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# Effectiveness of Teaching Naming Facial Expression to Children with Autism Via Video Modeling

**Nurgul Akmanoglu**[a]
Anadolu University

**Abstract**
This study aims to examine the effectiveness of teaching naming emotional facial expression via video modeling to children with autism. Teaching the naming of emotions (happy, sad, scared, disgusted, surprised, feeling physical pain, and bored) was made by creating situations that lead to the emergence of facial expressions to children participating in the study. A multiple probe design with probe trails across behaviors was used and replicated across subjects. Four subjects diagnosed with autism (ages 4,5, and 6) participated in the study. Ten people participated in the research study: eight people for the video modeling display and two for displaying the emotional facial expressions in the teaching and generalization sessions. The findings of the study show that teaching the naming of emotional facial expressions to children with autism is effective, and after the end of training the children can still maintain this ability. In addition, subjects can generalize their acquired skills from a variety of simulation situations created by different materials in different environments, both with persons who participated in this model and those who did not. Social validity findings show that the children's mothers and teachers and post-graduate students have positive opinions about the study.

**Keywords:** Autism • Video modeling • Emotions • Naming facial expressions • Single subject research

**a Correspondence**
Assist. Prof. Nurgul Akmanoglu (PhD), Research Institute for the Handicapped, Anadolu University, Yunus Emre Campus, Eskisehir 26470 Turkey
Research areas: Applied behavior analysis, educating children with developmental disabilities and autism, single-subject research methods
Email: nakmanoglu@anadolu.edu.tr

According to the American Psychiatric Association and Kanner, social inadequacies are one of the most distinctive features in diagnosing autism (Hall, 2000; Webber & Scheuermann, 2008). According to the Diagnostic and Statistical Manual of Mental Disorders -DSM-5 (American Psychiatric Association, 2013), the autism spectrum disorder shows permanent inadequacies in the field of social communication and interaction that is characterized by (*i*) an unusual approach toward people, including limitations in conversation, (*ii*) inadequacy in verbal and nonverbal communication (in understanding and using body language, gestures, and facial expressions), and (*iii*) inadequate adaptation to appropriate behaviors in various social contexts; difficulty in imaginary play, sharing, or making friends, showing interest in peers, developing and maintaining social relations, and understanding relations. Persons with autism show inadequacy in expressing their inner/emotional situations and understanding the feelings of others and apparent indifference and carelessness in looking at the face of other people (Balconi & Carrera, 2007; Celani, Battacchi, & Arcidiacono, 1999). This lack of social skills in individuals with autism makes interaction with peers and other people in the community difficult, and this can also lead to behavioral problems (Leirheimer & Stichter, 2011; Poljac, Poljac, & Wagemans, 2012).

The human face is the strongest and primary source of information, which mediates emotional and verbal communication as well as social interaction. For this reason, recognizing facial expressions is one of the building blocks in maintaining social competence (Balconi, Amenta, & Ferrari, 2012; Ekman, 1999; Tardif, Laine, Rodriguez, & Gepner, 2007). Facial expressions are reflections of emotions to the world outside, and they can be distinguished by using specific facial features (Leirheimer & Stichter, 2011). The ability to recognize emotional facial expressions during the first years of life is crucial in establishing interpersonal relationships. It is claimed that the recognition of facial expressions is one of the basic signals used for understanding emotions and purposes of others, and developing empathy; the ability to recognize basic emotional expressions can be universal (Baron-Cohen, 2002; Rump, Giovannelli, Minshew, & Strauss, 2009; Ryan & Charragain, 2010). When facial expressions recognition development is examined, it is seen that even infants who are just a few days old and who demonstrate normal development can imitate facial expressions. When they are 3–4 months old, they can distinguish happy, sad, and surprised facial expressions and angry ones at 7 months. Also, many 3 year-old children demonstrating normal development can use various emotional expressions from their own vocabulary (happy-angry-scared-surprised-upset) and can distinguish causes and effects of these emotions (Silver & Qakes, 2001; Soken & Pick, 1992).

Another important variable which is related to the recognition of facial expressions is contextual areas where emotions occur. The features and reasons for emotions play an important role in the child's learning of it, and this is called "emotion experience" in the literature. An emotional experience does includes not only include facial expressions but also factors that cause an emergence of emotions in physical and social contexts, various actions and as well as their results, and cognitive assessment by the person. Hence, the existence of interaction elements describing an emotional experience is a facilitating factor for understanding an emotion (Balconi & Carrera, 2007; Balconi et al., 2012; Russell & Widen, 2002). Of the literature aimed at understanding the use of facial expressions by children with autism, a large number of research studies consist of statistical studies that evaluate whether children with autism can recognize facial expressions and comparisons between children with autism and children with normal development. These studies showed that children with autism have difficulties in recognizing basic facial expressions and when they are compared with children demonstrating normal development, they show significant differences in the recognition of opposite faces. The research results also revealed that while children with normal development look at an area covering eye, mouth, and nose during facial expression recognition, children with autism only look at the mouth area. Therefore, this situation makes recognition and naming of facial expressions more difficult in children with autism (Akechi et al., 2009; Ashwin, Wheelwright, & Baron-Cohen, 2006; Balconi & Carrera, 2007; Kadak, Demir, & Doğangün, 2013; Klin, Jones, Schultz, Volkmar, & Cohen, 2002; Wallace, Coleman, & Bailey, 2008).

Different teaching procedures, such as discrete trial training, video modeling, and social stories training are used in the training of social skills in children with autism (National Autism Center [NAC], 2011; Odom, Collet-Klingenberg, Rogers, & Hatton, 2010). Video modeling developed with reference to observational learning theory is one of the evidence-based interventions used in teaching social skills to this population (NAC, 2011; Odom et al., 2010;

The National Professional Development Center on Autism Spectrum Disorders [NPDC], 2014). Video modeling includes watching video recording of a model performing the target behavior and the child repeating these behaviors. In other words, video modeling is the action of imitating behavior by a model after seeing it in a video recording (Koenig, 2012; Murray & Noland, 2013; Nikopoulos & Keenan, 2006). In comparing traditional methods and video modeling, video modeling visually describes target behaviors and the expected steps that should be exhibited to reach the target behavior concretely. This situation is particularly a great convenience for children with autism having difficulties in understanding language and processing auditory stimulus. Children with autism also respond to auditory stimulus late. Therefore, individuals with autism can miss new auditory stimulus when trying to process previous ones (Spencer, 2002). In video modeling, information is presented with visual methods more than auditory ones and images can be repeated many times, thus facilitating the individual's understanding of the skill. Furthermore, watching video is generally an exhilarating and motivating activity for children with autism during instruction (Charlop-Christy & Daneshvar, 2003; Prelock, Paul, & Allen, 2011; Spencer, 2002).

In the literature, there are two groups of studies related with video modeling: effectiveness studies that used video modeling to teach social skills and qualitative document analysis studies. When both groups of studies were examined, only 14 research studies were found to be conducted by using video modeling only (without using other kinds of prompts or methods). It is seen that 12 of them (Acar & Diken, 2012; Bellini, Akullian, & Hopf, 2007; Bidwell & Rehfeldt, 2004; Buggey, 2005; Buggey, Hoomes, Sherberger, & Williams, 2011; Charlop, Carpenter, & Greenberg, 2010; Gül & Vuran, 2010; Mason, Ganz, Parker, Burke, & Camargo, 2012; Nikopoulos & Keenan, 2003, 2004a, 2004b, 2007; Plavnick, Sam, Hume, & Odom, 2013; Sherer et al., 2001; Wert & Neisworth, 2003) studied initiating and maintaining social interaction skills, and two of them (Charlop-Christy & Daneshvar, 2003; LeBlanc et al., 2003) studied teaching the skills of understanding others' thoughts. In addition, only two research studies in the literature were conducted on the recognition of facial expressions (Axe & Evans, 2012; Charlop-Christy, Le, & Freeman, 2000).

Charlop-Christy et al. (2000) compared the effectiveness of video modeling and live modeling in training various social skills in children with autism. Five children diagnosed with autism participated in the study and just one of them was trained in happy-sad facial expressions with live modeling and tired-scared facial expressions with video modeling only. In both training sessions, images of a person's face were used and different persons' images were used in the generalization probes. At the end of the study it was seen that the child learned happy-sad facial expressions at the level meeting the criteria but could not generalize them with live modeling and, likewise, learned tired-scared facial expressions but could generalize them with video modeling. Social validity and maintenance were not included in the study. Axe and Evans (2012) used video modeling on the recognition of facial expressions with three 5 and 6-year old kindergartner boys diagnosed with Atypical autism. Video images were prepared to train disapproval, boredom, approval, disgust, and impatient facial expressions in the study. Two people were involved in the training sessions; one of them only performed facial expressions intended to train and the other one commented on the model's facial expression (e.g., feeling bored). In all examination sessions the participant children were asked to respond by only demonstrating facial expressions from the video. In addition, generalization data were collected to measure the participants' application of their learning across people and settings. The results revealed that two boys learned facial expressions at a level meeting the criteria, maintained the skill, and generalized it across settings. The third boy responded correctly to two facial expressions at a baseline phase and learned four facial expressions at a level meeting the criteria. Although an increase was seen in the response to disgust, pain, approval, and disapproval facial expressions, he could not learn them at a level meeting the criteria. Moreover, this child was able to generalize facial expressions he learned and maintained the skill with three of them.

