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Increasing Instructional Efficiency When Using Simultaneous Prompting Procedure in Teaching Academic Skills to Students with Autism Spectrum Disorders *

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Abstract

A multiple probe design across behaviors replicated across participants was used to examine the effects of a simultaneous prompting procedure delivered along with instructive feedback and observational learning stimuli when teaching academic skills to a small group of students with ASD. Different target skills were taught to each student in the group arrangement. Three 10-and-11-years-old male students participated. Results showed that the simultaneous prompting procedure was effective and the students acquired responding correctly to the instructive feedback and observational learning stimuli, which were exposed during the course of simultaneous prompting training. Furthermore, the simultaneous prompting procedure was effective in the maintenance and generalization of the acquired target skills and they maintained responding correctly to their instructive feedback and observational learning stimuli over time and across persons and materials. Last, social validity findings of the study were encouraging. All these findings provide the groundwork for suggesting teachers to use the simultaneous prompting procedure with the presentation of instructive feedback stimuli and providing opportunity of observational learning when teaching academic skills to students with ASD. Future research is needed to support these findings.

Keywords: Instructional efficiency, Simultaneous prompting, Group arrangement, Instructive feedback stimuli, Observational learning stimuli, Autism spectrum disorders

Introduction

The simultaneous prompting procedure is one of the evidence-based response-prompting procedures in teaching various skills to children with various disabilities (e.g., Fetko, Collins, Hager, & Spriggs, 2013; Heinrich, Collins, Knight, & Spriggs, 2016; Tekin-Iftar, 2008). Simultaneous prompting procedure consists of two trials: (a) instructional trials

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and (b) probe trials. During instructional trials, the teacher delivers a controlling prompt immediately following the presentation of the target stimuli (e. g., task direction) and students are expected to deliver a correct response. Controlling prompt is delivered during each instructional trial; therefore, prior to instructional trials, daily probe trials are needed to test acquisition of the target skills.

Although simultaneous prompting procedure has gained attention from researchers, only a few studies have examined the effectiveness of it when teaching students with intellectual disabilities in small group arrangement (e.g., Alberto, Waugh, & Fredrick, 2010; Fickel, Schuster, & Collins, 1998; Gursel, Tekin-Iftar, & Bozkurt, 2006; Karl, Collins, Hager, & Ault, 2013; Maciag, Schuster, Collins, & Cooper, 2000; Singleton, Schuster, & Ault, 1995). There appears to be no study investigating the effectiveness of simultaneous prompting in teaching children with ASD in a small group instructional arrangement.

Not only effectiveness but also efficiency of an instruction should be considered while teaching children with ASD due to the fact that the number of students with ASD in general education has shown a dramatic increase. In addition, efficient instruction will help to close the gap between children with and without disabilities. Although research has shown the simultaneous prompting procedure to be effective in directly teaching targeted skills to students with ASD (e.g., Pennington, Ault, Schuster, & Sanders, 2010; Tekin-Iftar, 2008), it may not close the gap between their skill level and that of their typically developing peers. Therefore, researchers and educators need to focus on providing efficient instruction. Efficient instruction paves the way for acquisition of nontarget information. Nontarget information can be any additional skill or information that are not directly aimed to teach as in the case of target skills. Teachers can provide nontarget information along with teaching target skills and expect learning of at least some portions of it.

