crotty, K. E. (2008). Comparison of simultaneous prompting procedure in 1:1 and small group instruction to teach play skills to preschool students with pervasive devolepmental disorders and devopmental disabilities. *Education and Training in Developmental Disabilities, 43*(2), 226–248. https://www.jstor.org/stable/23879932.

Çattık, M., & Odluyurt, S. (2017). The effectiveness of the smart board-based small-group graduated guidance instruction on digital gaming and observational learning skills of children with autism spectrum disorder. *The Turkish Online Journal of Educational Technology, 16*(4), 84–102.

Çay, E., & Eratay, E. (2019). The opinions of the parents who have children with multiple disabilities regarding leisure time activities (Çoklu yetersizliğe sahip çocuğu olan ebeveynlerin serbest zaman etkinliklerine yönelik görüşlerinin incelenmesi. *Ulusal Eğitim Akademisi Dergisi (UEAD), 3*(2), 158–184. https://doi.org/10.32960/uead.596857

Çay, E. (2022). *Effectiveness of self-management strategies in effective use of leisure time to individuals with intellectual disabilities (Unpublished doctoral dissertation)*. Bolu Abant İzzet Baysal University.

Delano, M. E. (2007). Video modeling ınterventions for ındividuals with autism. *Remedial and Special Education, 28*(1), 33–42. https://doi.org/10.1177/07419325070280010401

Devine, M. A. (2016). Leisure-time physical activity: Experiences of college students with disabilities. *Adapted Physical Activity Quarterly, 33*(2), 176–194. https://doi.org/10.1123/APAQ.2014-0241

Doğan, S. (2016). *The effectiveness of constant time delay procedure in teaching discrimination skills to children with autism spectrum disorders in small group teaching instruction (Unpublished master's thesis)*. Eskişehir Anadolu University.

Freericks, R., & Brinkmann, D. (2015). *Handbuch freizeitsoziologie*. Wiesbaden: VS Verlag für Sozialwissenschaften.

Georgiadou, I., Vlachou, A., & Stavroussi, P. (2021). Quality of life and vocational education service quality in students with intellectual disability. *International Journal of Developmental Disabilities, 68*(5), 681–691. https://doi.org/10.1080/20473869.2021.1887435

Gilson, C., & Stacy, D. (2012). Constructions of disability at a University in Hong Kong: Perspectives of disabled students, staff members, and instructors. *Journal Disability Studies Quarterly Acknowledges and Appreciates, 31*(2). https://doi.org/10.18061/dsq.v31i2.1589

Graetz, J. E., Mastropieri, M. A., & Scruggs, T. E. (2006). Show time: Using video self-modeling to decrease inappropriate behavior. *Teaching Exceptional Children, 38*(5), 43–48. https://doi.org/10.1177/004005990603800506

Graves, T. B., Collins, B. C., Schuster, J. W., & Kleinert, H. (2005). Using video prompting to teach cooking skills to secondary students with moderate disabilities. *Education and Training in Developmental Disabilities, 40*(1), 34–46. https://www.jstor.org/stable/23879770.

Grisham-Brown, J., Hemmeter, M. L., & Pretti-Frontczak, K. (2006). *Blended practices for teaching young children in inclusive settings*. Paul H. Brookes Publishing.

Gürsel, M., Sarı, H., & Dilmaç, B. (2004). *Sınıf yönetimi [Classroom management]*. Eğitim Kitabevi Basım Yayın Dağıtım.

Helps, D. H., & Herzberg, T. S. (2013). The use of an iPad2 as a leisure activity for a student with multiple disabilities. *Journal of Visual Impairment & Blindness, 107*(3), 232–236. https://doi.org/10.1177/0145482X1310700308

Hong, E. R., Ganz, J. B., Mason, R., Morin, K., Davis, J. L., Ninci, J., Neely, L., Boles, M., & Gilliland, W. D. (2016). The effects of video modeling in teaching functional living skills to persons with ASD: A meta-analysis of single-case studies. *Research in Developmental Disabilities, 57*, 158–169. https://doi.org/10.1016/j.ridd.2016.07.001

Hughes, E. M., & Yakubova, G. (2019). Addressing the mathematics gap for students with ASD: An evidence-based systematic review of video-based mathematics interventions. *Review Journal of Autism and Developmental Disorders, 6*(2), 147–158. https://doi.org/10.1007/s40489-019-00160-3