All of these studies carried out for both the instruction of facial expression and other social skills with children with autism have some limitations and give an opinion about using video modeling in social skill instruction. The limitations which grounded the need for the present study can be expressed as follows: (*i*) the studies that taught the naming of facial expressions do so without being associated with any context (Axe & Evans, 2012; Charlop-Christy et al., 2000). That is why contextual areas in which emotions are emphasized as an important variable associated with facial

expression in the literature were not evaluated in the studies. Axe and Evans (2012) stated that facial expressions' existence without connecting with context is one of the important limitations of their study. Hence, studies are needed in which physical and social contexts give rise to the emergence of facial expressions as an important factor in the naming of facial expressions. (*ii*) For the most part, the studies in which video modeling was used in the instruction of social skills to individuals with autism, treatment integrity data were not collected. In order to eliminate discussions related to independent variables' reliability, it was stated that collecting treatment integrity data were important in video modeling research (Acar & Diken, 2012; Gül & Vuran, 2010; Shukla-Mehta, Miller, & Callahan, 2010). (*iii*) In the data analysis of these studies, social validity data were seen to be outstanding only in one third of the research where video modeling was used in the training of social skills. Social acceptability of target behavior, suitability of video modeling, and its acceptability were not examined by social validity data collection, which was stated to be a serious limitation in the previous studies (Acar & Diken, 2012; Banda, Copple, Koul, Sancibrian, & Bogschutz, 2010; Gül & Vuran, 2010). (*iv*) It was indicated in the studies that there was a need for video modeling intervention to be carried out with individuals from different cultures and language groups on the training of intended social interaction and communication skills (Gül & Vuran, 2010; Shukla-Mehta et al., 2010).

The aim of this study was to determine the effectiveness of video modeling in the training of naming emotional facial expressions to children with autism. For this purpose, answers of the following questions were sought: (*i*) Is video modeling effective in the following situations (*a*) in the training of naming basic emotional facial expressions, (*b*) in maintaining the skill 1, 3, and 5 weeks after they acquired the skill, (*c*) in generalizing the simulation situations that were created by using different materials and settings to both the person modeling the emotions and a person who did not take part in the instruction process? (*ii*) What were the opinions (social validity) of the children's mothers and teachers, and the students registered in the Applied Behavior Analysis in Autism Graduate Program who have intervention experience with children with autism?

## Method

### Participants

Four subjects attending a public university's developmental disability intervention unit and diagnosed with autism participated in the study. In addition, eight non-professional and professional actors for video images were used during video modeling, and two different adult models presented facial expressions in the training and generalization sessions of the study.

**Subjects:** The subjects of the study were three boys and a girl of the ages of 4, 5, and 6 years old diagnosed with autism. Before the study, the subjects' parents were informed about the study, and permission was taken from them for their children's participation. In the reporting process pseudonyms were given to the subjects. None of the subjects had systematic training background related to video modeling and facial expressions, which were dependent variables of the study. In the following lines the prerequisite features of target skills for subjects are described and how they were tested. The prerequisite features desired in the subjects of the research were: (*i*) looking at the face of the opposite person for at least five seconds, (*ii*) watching the image on the computer screen for at least two minutes, (*iii*) imitating the sentences consisting of one or two words, and (*iv*) participating in the activity for four or five minutes. With the purpose of determining whether subjects had these skills, firstly interviews were conducted with their teachers, and observations were made in the subjects' classroom. Each skill was tested by the researcher as follows: (*i*) in classrooms where the intervention was carried out the child was addressed and it was evaluated whether the child looked at the face of the person addressing him or her for at least five seconds, (*ii*) how long the subject watched the image on a computer screen was determined by encouraging the child watch an appropriate cartoon to his or her development level, (*iii*) sentences consisting of one or two words were said to the subject and he or she was asked to imitate (e.g., by demonstrating an action card "What is Ali doing?" task direction was presented by giving a controlling prompt "Ali is running." The subject was asked to imitate the action.), and (*iv*) by presenting the activities such as painting and fixing a jigsaw puzzle, a direction was given to the subject for performing these activities (e.g., "make the jigsaw puzzle"), and it was determined whether the subject focused on it for four to five minutes.

Suna is a six year-old girl with autistic characteristics. When she was four and a half years old she was

diagnosed with pervasive developmental disorder by a child psychiatrist at a state hospital. Suna's IQ was identified as 80 in the applied Leitter IQ Test in the Guidance and Research Center. Suna's developmental performance was evaluated by using the Gilliam Autistic Disorder Rating Scale 2, Turkish version (GOBDO-2-TV) by the researcher. Suna scored 88 points on the Autistic Disorder Index, which means that the possibility of incidence of an autistic disorder is quite high. Suna had been attending a group training that was between 09:00 and 12:30 on weekdays in the developmental disabilities intervention unit of a public university for seven months. Suna had also been attending a preschool with typically developing children everyday on weekdays and a private educational institution for three hours per week. Suna had difficulties in initiating and maintaining social interaction and communication behaviors; she performed similar to her peers in self-care and gross and fine motor developmental areas. Suna could follow directions, including two objects and one action, and express her request by using two or three words. She had the ability of basic mapping, classification, and imitating. She could use the toys related with their functions but could not play an imaginary and symbolic game.

Emre is a five year-old boy with autistic characteristics. When he was five years old he was diagnosed with autism by a child psychiatrist at a state hospital. Emre's score was not determined because he could not reply to the Leitter IQ Test's questions applied in the Guidance and Research Center. Emre's developmental performance was evaluated by the Gilliam Autistic Disorder Rating Scale 2, Turkish version (GOBDO-2-TV) by the researcher. Emre scored 107 points on the Autistic Disorder Index, which means that the possibility of incidence of an autistic disorder was quite high. Emre had been attending a group training that was between 09:00 and 12:30 on weekdays in the developmental disabilities intervention unit of a public university for seven months. Emre had also been attending a preschool with typically developing children everyday on weekdays and a private educational institution for three hours per week. Emre had difficulties in initiating and maintaining social interaction and communication behaviors; he performed similar to his peers in self-care and gross and fine motor developmental areas. Emre could follow simple directions, including one object and one action, and express his requests by using one or two words. He could show and name basic colors and shapes among four options and he could use toys related with their function, but could not play an imaginary and symbolic game.

Aras is a five year-old boy with autistic characteristics. When he was five years old he was diagnosed with autism by a child psychiatrist at a state hospital. Aras' score was not determined because he could not reply to the Leitter IQ Test's questions applied in the Guidance and Research Center. Aras's developmental performance was evaluated by using the Gilliam Autistic Disorder Rating Scale 2, Turkish version (GOBDO-2-TV) by the researcher. Aras scored 114 points on the Autistic Disorder Index, meaning that the possibility of incidence of an autistic disorder was quite high. Aras had been attending a group training that was between 09:00 and 12:30 on weekdays in the developmental disabilities intervention unit of a public university for seven months. Aras had also been attending a private educational institution for three hours per week. Aras had difficulties in initiating and maintaining social interaction and communication behaviors. He also made meaningless sounds and demonstrated intense stereotypic behaviors. He performed similar to his peers in the skills of self-care and gross and fine motor developmental areas. Aras could follow simple directions, including two objects and one action, and express his requests by using one or two words. He could show basic colors and shapes among four options and use toys in line with their function, but he could not play imaginary and symbolic games.

Ege is a four and half year-old boy with autistic characteristics. When he was three years old he was diagnosed with autism by a child psychiatrist at a state hospital. Ege's score was not determined because he could not reply to the Leitter IQ Test's questions applied in the Guidance and Research Center. Ege's developmental performance was evaluated by using the Gilliam Autistic Disorder Rating Scale 2, Turkish version (GOBDO-2-TV) by the researcher. Ege scored 116 points on the Autistic Disorder Index, meaning that the possibility of incidence of an autistic disorder was quite high. Ege had been attending a group training that was between 09:00 and 12:30 on weekdays in the developmental disabilities intervention unit of a public university for seven months. Ege had also been attending a preschool with his typically developing peers for three days per week on weekdays and a private educational institution for ten hours per week. Ege had difficulties in initiating and maintaining social interaction and communication behaviors; he performed similar to his peers in the skills of self-care and gross and fine

motor developmental areas. Ege could follow simple directions, including one object and one action, and express his requests by using a single word. He could show basic colors and shapes among four options and could independently complete six-piece puzzles consisting of randomly cut shapes. He could play games in accordance with their rules but could not play imaginary and symbolic games.