Presenting nontargeted information as instructive feedback (Collins, 2012) can increase the amount of information that a student acquires during instructional trials. Instructive feedback can be related or unrelated to the targeted skill, requires the teacher to deliver additional information about a topic. The temporal locations of instructive feedback stimuli can be varied (Smith, Schuster, Collins, & Kleinert, 2011). It can be delivered as a component of (a) antecedent stimuli (e.g., Alig-Cybriwsky, Wolery, & Gast, 1990), (b) task direction (e.g., Smith et al., 2011), (c) prompt hierarchy (e.g., Jones & Collins, 1997), and (d) consequent stimuli (e.g., Werts, Hoffman, & Darcy, 2011). Although there have been studies investigating the use of instructive feedback with a variety of populations (e.g., intellectual disability, emotional and behavioral disabilities, typical development; Fetko et al., 2013; Fickel et al., 1998; Hudson, Hinkson-Lee, & Collins, 2013; Parker & Schuster, 2002; Smith et al., 2011), at present, only four studies (all included instructive feedback stimuli as a component of consequent event) are available while teaching children with ASD (Ledford, Gast, Luscre, & Ayres, 2008; Loughrey, Betz, Majdalany, & Nicholson, 2014; Reichow & Wolery, 2011; Vladescu & Kodak, 2013). The majority of the studies investigating the acquisition of instructive feedback have been conducted by providing one instructive feedback stimulus per target skill and only a few studies have been conducted by providing more than one instructive feedback stimulus (e.g., Parrot, Schuster, Collins, & Gassaway, 2000; Stinson, Gast, Wolery & Collins, 1991; Werts et al., 2011). There appears to be no research investigating the acquisition of the nontarget information when the use of more than one instructive feedback stimuli per target skill is the case in teaching children with ASD.

When the use of instructive feedback stimuli during simultaneous prompting procedure in a group instructional arrangement is considered, only three studies teaching children with intellectual disabilities are found (Gursel et al., 2006; Parker & Schuster, 2002; Singleton et

al., 1995). Instructive feedback stimuli is presented as consequent event in these studies and only in a study the acquisition of instructive feedback was investigated along with the maintenance and generalization of instructive feedback stimuli (Singleton et al., 1995).

Providing opportunity to observe the peers (Tekin-Iftar & Birkan, 2010) during instruction is another strategy to increase efficiency of instruction. By doing that, the children not only learn their target skills but also have the opportunity to learn the target skills of their peers. This is called as observational learning (Bandura, 1977). Research has shown that children with ASD may learn new skills through observational learning (e.g., Charlop, Schreibman, & Tryon, 1983; Taylor, DeQuinzio, & Stine, 2012; Tekin-Iftar & Birkan, 2010). Especially when teaching children with ASD in a group instructional arrangement, the use of observational learning can be an option. The students in the group can be required to perform individual or choral responding during group instruction. Haydon, Conroy, Scott, Sindelar, Barber, and Orlando (2010) defined choral responding as students answering the teacher's questions altogether. Choral responding during group instruction has been found successful for contributing effectiveness and efficiency of the instruction (Haydon et al., 2010; Haydon, Mancil, & Van Loan, 2009; Sainato, Strain, & Lyon, 1987; Sutherland, Alder, & Gunter, 2003). Alberto et al. (2010) investigated the use of choral responding in teaching sight words to children with intellectual disabilities during simultaneous prompting procedure in a group instructional arrangement. No study has been found requesting students to provide choral responding when teaching children with ASD.

The present study was designed to address the following research questions. (1) May simultaneous prompting procedure delivered in a small group instructional arrangement be effective in teaching academic skills to students with ASD? (2) May simultaneous prompting procedure delivered in a small group instructional arrangement be effective in maintaining the acquired academic skills over time and generalizing them across materials and persons in students with ASD? (3) May students with ASD learn their nontarget information provided as instructive feedback stimuli during presentation of the task direction? (4) May students with ASD maintain their nontarget information over time and generalize them across materials and persons? (5) May students with ASD learn target skills and instructive feedback stimuli sets of their peers in the group through observational learning? (6) May students with ASD maintained their peers target skills and instructive feedback stimuli sets over time and generalize them across materials and settings? (7) May the opinions of students with ASD support the social validity of this study?

Method

Participants

Three students with ASD who were included in regular classrooms in public schools participated in this study. They were selected based on teacher interview. Each student and parent was informed individually about the study. Then signed consent and assent forms were obtained. Child psychiatrists diagnosed the students based on behavioral observations and parental reports. The students spend 100% of their school time in their classrooms. Olgun, Orhan, and Enes had IQ scores of 100, 105, and 70 respectively on the *Wechsler*'s Turkish version (Savasir & Sahin, 1995).