Jessup, G. M., Cornell, E., & Bundy, A. C. (2010). The treasure in leisure activities: Fostering resilience in young people who are blind. *Journal of Visual Impairment & Blindness, 104*(7), 419–430. https://doi.org/10.1177/0145482X1010400705

Kazdin, A. E. (2011). *Single-case research designs: Methods for clinical and applied settings* (2nd ed.). Oxford University Press.
Kennedy, C. H. (1992). Trends in the measurement of social validity. *The Behavior Analyst, 15*, 147–156. https://doi.org/10.1007/BF03392597
Kleinert, H. L., Miracle, S., & Sheppard-Jones, K. (2007). Including students with moderate and severe intellectual disabilities in school extracurricular and community recreation activities. *Intellectual and Developmental Disabilities, 45*(1), 46–55. https://doi.org/10.1352/1934-9556(2007)45[46:ISWMAS]2.0.CO;2
Kraemer, B. R., McIntyre, L. L., & Blacher, J. (2003). Quality of life for young adults with mental retardation during transition. *Mental Retardation, 41*(4), 250–262. https://doi.org/10.1352/0047-6765(2003)41≤250:QOLFYA≥2.0.CO;2
Kurar, I., & Baltacı, F. (2014). Peoples leisure habits review: Case of Alanya. *International Journal of Science Culture and Sport, 2*(2), 39–52. https://doi.org/10.14486/IJSCS177 [Special Issue].
Lancioni, G. E., Singh, N. N., O'reilly, M. F., Oliva, D., & Basili, G. (2005). An overview of research on increasing indices of happiness of people with severe/profound intellectual and multiple disabilities. *Disability and Rehabilitation, 27*(3), 83–93. https://doi.org/10.1080/09638280400007406
Lane, J. D., Gast, D. L., Shepley, C., & Ledford, J. R. (2015). Including social opportunities during small group instruction of preschool children with social-communication delays. *Journal of Early Intervention, 37*(1), 3–22. https://doi.org/10.1177/1053815115588828
Leaf, J. B., Oppenheim-Leaf, M. L., Dotson, W. H., Johnson, V. A., Courtemanche, A. B., Sheldon, J. B., & Sherman, J. A. (2011). Effects of no-no prompting on teaching expressive labeling of facial expressions to children with and without a pervasive developmental disorder. *Education and Training in Autism and Developmental Disabilities, 46*(2), 186–203. https://www.jstor.org/stable/23879690.
Ledford, J. R., & Wolery, M. (2015). Observational learning of academic and social behaviors during small-group direct instruction. *Exceptional Children, 81*(3), 272–291. https://doi.org/10.1177/0014402914563698
Ledford, J. R., & Gast, D. L. (2018). *Single case research methodology: Applications in special education and behavioral sciences* (3rd ed.). Routledge. https://doi.org/10.4324/9781315150666
Ledford, J. R., Lane, J. D., Elam, K. L., & Wolery, M. (2012). Using response-prompting procedures during small-group direct instruction: Outcomes and procedural variations. *American Journal on Intellectual and Developmental Disabilities, 117*(5), 413–434. https://doi.org/10.1352/1944-7558-117.5.413
Leitner, M. J., & Leitner, S. F. (2012). *Concepts of leisure: Leisure enhancement* (4th ed.). Sagamore Publishing.
Lewis, S. (2003). The integration of paid work and the rest of life: Is post-industrial work the new leisure? *Leisure Studies, 22*(4), 343–355. https://doi.org/10.1080/0261436031000159413 1
Lundberg, N. R., Taniguchi, S., McCormick, B. P., & Tibbs, C. (2011). Identity negotiating: Redefining stigmatized identities through adaptive sports and recreation participation among individuals with a disability. *Journal of Leisure Research, 43*(2), 205–225. https://doi.org/10.1080/00222216.2011.11950233
Mercer, C. D., & Mercer, A. R. (2005). *Teaching students with learning problems*. Pearson Merill Prentic Hall.
Mount, H. (2013). Art, drama and music. In J. Hogg, & J. Cavet (Eds.), *Making leisure provision for people with profound learning and multiple disabilities*. Springer.
Park, J., Bouck, E., & Duenas, A. (2019). The effect of video modeling and video prompting interventions on individuals with intellectual disability: A systematic literature review. *Journal of Special Education Technology, 34*(1), 3–16. https://doi.org/10.1177/0162643418780464