**Adult Models:** Adults also participated in the study as models to the subjects on video images that they would watch and perform simulation situations. Models were volunteer professional and non-professional actors from the city where the research was carried out. Age, gender, and physical characteristics of models (weight, height, hair color, and hair type) on the video images had been noted to show as much diversity as possible. If many examples which consist target stimuli and target response features are presented to the students during training, they will be able to generalize the skill they've learned without a special training provided (Alberto & Troutman, 2013; Sulzer-Azaroff & Mayer, 1991; Walker, Shea, & Bauer, 2007). Hence, presenting multiple examples, one of the generalization strategies, was used to ensure generalization of target behaviors in the research. For this purpose, the subjects were faced with many different models during the video modeling process.

An approximately three-hour study was conducted with models who participated in the research study to inform them about the research process. This information phase consisted of four steps: (*i*) a description of the research's objectives, (*ii*) a description of the definition of facial expressions, (*iii*) promoting fiction contained in the simulation situations, and (*iv*) allowing a chance for intervention.

The video modeling images belong to simulation fictions of eight emotions and were watched by three specialists with doctoral degrees who had performed research and interventions on the autism spectrum disorder field and published studies related to video modeling; their opinions were received regarding the suitability of the images. They were asked to evaluate both content of the images (e.g., whether watched emotion reflected the emotion in data collection form and whether fictions on images took place in the manner of expression) and technical features (e.g., whether images on video were clear and the clarity of sound). All three specialists stated that the video images were prepared in accordance with the purpose of the video.

**Trainer:** All interventions made in the study were conducted by the researcher. The trainer had undergraduate, master's, and doctoral degrees in the special education field. The trainer actively continued instruction studies with children with autism in various contexts (group and one-to-one training, trainer studies). The trainer also conducted undergraduate and graduate courses related to providing effective instruction in the institution where she/he worked.

**Observer:** The trainer and a student who was attending a doctoral program in the special education field collected the reliability data related to the dependent and independent variables of the study. Descriptions related to the study in written and verbal forms were explained to the observer.

### Settings

The study was carried out in one of the one-to-one-study rooms of the institution where the subjects were attending. Dimensions of the room were 4 m. x 2.9 m. and the floor was covered with waterproof soft ground supplies. There were two study tables, chairs, and a bookshelf in the room. Video modeling sessions were carried out in this setting. Browder and Snell (2000) had identified the simulation as creating situations that were close to actual situation skills to be performed during the instruction. In this study, the creation of simulation situations occurred by fictionalizing the creation of physical and social contexts for demonstrating emotional facial expressions. For example, one of simulation fictions created for a feeling of surprise like "when playing in the sand and finding a beard in it."

**Generalization Setting:** Generalization probe sessions were carried out in students' classrooms in the institution where they attended group education.

### Materials

Materials used during the research process were as follows: (*i*) a digital video camera recording facial expressions, (*ii*) a laptop for converting recorded images into video clip and watching the instruction process on computer, (*iii*) video clips of eight facial expressions (resulting from fictional situations and an audio statement expressing the emotion related to these facial expressions), (*iv*) material of the fictional situation related to the facial expressions (e.g., gift pack, doll, and chocolate), (*v*) reinforces for the subjects, and (*vi*) data collection forms. Information about the fiction materials and the fictions related to the target behaviors are presented in Table 1.

Table 1
*Target Behaviors, Simulation Fictions, and Materials used in Fictions*

| Target behaviors | Training materials | Fictions related to simulations in probe and training session | Generalization materials | Fictions related to simulation in generalization session |
|---|---|---|---|---|
| Happy | Gift pack, toy motorcycle, big doll, chocolate | Opening a gift pack in which there is a gift/Playing with a baby doll/Eating chocolate | Ice cream | Eating ice cream |
| Sad | Toy car, story book, candy | Breaking of the car when playing/Tearing of the book when reading/ Falling of the candy when unpacking | Eyeglasses | Breaking of glasses when wearing them |
| Angry | Balloon, water gun, toy clown | Trying to puncture balloon by another person/spraying water to face with water gun by another person/trying to dispose toy clown by another person | | Pulling someone's hair |
| Scared | Fear mask and hanger, model snake, bursting lighter | Seeing mask on the stand/Seeing snake on the wall/Exploding of lighter when handled | Toy skeleton light (20 cm. size) with a spooky ghost sound | Making ghost sound and shining a light when touching the toy skeleton |
| Disgust | Model feces, model puke, model wormy apple | Seeing feces when paper is removed/Seeing puke on the table/ Seeing a worm emerge when handling the apple | Spoon and a plate, in which there is meal and hair | Finding hair in a meal when eating |
| Surprised | Sand box and fake beard, glass without pouring, Santa Claus hat and model bird | Finding a beard when playing with sand/Not being able to drink cola when turning handle glass to drink/Finding a bird when handling Santa Claus hat | A doll with a wig on its head and a big nose | Seeing a doll |
| Feeling physical pain | Wounded finger model, cork board+ hammer+ nail, capped cupboard | Looking at wounded finger and feeling pain/Hit his or her finger when banging a nail with hammer/Closing cupboard on one's finger | Toy and table | Hit his or her head on the table when reaching for the toy |
| Bored | Thick book, colored yarn | Feeling bored when reading/ Trying to unravel tangled yarn/ Sitting with folded arms without doing anything | Pen and notebook | Writing |

**Research Model**

To determine the effectiveness of video modeling on the training of naming emotional facial expressions to children with autism, multiple probe designs with probe trials across behaviors were used and was replicated across subjects. Multiple probe models are research models aimed to evaluate the effectiveness of an instruction or behavior modification program in multiple situations (Tekin-İftar, 2012). In the multiple probe design with probe trials across behaviors, experimental control was set by increasing the possibility of correct responses by the subjects on the training set that was started to be taught. In multiple probe designs with probe trials across behaviors, experimental control can be provided with the increase of the number of correct responses in participants, besides, without an important change in the sets which hasn't started to be taught yet, and a consecutive repeat in the other teaching sets (Tekin-İftar, 2012). The research began with baseline probe sessions of all training sets. In the first training set, the collection of baseline data were done until obtaining at least three stable data points and baseline data were obtained in other training sets. After obtaining stable data in baseline probe sessions, the intervention began in the first training set. Training sessions were performed until the criteria were met in the first training set. While training sessions were performed at the first training set, probe data were collected in another two training sets intermittently. When the criteria were met in the first training set, baseline data were collected until obtaining at least three stable points in the second teaching set and then intervention was started. When training sessions were continued with the second training set, probe data were collected in the third training set intermittently. When the criteria were met in the second training set, baseline data were collected until obtaining at least three stable points in the third teaching set, and then subsequent intervention training sessions were performed until the criteria were met.

With the aim of controlling factors that affect internal validity, the researcher gave information about the research to the subjects' parents and teachers; the trainer asked that the children not be provided

training on this subject until the end of the research. Also, in order to control for the maturation process, the study was completed in a reasonable period and was carried out with four children.

### Dependent Variable

The dependent variable of the study was naming eight emotional facial expressions. The skill of naming emotions was defined as a verbal statement by the subject of a corresponding emotional expression that appeared on the face of the person opposite the subject after an event or situation within four seconds. A literature review was conducted to determine dependent variables of the study. Results of the literature review about this topic showed that there were dozens of emotions and their corresponding facial expressions, but six to eight of these were considered basic emotions frequently encountered in daily life (Axe & Evans, 2012; Balconi et al., 2012; Crissey, 2008; Ekman, 1999; Emotional Competency, 2014; Lierheimer & Stichter, 2011). Hence, in this study it was aimed to name eight basic emotions mentioned in the literature. Training sets in the scope of dependent variables were created, thereby analyzing levels of difficulty. While analyzing difficulty level, name, length, sound structure, and facial expressions corresponding to emotions were considered; so three training sets were created. A total of three separate training sets were created with target behaviors; two in the first, three in the second, and three in the third for a total of eight target behaviors. Training sets, dependent variables, and descriptions of the study are shown in Table 2. These descriptions were defined based on Emotional Competency (2014) and Lierheimer and Stichter (2011).

### Probable Subject Responses in the Probe, Training, Maintenance, and Generalization Sessions

It was expected that subjects would demonstrate correct or incorrect responses in all experimental sessions. The subjects' responses in training sessions, intermittent probe sessions, and maintenance and generalization sessions were noted on the data collection form. Correct and incorrect response descriptions are listed below:

**Correct Responses:** Defined as a verbal statement (e.g., sad, feeling sad) of a corresponding emotional expression that results after an event or situation and appears on the face of the person opposite to the subject; the subject must give the verbal statement within four seconds after the skill direction was given.

**Incorrect Responses:** Defined as the subject not stating the corresponding verbal statement of the emotional expression that results after an event or situation and appears on the face of the person opposite to subject within four seconds after the skill direction was given or not responding to the skill direction by object (e.g., couldn't use "sad" or "feeling sad" expressions or express incorrectly).