Olgun was a 11-year old Turkish male student (5th grade) with ASD. He could read and write, do addition and subtraction with four-digit numbers, division and multiplication with two-digit numbers, read and write six-digit numbers, answer wh- questions (e.g., why, what, where, when), and tell the sense organs and their functions. He could collaborate with adults, however he had problem in establishing and maintaining

communication with his peers. He sometimes exhibited verbal and physical aggression towards others.

Orhan was a 10-year old Turkish male student (4th grade) with ASD. He could read and write, do addition and subtraction with three-digit numbers, and answer wh- questions. He could not solve basic problems fluently and use grammatical rules appropriately when writing. He had problems in communication and social interaction with his peers. He often exhibited physical and verbal aggressions towards his peers and teachers (e.g., hitting).

Enes was a 11-year old Turkish male student (5th grade) with ASD and mild intellectual disabilities. He could read and write (not fluent though, had too many spelling errors), do addition and subtraction with one-digit numbers. He had failures in social/communication skills. He often exhibited stereotypic behaviors when he wasn't engaged on a task.

The prerequisite skills for the students were the ability to (a) attend to visual and/or audio stimuli for 10 min, (b) follow verbal directions (e.g., 3-4 words sentence), (c) imitate nonverbal skills (e.g., clapping), and (d) imitate verbal language. The second author interviewed the teachers regarding these skills, and subsequently tested the students, as follows: Attending to visual and audio stimuli was tested by asking them to build a puzzle and to listen an audio book for 10 min, following verbal directions was tested by delivering simple directions (e.g., "Please give this pencil to your friend."), and verbal and nonverbal language skills were tested by delivering directions (e.g., "Say/Do it just like me").

Settings

All sessions occurred at a classroom (5 by 4 m) furnished with a table, chairs, and bookshelves. During training, students sat in their chairs in a U-shape, and the teacher and the second author, sat across them.

Materials

The teacher did not use any specific materials for teaching target skills to the students. However, picture cards were used for the presentation of instructive feedback stimuli (see right column under the "Instructive Feedback Stimuli Set" in Table 1). Picture cards (n = 9; 15 by 10 cm) showing the place of interior organs in human body, flags of the foreign countries (n = 9; 15 by 10 cm), and black and white map of Turkey (n = 9; 15 by 10 cm), in which only the asked province colored in red were used during study. Moreover, two distracters for each organ, flag, and province were used during training and probe sessions for the second instructive feedback stimuli set. Eighty-one cards (27 for each student) were used.

For assessing generalization, the places of organs were asked on the students' bodies and a map of Turkey in different colors and flags showed on a computer screen were used. In addition a video camera, desktop computer for assessing the generalization of the acquired skills, and data collections forms were used during all experimental sessions.

Experimental Design

A multiple probe design across behaviors and replicated across students was used. Experimental control was established when the student was responding at or near to zero before the intervention had been introduced and then reached criterion only after the intervention was introduced (Gast & Ledford, 2010).

Dependent and Independent Variables

Target skills were selected from two curriculum areas (Science and Social Science) based on interviewing with the teachers and parents, reviewing the textbooks and individualized

educational plans (IEP) of the students. Target skills for Olgun were "telling the function of given organs". Organs were observational learning stimuli for Orhan and Enes. Target skills for Orhan were "telling major means of living of given provinces in Turkey" and they were observational leaning stimuli for Olgun and Enes. "Telling the capital cities of the given countries" were target skills for Enes and they were observational leaning stimuli for Olgun and Orhan. The target skills, instructive feedback stimuli, and observational learning stimuli for each participant are presented in Table 1.