Parker, R. I., Hagan-Burke, S., & Vannest, K. (2007). Percentage of All Non-Overlapping Data (PAND): An Alternative to PND. *The Journal of Special Education, 40*(4), 194–204. https://doi.org/10.1177/00224669070400040101
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*(2), 284–299. https://doi.org/10.1016/j.beth.2010.08.006
Porter, H., Iwasaki, Y., & Shank, J. (2010). Conceptualizing meaning-making through leisure experiences. *Loisir Et Société /Society and Leisure, 33*(2), 167–194. https://doi.org/10.1080/07053436.2010.10707808
Pustejovsky, J. E. (2019). Procedural sensitivities of effect sizes for single-case designs with directly observed behavioral outcome measures. *Psychological Methods, 24*(2), 217–235. https://doi.org/10.1037/met0000179
Samara, E., & Loannidi, V. (2019). The use of leisure time as a structured pedagogical intervention to prevent and mitigate behavioral problems - a case presentation from the point of view of informal learning and education. *European Journal of Special Education Research, 4*(2), 2501. https://doi.org/10.5281/zenodo.2625748. -2428.
Satsangi, R., Hammer, R., & Hogan, C. D. (2019). Video modeling and explicit instruction: A comparison of strategies for teaching mathematics to students with learning disabilities. *Learning Disabilities Research & Practice, 34*(1), 35–46. https://doi.org/10.1111/ldrp.12189
Schulz, J., & Watkins, M. (2007). The development of the leisure meanings inventory. *Journal of Leisure Research, 39*(3), 477. https://doi.org/10.1080/00222216.2007.11950118
Scruggs, T. E., & Mastropieri, M. A. (1998). Summarizing single-subject research: Issues and applications. *Behavior Modification, 22*(3), 221–242. https://doi.org/10.1177/01454455980223001
Scruggs, T. E., & Mastropieri, M. A. (2013). PND at 25: Past, present, and future trends in summarizing single-subject research. *Remedial and Special Education, 34*(1), 9–19. https://doi.org/10.1177/0741932512440730
Scruggs, T. E., Mastropieri, M. A., & Casto, G. (1987). The quantitative synthesis of single-subject research: Methodology and validation. *Remedial and Special Education, 8*(2), 24–33. https://doi.org/10.1177/074193258700800206
Sherrow, L. A., Spriggs, A. D., & Knight, V. F. (2016). Using video models to teach students with disabilities to play the Wii. *Focus on Autism and Other Developmental Disabilities, 31*(4), 312–320. https://doi.org/10.1177/1088357615583469
Sivan, A., & Ruskin, H. (2000). *Leisure education, community development, and populations with special needs*. CAB International.
Stebbins, R. A. (2005). Project based leisure: Theoretical neglect of a common use of free time. *Leisure Studies, 24*(1), 1–11. https://doi.org/10.1080/0261436042000180832
Sturmey, P. (2014). Adaptive behaviors. In P. Sturmey, & R. Didden (Eds.), *Evidence-Based practice and intellectual disabilities (47-50)*. Wiley Blackwell. https://doi.org/10.1002/9781118326077.ch2.
Süzer, M. (2000). Leisure time habits of university students (Üniversite öğrencilerinin boş zamanlarını değerlendirme alışkanlıkları). *Pamukkale Üniversitesi Eğitim Fakiiltesi Dergisi, 8*(8), 123–133.
Wolf, M. M. (1978). Social validity: the case for subjective measurement or how applied behavior analysis is finding its heart 1. *Journal of applied behavior analysis, 11*(2), 203–214. https://doi.org/10.1901/jaba.1978.11-203
Wynkoop, K. S., Robertson, R. E., & Schwartz, R. (2019). The effects of two video modeling interventions on the independent living skills of students with autism spectrum disorder and intellectual disability. *Journal of Special Education Technology, 33*(3), 145–158. https://doi.org/10.1177/0162643417746149
Zarotis, G. F., & Tokarski, W. (2020). Definition, concepts and research about leisure time. *International Journal of Innovative Research and Knowledge, 5*(2), 139–149. https://doi.org/10.24018/ejbmr.2020.5.2.290