### Independent Variable

The independent variable of the study was video modeling. Simulations of each target behavior were created by the researcher to teach emotional facial expressions in the training process with video modeling. A requirement situation was created to perform each target behavior in simulation situations, then an image expressed this

Table 2
*Training Sets, Dependent Variables, and Descriptions*

| | Facial expression | Description of facial expression | Response of model | Acceptable response of subject |
|---|---|---|---|---|
| I. Training Set | Happy | Eyes open (neither little nor much)/smiling/ forehead is smooth | Feeling happy | Happy/Feeling happy. |
| | Angry | Narrowed eyes/beetle brows/narrowed lips-clamped teeth/forehead slightly winkled | Feeling angry | Angry/Feeling angry. |
| II. Training Set | Sad | Eyes closed a bit because of prolapse on the eyelids/ eyebrows down/mouth down/fore-head smooth | Feeling sad | Sad/Feeling sad. |
| | Scared | Eyes fully open/eyebrows upward/mouth a bit open and strained to downward | Feeling scared | Scared/Feeling scared. |
| | Disgusted | Eyes a bit narrowed/lips bent/forehead slight-ly winkled/head slope slightly to backward | Feeling disgusted | Disgusted/Feeling disgusted. |
| III. Training Set | Surprised | Eyes a bit open/eyebrows up/mouth open/ forehead slightly winkled | Feeling surprised | Surprised/Feeling surprised. |
| | Feeling phys-ical pain | Narrowed eyes/fractioning forehead/closing and moving lips | Feeling pain | Pain/Feeling pain. |
| | Bored | Drooping face/lips downward | Feeling bored | Bored/Feeling bored. |

experienced emotion as a result of this designed situation, and video modeling interventions were carried out by designing video images which name this performed emotion.

**General Process**

To determine in advance possible problems that might occur in the experimental process and to perform necessary adaptations, a pilot study was carried out with a child who was not a subject of the study. For the pilot study a child was selected with similar characteristics to the subjects of this study. After the pilot study, it was decided to conduct the study as planned. The experimental process consisted of probe (baseline/intermittent), training, maintenance, and generalization sessions. All sessions were carried out with a one-to-one training format on weekdays with one session daily.

**Baseline Probe Sessions**

Before starting the training set, baseline probe sessions were organized until obtaining stable data in at least three consecutive sessions. Baseline data were collected intermittently (once a week) fort he teaching sets which hasn't been to be taught yet. After subjects demonstrated 100% correct behavior performance in three consecutive sessions, baseline data were collected until obtaining stable data in the second behavior set with three sessions. After the subject demonstrated 100% correct performance in three consecutive sessions of the second behavior set that was taught, baseline data were collected until obtaining stable data of the third behavior set for three consecutive sessions. These sessions were held in the form of a probe session for each training set every day. In each probe session three trials were conducted for naming each emotion of the training sets. In other words, in the baseline probe sessions, one trial was performed for each simulation situation that addressed each target behavior, and six trials for the first nine trials of the other training sets were organized. The intertrial intervals were five seconds. Target behaviors that took place in the training sets were asked with an unpredictable order in the probe sessions. In the probe sessions correct responses were reinforced by using social reinforcers with a constant reinforcement schedule. Incorrect responses were ignored. Social reinforcers were used at the end of all sessions to commend the subjects on their cooperation (e.g., Aras, you are great, you worked very well!).

While collecting data for probe trials, simulation situations fictionalized for the evaluation of target behaviors were created (see Table 1). To direct subjects' attention to the study, the trainer asked "Aras, are you ready to work?" When the subject indicated his readiness to work (e.g., subject nods his head), the trainer praised him/her (e.g., Bravo!), the model performed the fiction situation (e.g., hit his hand when banging a nail) with the facial expression and the trainer presented the task direction to the subject (e.g., what do you think he is feeling?). The trainer waited for four seconds in order to get the subject's response. Correct answers expressed within four seconds were rewarded with social reinforces (e.g., You are awesome) and incorrect responses were ignored.

**Intermittent Probe Sessions**

Intermittent probe sessions were organized to determine subjects' performance related to all skills trained in the intervention process and in graphic obtained data from sessions formed data that took place in training phase. In order to determine whether subjects met criteria, the percentage of correct responses they performed in the intermittent probe sessions was calculated. These obtained percentages were transferred into the graphs. Until the subjects performed 100% correct response in three consecutive sessions in intermittent probe sessions, training sessions were carried out with reference to the idea that it could make intervention easier and reduce the probable incorrect responses of the subject. Until the correct response of the subject in the intermittent probe sessions criteria was met, it was reinforced by using a constant reinforcement schedule and primary reinforcers (food). Apart from the reinforcer used in intermittent probe sessions, the same process was followed in baseline probe sessions.

**Training Sessions**

After obtaining stable data in the baseline probe sessions, the training of target behaviors began. The training was carried out until the subjects performed the trained skills 100% correctly in three consecutive sessions. All sessions were carried out with a one-to-one training format on weekdays with one session daily. In the training sessions one trial was performed for each simulation situation, which addressed each target behavior; six trials were performed for the first session and nine trials were held for the other training sets. The intertrial

intervals were five seconds. The emotions in the teaching sets were trained one after another in each training session. In other words, first the video images related to the emotion (e.g., happy) were watched during each training session, then all simulation fictions were watched in order to perform the emotions. Then the same process was repeated for the training of all emotions of the training set. During the training sessions the trainer and the subject were seated side-by-side in front of the computer screen. The trainer provided explanations about the study and distinctive stimuli to direct the subject's attention to the study (e.g., Aras, we are learning the emotions now. Look, there is one here, let's watch it. Are you ready?). If the subject expressed that he was ready for the task by signalizing or verbally confirming, she was reinforced by the trainer (e.g., Well done!). If the subject was distracted while watching the video, to direct his/her attention to computer screen again, the trainer encouraged the subject verbally and by pointing to the computer screen (e.g., Look at the screen!). After watching the image the trainer gave reinforcement to the subject because he/she watched the image perfectly (e.g., Well done Aras, you watched the image carefully, now look there is someone here, let's look what he is doing.). When they reached the simulation area where the target behavior would be carried out, the trainer presented pre-distinctive stimuli to the subject (e.g., Now look at the boy/girl here.). Another person in the simulation setting carried out the first live fiction similar to the fiction on video (e.g., a warm coming out while eating an apple) and when the subject performed a facial expression corresponding to that emotion the trainer asked him or her about this (What do you think he is feeling? When he handled the apple, a worm appeared.). The subject's correct responses were reinforced by using primary reinforcers (food) and social reinforcers through a constant reinforcement schedule until he or she demonstrated 100% performance for the first session. Incorrect responses were ignored. After successful completion of the first session with 100% performance, by fading the reinforces gradually only social reinforces were used through a fixed ratio (FR2) reinforcement schedule. The trainer reinforced the subjects' attention and his/her cooperative participation through social reinforcers at the beginning and at the end of the training sessions.

**Maintenance and Generalization Sessions**

The maintenance sessions were organized after meeting the criteria for target behaviors one, three, or five weeks later. A generalization study was conducted in a pretest-posttest design probe. A generalization study was conducted with different simulation fictions created by using materials that did not take place in the training process under different settings, persons who both presented a model during the training process and who did not take part in the training process for each emotion. The subject was reinforced by using a variable ratio reinforcement schedule (VR3) with only social reinforces after he/she met the criteria regarding the target behavior. The reinforcement schedule process used in the maintenance sessions was also followed in the generalization sessions.

**Social Validity**

With the purpose of determining the suitability of methods used in target behavior training and importance of results obtained from the study for parents and teachers of the subjects registered in Applied Behavior Analysis in Autism post-graduate and had experience with children with autism. The Social Validity Form was improved; in the form prepared for the mothers, there were nine yes-no statements and two description questions; and in the form prepared for the teachers and post-graduate students, there were seven yes-no statements three description questions. For this purpose an envelope was prepared for the post-graduate students, subjects' parents and teachers. It included a DVD with the images of the children during the training and a social validity form prepared for determining their opinions. When the trainer delivered the envelope to parents, teachers, and post-graduate students he gave them information about the content of the DVD and the form and asked them to fill out the form after watching the image on DVD. Forms were collected in closed envelopes without including personal identification information from participants. A subjective evaluation method was used in determining social validity; data obtained from this form was analyzed descriptively (Kurt, 2012).

**Reliability**

Inter-observer reliability and treatment integrity data were collected in at least 20% of the sessions held during the study. Reliability data of the study was collected by the doctoral student who was

a researcher and trained in a special education field. Reliability data were recorded by using data collection forms improved for probe, training, maintenance, and generalization sessions.

**Inter-Observer Reliability:** For the analysis of inter-observer reliability data, the formula "Consensus/Consensus + Dissensus × 100" was used (Erbaş, 2012; Tawney & Gast, 1984). The inter-observer reliability co-efficient was determined as 100%, which was carried out on the sessions of the probe, training, intermittent probe, maintenance, and generalization in all subjects.

**Treatment Integrity**: When analyzing the treatment integrity data, a percentage was determined by using the formula "Trainer Behavior Observed/ Planned Trainer Behavior × 100" (Billingsley, White, & Munson, 1980; Erbaş, 2012). When treatment integrity data were collected in probe sessions, the following behaviors were taken into consideration: (*i*) the trainer preparing video and materials, (*ii*) model performing the fiction in the simulation situation, (*iii*) model performing the emotion, (*iv*) the trainer presenting skill direction, (*v*) waiting for the subject's response (four seconds), (*vi*) subjects providing an appropriate response (reinforcing correct responses and ignoring the wrong ones), (*vii*) waiting for the inter-trial intervals (five seconds), and (viii) the subjects reinforcing by showing participation in the study and cooperation. When treatment integrity data were collected in the training sessions, the following behaviors were taken into consideration; (*i*) the trainer preparing video and materials, (*ii*) providing the student's attention for watching video images, (*iii*) the subject watching the video, (*iv*) the trainer reinforcing the subject for watching the video, (*v*) model performing the fiction in the simulation situation, (*vi*) model performing the emotion, (*vii*) the trainer presenting skill direction, (*viii*) waiting for the subject's response (four seconds), (*ix*) subjects providing an appropriate response (reinforcing correct responses and ignoring incorrect ones), (*x*) waiting for the inter-trial intervals (five seconds), and (*xii*) the subjects reinforcing by showing participation in this study and cooperation. The treatment integrity co-efficient was determined as 100% related to probe, training, intermittent probe, maintenance, and generalization sessions in all subjects.

## Results

### Effectiveness Results

Collected data related to learning the naming of emotional skills via video modeling by the subjects of the study (Suna, Emre, Aras, and Ege) is in Figures 1-4, respectively.

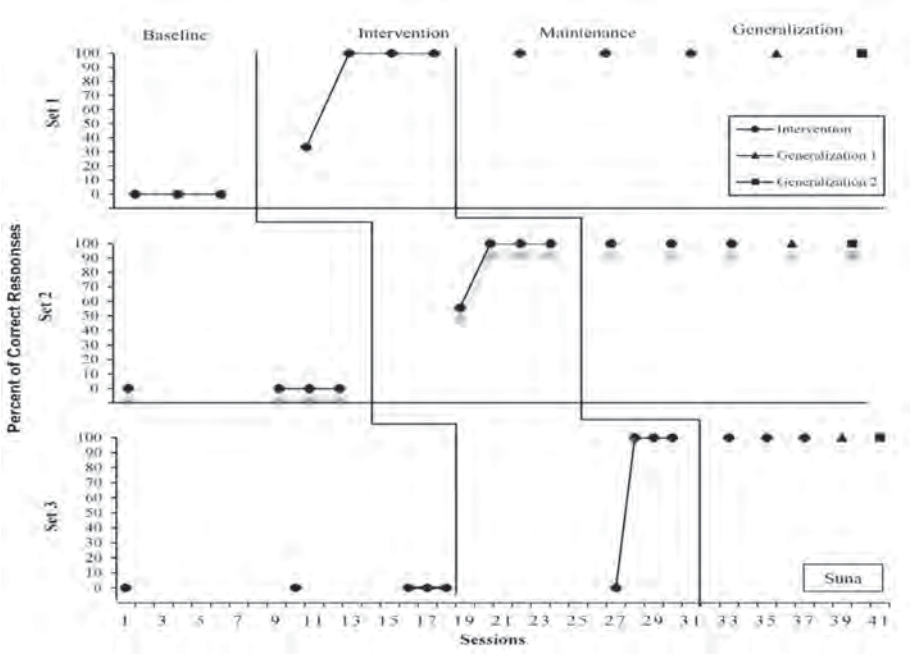


*Figure 1:* Suna's correct response percentage related to emotional facial expression in baseline, intervention, maintenance, and generalization probe sessions. Data related to intervention phase were collected in the intermittent probe sessions.

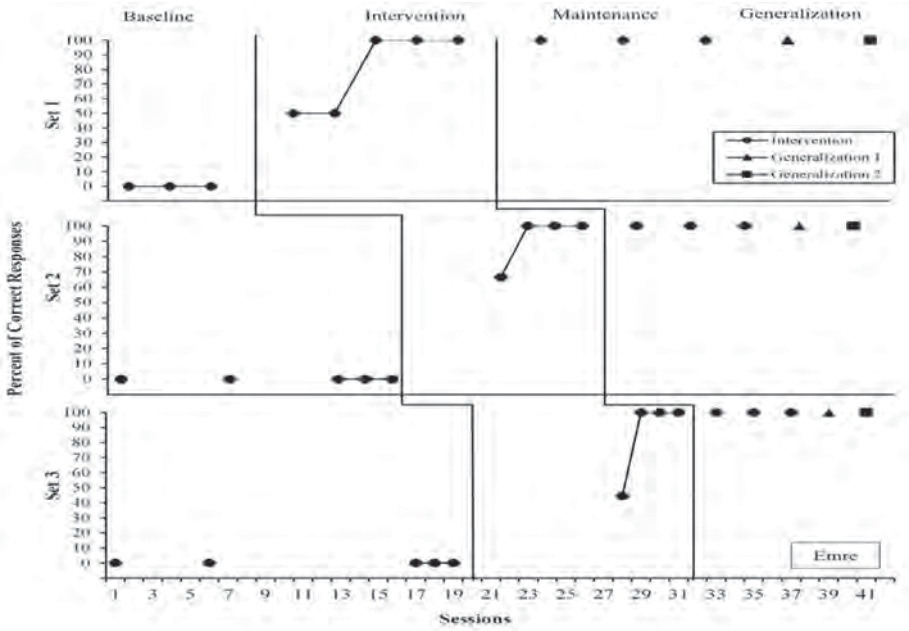


*Figure 2:* Emre's correct response percentage related to emotional facial expression in baseline, intervention, maintenance, and generalization probe sessions. Data related to the intervention phase were collected in the intermittent probe sessions.

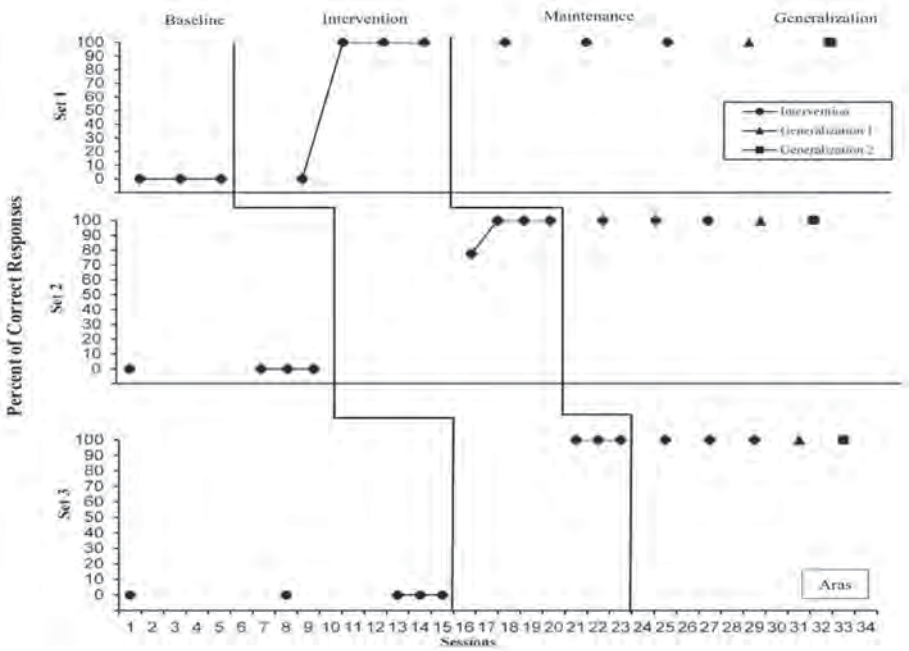


*Figure 3:* Aras's correct response percentage related to emotional facial expression in baseline, intervention, maintenance, and generalization probe sessions. Data related to the intervention phase were collected in the intermittent probe sessions.

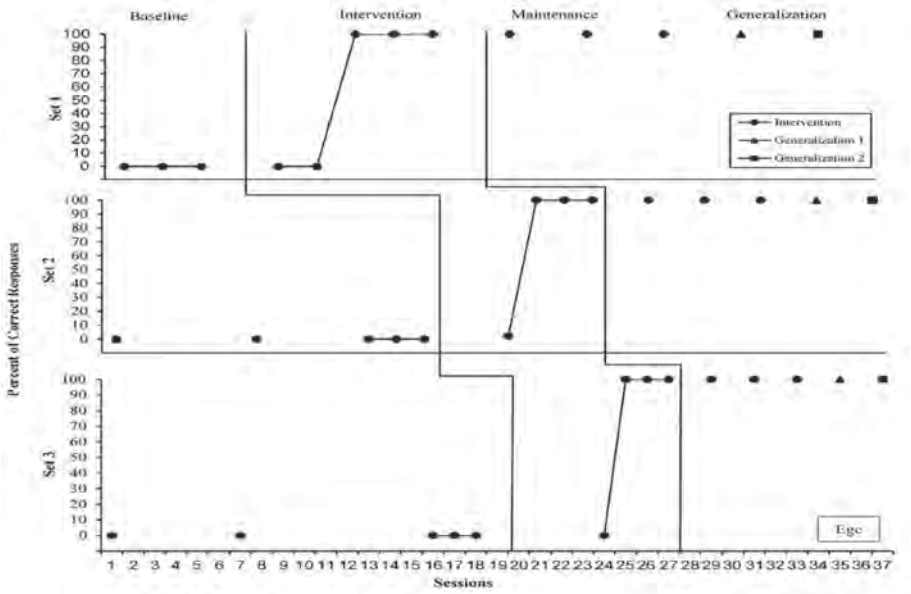


*Figure 4:* Ege's correct response percentage related to emotional facial expression in baseline, intervention, maintenance, and generalization probe sessions. Data related to the intervention phase were collected in the intermittent probe sessions.

When data obtained from target skills were examined it was seen that Suna did not perform correct responses to all of the training sets in the baseline phase. Suna responded 100% correct in all target training sets by meeting the criteria in the intervention phase in which video modeling was used. When data obtained from maintenance sessions was examined, it was seen that Suna maintained the skills learned from previous training sets at 100% correct (see Figure 1).

When data obtained from target skills were examined, it was seen that Emre did not perform correct responses to all of the training sets in the baseline phase. Emre responded 100% correct in all target training sets by meeting the criteria in the intervention phase in which video modeling was used. When data obtained from maintenance sessions was examined, it was seen that Emre maintained the skills learned from previous training sets at 100% correct (see Figure 2).

When data obtained from target skills were examined it was seen that Aras did not perform correct responses to all of the training sets in the baseline phase. Aras responded 100% correct in all target training sets by meeting the criteria in the intervention phase in which video modeling was used. When data obtained from maintenance sessions was examined, it was seen that Aras maintained the skills learned in previous training sets at 100% correct (see Figure 3).

When data obtained from target skills were examined it was seen that Ege did not perform correct responses to all of the training sets in the baseline phase. Ege responsed 100% correct in all target training sets by meeting the criteria in the intervention phase where video modeling was used. When data obtained from maintenance sessions was examined, it was seen that Ege maintained the skills learned in previous training sets at 100% correct (see Figure 4).

**Generalization Results**

Generalization data were collected for each emotion by using different materials in different simulation fictions and different settings which did not take place in the training sessions, besides, model who took place in the training sessions and a model who did not take place in the training sessions were also participated in the generalization sessions. It was seen that all subjects did not response correctly in the pre-test generalization sessions and that they could generalize the training set skills with a 100% accuracy level in the post-test generalization sessions (see Figures 1-4).

**Instructional Data**

When the data obtained from the training sessions were examined, Suna learned naming

Table 3
*Instructional Data*

| Subjects | No. of training sessions/ training trials | No. and % of training errors | Training time (h:m:s) | No. and % of intermittent probe | Intermittent probe (h:m) |
|---|---|---|---|---|---|
| Suna | 12-96 | 24-25.00 % | 1:16:23 | 14-17.58 % | 22:59 |
| Emre | 14-108 | 33-30.55 % | 1:31:18 | 14-14.52 % | 30:22 |
| Aras | 10-78 | 32-41.02 % | 1:07:02 | 8-11.10 % | 27:30 |
| Ege | 14-108 | 55-50.92 % | 1:29:17 | 28-29.05 % | 26:47 |

emotional facial expressions that took place in all of the training sets by the end of the 12 training sessions. 96 trials were conducted with Suna in all of the training sessions until the criteria were met; training sessions lasted for a total of 1 hour, 16 minutes, and 23 seconds and the intermittent probe sessions lasted for a total of 22 minutes and 59 seconds. Suna performed 24 (25%) incorrect responses in training sessions until criteria were met and 14 (17.58%) incorrect responses in the intermittent probe sessions (see Table 3).

When the data obtained from the training sessions were examined, Emre learned naming emotional facial expressions that took place in all of the training sets by the end of the 14 training sessions. 108 trials were conducted with Emre in all training sessions until the criteria were met; training sessions lasted for a total of 1 hour, 31 minutes, and 18 seconds, and the intermittent probe sessions lasted for a total of 30 minutes and 22 seconds. Emre performed 33 (30.55%) incorrect responses in the training sessions until criteria were met and 14 (14.52%) incorrect responses in the intermittent probe sessions (see Table 3).

When the data obtained from the training sessions were examined, Aras learned naming emotional facial expressions that took place in all of the training sets by the end of 10 training sessions. 78 trials were conducted with Aras in all training sessions until the criteria were met; training sessions lasted for a total of 1 hour, 7 minutes, and 02 seconds, and the intermittent probe sessions lasted for a total of 27 minutes and 30 seconds. Aras performed 32 (41.02%) incorrect responses in the training sessions until criteria were met and 8 (11.10%) incorrect responses in the intermittent probe sessions (see Table 3).

When the data obtained from the training sessions were examined, Ege learned naming emotional facial expressions that took place in all of the training sets by the end of 14 training sessions. 108 trials were conducted with Ege in all training sessions until the criteria were met; training sessions lasted for a total of 1 hour, 29 minutes, and 17 seconds, and the intermittent probe sessions lasted for a total of 26 minutes and 47 seconds. Ege performed 55 (50.92%) incorrect responses in the training sessions until criteria were met and 28 (29.05%) incorrect responses in the intermittent probe sessions (see Table 3).

**Social Validity Results**

In the study, social validity results related to the importance of the results obtained from the study were collected from a total of 18 people: 4 of them were mothers of the subjects, 2 of them were teachers of the subjects, and 12 were post-graduate students.

All mothers stated that naming emotional facial expressions was an important skill for their children; and they mentioned that they were satisfied about the study's process of showing short films to their children for teaching the target skills and also about their children's participation in the study. Two of the mothers answered "yes" and two answered "no" to the following question: "Do you think that you can teach other skills to your children by using video modeling?" All of them stated that their children learned target skills, observed these skills outside of school, and opined that teaching these skills to their children contributes to their social and emotional development. Mothers expressed the changes that they saw in their children with the following comments: "s/he understands the emotions of TV characters and tells them to me or s/he tells me when other people are scared," "s/he doesn't behave carelessly and responds to my reaction.," "started to express his/her feelings; for example, he says 'it hurts' when water is very hot in bath," "s/he understands my facial expressions and responds." They indicated positive aspects of the study with the following comments: "participation of real people and events in the study, using video modeling in the study, children learning even abstract concepts with a systematic training method, children learning facial expressions by the end of the study." They indicated that there was no negative part of the study.

All of the teachers of the training sessions and all of the post-graduate students stated that the training

of naming emotions was an important skill for autistic individuals and video modeling could be used in training studies with children. Once again, all the teachers of stated that they were satisfied with participating in the study and the post-graduate students stated that their students would want to participate in a study aimed at teaching the skill of naming emotions; also, all participants stated that being taught this skill could contribute to the child's social and emotional development. While 13 people, including training session teachers and post-graduate students, participating in the social validity study said that the one-to-one training interventions carried out with children with autism by using video modeling could be used easily, one participant said that he was hesitant; while 7 participants stated that video modeling training method in the group training interventions could be used easily, 7 participants stated that they were hesitant. Eight of the participants participating in the social validity study stated that the training process carried out with video modeling was not a costly process, 3 of them stated that it was a costly process, and 3 of them stated that they were hesitant about it. When the teachers and post-graduate students were asked about which aspects of the study they liked, they stated that "the used materials were various and attractive; models were real persons during the training; when considered the basic inadequacies that children with autism experience, this study deeply contributed to the field and the children, performing the most common emotional context in daily life." Finally, when the participants were asked about the undesired aspects of this study, they answered that there was nothing inacceptable or unwanted.

## Discussion

In this study, the effectiveness of video modeling was examined for teaching the naming of emotional facial expressions to children with autism. In addition, it attempted to determine the opinions of the training session teachers and the students registered in the Applied Behavior Analysis in Autism Program who had experience in working with children with autism. Study results demonstrated that video modeling was effective in teaching the naming of emotional facial expressions to children participating in the study. Furthermore, it was seen that the subjects could maintain these skills after the end of the intervention, and they could also generalize different simulation situations created by using different materials to different settings and to persons who presented a model during the intervention and those who did not. Social validity results collected from the subjects' mothers and teachers, and the post-graduate students demonstrated that they had positive opinions about the training of emotional facial expressions to children with autism. The study was discussed on various dimensions in light of the study results, and suggestions were made for further studies.

In the literature only two research studies were performed on the training of naming emotional facial expressions (Axe & Evans, 2012; Charlop-Christy et al., 2000). Results of the present study were in a parallel fashion with the other studies' results regarding teaching facial emotional expressions. However, training sessions in previous studies were carried out and evaluated by presenting just one person's facial expression on images and video. Unlike similar studies, many different situations leading to an appearance of an emotional facial expression were created and different people took part in this study. In other words, different situations were created for the appearance of each facial expression and the emotions experienced as a consequence of these were used here. When difficulty of recognizing facial expression without observing the process that revealed the emotion and observing the importance of reasons and results causing the emotion to recognize facial expression (Balconi & Carrera, 2007; Balconi et al., 2012; Russell & Widen, 2002) was considered, one could think that this was one of the powerful parts of the study. Furthermore, it could be said that the results of this study contributed to an expansion of limited literature carried out by the training of these skills (Axe & Evans, 2012; Charlop-Christy et al., 2000). Unlike previous studies, facial expressions frequently encountered in daily life (such as surprise, feeling physical pain, and anger), were included in this study, and it was conducted with subjects who had different characteristics from those in the literature. Therefore, it can be thought that the effectiveness results contribute significantly to the literature in terms of both training of different facial expressions and a generalization to subject group having different features.

Results of the study demonstrated that all subjects maintained the emotional facial expressions taught by using video modeling after the end of the training. The results also demonstrated that all subjects could generalize obtained skills to different simulation situations created by using different

materials, to different settings and to person both presenting a model during intervention and not taking part in in the training process. Data of the study demonstrated consistency with the results of other studies in the literature (Axe & Evans, 2012; Charlop-Christy et al., 2000). However, when the generalization results of the studies in the literature were examined, it was seen that taught skills were not evaluated in real or similar situations; they were only evaluated by watching facial expressions on video clips. In this study, generalization evaluations were assessed in different simulation fictions, persons, and settings created by thinking of possible situations that might be encountered in daily life with materials that were not used in the training. When difficulties of children with autism in generalization of learned skills were considered, (Neisworth & Wolfe, 2005) the generalization sessions could be evaluated as powerful parts of this study. Moreover, study results extended the results of literature in terms of the maintenance and generalization effects.

When the study results were evaluated in terms of social validity, it was seen that the subjects' parents and teachers, and the post-graduate students gave a positive opinion of the study. Social validity data were collected only from the subjects' teachers who participated in this unique study in which emotional facial expressions were taught by video modeling; this data were similar to the social validity results obtained from Axe and Evans (2012). Schwartz and Baer (1991) stated that collecting data from only direct consumers of studies was lacking for the studies related to determining social validity. In order to correct this deficiency, social validity data needs to be collected from individuals who were in a close relationship with the participants in the intervention (e.g. the subjects' parents or teachers), or people who interact directly or indirectly with them (e.g. peers or a candidate teacher who works in the field and who could interact with the children showing developmental disabilities (Kurt, 2012). In addition, the social skills training was only observed in one third of the studies in which video modeling was used. The social validity data of this study could contribute to the existing literature on mothers', teachers', and post-graduate students' feedback on autistic subjects' development.

In addition to obtaining effective results related to the use of video modeling for the naming of emotional expressions training in children with autism, several points should be discussed in this study. The first of all, the subjects arrived at the criteria in the 2nd and 3rd training sets, within a short time and in less training sessions in comparison with training set. It was observed that in the sessions organized after the first training the subjects looked at the face of the opposite model and made eye contact for longer periods of time. This situation was taught to accelerate the learning process of the subjects. Furthermore, it was supportive that the subjects' teachers made statements that the children looked at their faces longer. As a result it could be thought that although this change was not included in the targets of the study, it was an important contribution to the children's development.

Another powerful aspect of the study was that the treatment integrity data collected was practiced with all subjects with 100% reliability in order to determine whether the study was executed as planned. Treatment integrity data were not collected in the majority of the studies in the literature in which social skills training and video modeling were used (Acar & Diken, 2012; Shukla-Mehta et al., 2010). With the purpose of determining whether integrity treatment data were practiced as an independent variable as planned, not collecting treatment integrity data brought a discussion of whether the change occurring in the dependent variable only arose from independent variable. It could be thought that the collection of treatment integrity data were important in two terms. First, it could be thought that it could eliminate the limitation in the existing literature. Second, we could say that the treatment integrity data obtained from the study was an indicator of a fairly high level of video modeling.

In spite of obtaining effective results of video modeling in the training of facial expressions to children with autism, there were some limitations that were thought to have affected the results of the study. First of all, four children with autism were taught eight emotional facial expressions; therefore, the results obtained from this study were limited. However, when this limitation was evaluated in the literature, starting the training of facial expressions with the most common facial expressions in daily life should be taken into consideration (Leirheimer & Stichter, 2011). Because the four children who participated in the study were not familiar with any facial expression prior to study, only the training of these eight emotional facial expressions was conducted. Secondly, although it was attempted to create natural contexts for the formation of emotional facial expressions in the study, these situations did not happen in real life naturally.

Suggestions for further studies could be considered in terms of the results and limitations of this study: (*i*) The effectiveness of video modeling in the training of naming emotional facial expressions to four children with autism was evaluated. Hence, the study could be repeated with children who had different autistic features; (*ii*) The training of facial expressions that were different from those eight facial expressions that were taught in the present study could be aimed to be taught; (*iii*) The use of gestures or intonations during speech was another component of social interaction that could be trained; (*iv*) The effectiveness of different methods for the training of facial expressions could be explored; (*v*) A comparison study of the effectiveness and efficiency of different training methods of video modeling for the training of emotional facial expressions; (*vi*) Faithful usage of video modeling could be determined by parents and specialists who work in this field (e.g., physiotherapist, language and speaking therapist); (*vii*) A study carried out in the subjects' special educational institutions. By using different public settings for a study (e.g., park or shopping center) the skill performance level of the subjects could be observed; (*viii*) This study was carried out with a one-to-one training method. A similar study could be carried out with interventions such as observational learning and non-target information obtained in a group training method.

In conclusion, the training was an effective process for learning of the skill of emotional facial expression recognition through video recordings and the observation of the contexts leading to the expressions. It can be suggested that trainers and researchers working with autistic individuals use video modeling in the training of facial expressions and different social skills. Because the preparation of videos is not costly and the use of video modeling is easy, this training method can be preferred by trainers and parents.

## References


Acar, Ç., & Diken, İ. (2012). Reviewing instructional studies conducted using video modeling to children with autism. *Educational Sciences: Theory* & *Practice, 12,* 2731-2735.

Akechi, H., Senju, A., Kikuchi, Y., Tojo, Y., Osanai, H., & Hasegawa, T. (2009). Does gaze direction modulate facial expression processing in children with autism spectrum disorder? *Child Development, 80,* 1134–1146.

Alberto, P. A., & Troutman A. C. (2013). *Applied behaviour analysis for teachers* (9th ed.). New Jersey, NJ: Pearson.

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*. Author.

Ashwin, C., Wheelwright, S., & Baron-Cohen, S. (2006). Attention bias to faces in Asperger Syndrome: A pictorial emotion stroop study. *Psychological Medicine, 36,* 835–843.

Axe, J. B., & Evans, C. J. (2012). Using video modeling to teach children with PDD-NOS to respond to facial expressions. *Research in Autism Spectrum Disorders, 6,* 1176-1185.

Balconi, M., & Carrera, A. (2007). Emotional representation in facial expression and script. A comparison between normal and autistic children. *Research in Developmental Disabilities, 28,* 409–422.

Balconi, M., Amenta, S., & Ferrari, C. (2012). Emotional decoding in facial expression, scripts and videos: A comparison between normal, autistic and Asperger children. *Research in Autism Spectrum Disorders, 6,* 193–203.

Banda, D. R., Copple, K. S., Koul, R. K., Sancibrian, S. L., & Bogschutz, R. J. (2010). Video modelling interventions to teach spontaneous requesting using AAC devices to individuals with autism: A preliminary investigation. *Disability and Rehabilitation, 32,* 1364–1372.

Baron-Cohen, S. (2002). The extreme male brain theory of autism. *Trends in Cognitive Science, 6,* 248–254.

Bellini, S., Akullian, J., & Hopf, A. (2007). Increasing social engagement in young children with autism spectrum disorders using self-modeling. *School Psychology, 36,* 80-90.

Bidwell, M. A., & Rehfeldt, R. A. (2004). Using video modeling to teach a domestic skill with on embedded social skill to adults with severe mental retardation. *Behavioral Intervention, 19,* 263-274.

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

Browder, D. M., & Snell, M. E. (2000). Teaching functional academics. In M. E. Snell & F. Brown (Eds.), *Instruction of severe disabilities* (5th ed., pp. 453-543). Upper Saddle River, NJ: Prentice Hall.

Buggey, T. (2005). Video self-modeling applications with students with autism spectrum disorder in a small private school setting. *Focus on Autism and Other Developmental Disabilities, 20,* 52-73.

Buggey, T., Hoomes, G., Sherberger, M. E., & Williams, S. (2011). Facilitating social initiations of preschoolers with autism spectrum disorders using video self-modeling. *Focus on Autism and Other Developmental Disabilities, 26,* 25-36.

Celani, G., Battacchi, M. W., & Arcidiacono, L. (1999). The understanding of the emotional meaning of facial expressions in people with autism. *Journal of Autism and Developmental Disorders, 29,* 57–66.

Charlop, M. H., Carpenter, M. H., & Greenberg, A. L. (2010). Teaching socially expressive behaviors to children with autism through video modeling. *Education and Treatment of Children, 33,* 371-393.

Charlop-Christy, M. H., & Daneshvar, S. (2003). Using video modeling to teach perspective taking to children with autism. *Journal of Positive Behavior Intervention, 5,* 12-21.

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.

Crissey, P. (2008). *Learning to read facial expressions. Autism Asperger's digest.* Retrieved from http://autismdigest.com/learning-to-read-facial-expressions

Ekman, P. (1999). Basic emotions. In T. Dalgleish & M. Power (Eds.), *Handbook of cognition and emotion* (pp. 45-60). Chichester: John Wiley&Sons.

Emotional Competency. (2014). Learn to recognize these emotions in yourself and others. Retrieved from http://www. emotionalcompetency.com/recognizing.htm

Erbaş, D. (2012). Güvenirlik. In E. Tekin-İftar (Ed.), *Eğitim ve davranış bilimlerinde tek-denekli araştırmalar* (pp. 109-128). Ankara: Türk Psikologlar Derneği Yayınları.

Gül, S. O., & Vuran, S. (2010). An analysis of studies conducted video modeling in teaching social skills. *Educational Sciences: Theory & Practice, 10,* 249-274.

Hall, L. J. (2009). *Autism spectrum disorders from theory to practice.* Upper Saddle River, NJ: Pearson.

Kadak, M. T., Demir, T., & Doğangün, B. (2013). Otizmde yüz ve duygusal yüz ifadelerini tanıma. *Psikiyatride Güncel Yaklaşımlar, 5,* 15-29.

Klin, A., Jones, W., Schultz, R., Volkmar, F., & Cohen, D. J. (2002). Visual fixation patterns during viewing of naturalistic social situations as predictors of social competence in individuals with autism. *Arch Gen Psychiatry, 59,* 809-816.

Koenig, K. (2012). *Practical social skills for autism spectrum disorders.* New York, NY: Norton & Company.

Kurt, O. (2012). Sosyal geçerlik. In E. Tekin-İftar (Ed.), *Eğitim ve davranış bilimlerinde tek-denekli araştırmalar* (pp. 375-394). Ankara: Türk Psikologlar Derneği Yayınları.

LeBlanc, L. A., Coates, A. M., Daneshvar, S., Charlop-Christy, M. H., Morris, C., & Lancaster, B. M. (2003). Using video modelling and reinforcement to teach perspective-taking skills to children with autism. *Journal of Applied Behavior Analysis, 36*, 253-257.

Leirheimer, K., & Stichter, J. (2011). Teaching facial expressions of emotion. *Beyond Behavior, 21,* 20-27.

Mason, R. A., Ganz, J. B., Parker, R. I., Burke, M. D., & Camargo, S. P. (2012). Moderating factors of video-modeling with other as model: A meta-analysis of single-case studies. *Research in Developmental Disabilities, 33,* 1076-1086.

Murray, S., & Noland, B. (2013). *Video modeling for young children with autism spectrum disorders.* Philadelphia: Jessica Kingsley Publishers.

National Autism Center. (2011). *A parent's guide to evidence-based practice and autism: Providing information and resources for families of children with autism spectrum disorders.* Randolph, Massachusetts. Retrieved from http://www.nationalautismcenter.org/pdf/nac_parent_manual.pdf

Neisworth, J. T., & Wolfe, P. S. (2005). *The autism encyclopedia.* Baltimore, MD: Paul H. Brookes Publishing.

Nikopoulos, C., & Keenan, M. (2003). Promoting social initiation in children with autism using video modeling. *Behavioral Interventions, 18,* 87-108.

Nikopoulos, C., & Keenan, M. (2004a). Effects of video modeling on social initiations by children with autism. *Journal of Applied Behavior Analysis, 37,* 93-96.

Nikopoulos, C., & Keenan, M. (2004b). Effects of video modeling on training and generalization of social initiation and reciprocal play by children with autism. *European Journal of Behaviour Analysis, 5,* 1-13.

Nikopoulos, C., & Keenan, M. (2006). *Video modelling and behaviour analysis: A guide for teaching social skills to children with autism.* London: Jessica Kingsley Publishers.

Nikopoulos, K. C., & Keenan, M. (2007). Using videos modeling to teach complex social sequences to children with autism. *Journal Autism Developmental Disorder, 37,* 678-693.

Odom, S. L., Collet-Klingenberg, L., Rogers, S. J., & Hatton, D. D. (2010). Evidence-based practices in interventions for children and youth with autism spectrum disorders. *Preventing School Failure, 54,* 275-282.

Plavnick, J. B., Sam, A. M., Hume, K., & Odom, S. L. (2013). Effects of video-based croup instruction for adolescents with autism spectrum disorder. *Council for Exceptional Children, 80,* 67-83.

Poljac, E., Poljac, E., & Wagemans, J. (2012). Reduced accuracy and sensitivity in the perception of emotional facial expressions in individuals with high autism spectrum traits. *Autism, 17,* 668-680.

Prelock, P. A., Paul, R., & Allen, E. M. (2011). Evidence-based treatments in communication for children with autism spectrum disorders. In B. Reichow, P. Doehring, D. V. Cichetti & F. Volkmar (Eds.), *Evidence-based practices and treatments for children with autism* (pp. 93-171). New York, NY: Springer.

Rump, K. M., Giovannelli, J. L., Minshew, N. J., & Strauss, M. S. (2009). The development of emotion recognition in individuals with autism. *Child Development, 80,* 1434–1447.

Russell, J. A., & Widen, S. C. (2002). Words versus faces in evoking preschool children's knowledge of the causes of emotions. *International Journal of Behavioral Development, 26,* 97–103.

Ryan, C., & Charragain, C. N. (2010). Teaching emotion recognition skills to children with autism. *Journal of Autism and Developmental Disorders, 40, 1505–1511.*

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

Sherer, M., Pierce, K. L., Paredes, S., Kisacky, K. L., Ingersoll, B., & Schreibman, L. (2001). Enhancing conversation skills in children with autism via video technology: Which is better "self" or "other" as a model? *Behavior Modification, 25,* 140-158.

Shukla-Mehta, S., Miller, T., & Callahan, K. J. (2010). Evaluating the effectiveness of video instruction on social and communication skills training for children with autism spectrum disorders: A review of the literature. *Focus on Autism and Other Developmental Disabilities, 25,* 23–36.

Silver, M., & Qakes, P. (2001). Evaluation of a new computer intervention to teach people with autism or Asperger syndrome to recognize and predict emotions in others. *Autism, 5,* 299–316.

Soken, N. H., & Pick, A. D. (1992). Intermodal perception of happy and angry expressive behaviors by seven month-old infants. *Child Development, 63,* 787–795.

Spencer, L. G. (2002). *Comparing the effectiveness of static pictures vs. video modeling on teaching requesting skills to elementary children with autism* (Doctoral dissertation, Georgia State University, Atlanta, U.S.A).

Sulzer-Azaroff, B., & Mayer, G. R. (1991). *Behavior analysis for lasting change.* Belmont: Wadsworth.

Tardif, C., Laine, F., Rodriguez, M., & Gepner, B. (2007). Slowing down presentation of facial movements and vocal sounds enhances facial expression recognition and induces facial–vocal imitation in children with autism. *Journal of Autism and Developmental Disorders, 37,* 1469–1484.

Tawney, J. W., & Gast, D. L. (1984). *Single subject research design in special education*. Columbus, OH: Merrill.

Tekin-İftar, E. (2012). Çoklu yoklama modelleri. In E. Tekin-İftar (Ed.), *Eğitim ve davranış bilimlerinde tek-denekli araştırmalar* (pp. 217-243). Ankara: Türk Psikologlar Derneği Yayınları.

The National Professional Development Center on Autism Spectrum Disorders. (2014). *Evidence-based practices for children, youth, and young adults with autism spectrum disorder.* Retrieved from http://autismpdc.fpg.unc.edu

Walker, J. E., Shea, T. M., & Bauer, A. M. (2007). *Behavior management a practical approach for educators* (9th ed.). New Jersey, NJ: Pearson Prentice Hall.

Wallace, S., Coleman, M., & Bailey, A. (2008). An investigation of basic facial expression recognition in autism spectrum disorders. *Cognition and Emotion, 22,* 1353-1380.

Webber, J., & Scheuermann, B. (2008). *Educating students with autism.* Texas, TX: Pro-ed, Inc.

Wert, B. Y., & Neisworth, J. T. (2003). Effects of video self modeling on spontaneous requesting in children with autism. *Journal of Positive Behavior Interventions, 5,* 30-34.