Correct responses were defined as responding to the task direction correctly within 4 s of hearing it. All other responses were scored as incorrect. The dependent variable was the percentage of correct responses during full and daily probe sessions.

Independent variable was the simultaneous prompting procedure delivered in a group instructional arrangement. A training set was introduced at a time in accordance with the experimental design (i.e., training sets were introduced in a time lagged manner) and choral responding was required throughout the training. Nontarget information was presented as instructive feedback stimuli along with the simultaneous prompting trials and the opportunity to observe their peers were planned during training in the study.

Procedures

Screening, probe (both daily and full probe, and instructive feedback and observational learning probe), training, maintenance and generalization sessions were conducted in the study. Except training sessions, all sessions were conducted in one-on-one instructional arrangement. Correct responses resulted in verbal reinforcement and incorrect responses resulted in ignorance throughout the sessions. There were nine trials, three trials for each target skill, during each experimental session.

Screening Sessions

Screening sessions were conducted to identify prospective target skills for each participant. Prior to baseline sessions, pools for provinces (n=20) and countries (n=16) were formed and instructive feedback stimuli (two for each target skill) for the prospective target skills were developed. Then the teacher conducted two consecutive screening sessions to identify the unknown stimuli for the target stimuli and unknown instructive feedback stimuli from these pools. Each prospective stimulus was asked twice in a random order by using 4 s response and inter-trial intervals and both correct and incorrect responses were ignored during the course of screening sessions (Correct responses were ignored in order not to reinforce the possibility of learning during the screening session). However, the cooperation of the students was verbally reinforced at the end of each screening session. A trial during a screening session was conducted as follows: The teacher secured the student's attention (e.g., "Enes, I am going to ask several questions. Are you ready?") and provide reinforcement for his affirmative response (e.g., "Great! Let's start."). Then the teacher provided task direction (e.g., "Please, tell me the capital city of Japan.") for the target skill and waited for a response for 4 s. After presenting a screening trial, the teacher delivered task direction to identify the instructive feedback stimuli to be used during training. The teacher provided task direction for the instructive feedback stimulus (e.g., "Tell me Japan belongs to which continent." and "Show me the flag of Japan among these three flags") respectively as two instructive feedback stimuli about the location and flag of Japan. The teacher collected data using a plus (+) to indicate that the student delivered a correct response and a minus (-) to indicate that the student delivered incorrect response of failed to perform a response (this data collection method, discrete trial teaching method, was used across all sessions in the study). Since choral responding was planned during training, target skills were selected randomly from those prospective stimuli that all of the participating students responded incorrectly.

Since, there were not too many (more than nine) organs in their books, screening sessions were not conducted with organs. To equalize the difficulty levels across the training sets, a difficulty level analysis was conducted by considering the number of words in the target skills and sound similarity.

Probe Sessions

Full probe sessions. Full probe sessions were conducted prior to introduction of simultaneous prompting training sessions and after criterion were met for each training set. First full probe conditions prior to training were considered as baseline conditions for each student. All training sets identified for each student were probed during a full probe session. They were conducted until stable data were obtained for at least three consecutive probe sessions for each student. One full probe sessions conducted per day including a total of 27 probe trials [9 trials for each set (training set and two instructive feedback stimuli sets)]. A full probe session was conduced as follows: The teacher secured the student's attention (e.g., "Olgun, I am going to ask several questions. Are you ready?) and provided reinforcement for his affirmative response ("Great! Let's start."). Then the teacher provided task direction (e.g., "Tell me the function of kidneys.") and waited 4 s for a response. Correct responses were verbally reinforced (e.g., "Great!") and incorrect/no responses were ignored.

Daily probe sessions. They were conducted during training condition to test acquisition of target skills and instructive feedback stimuli. These sessions were conducted prior to every single daily training session and two daily probe sessions were administered in a day. They were conducted as full probe sessions with an exception. Only training set that was currently being taught was probed during daily these sessions. Nine trials were delivered for each set. No daily probe session was conducted before the first training session. Correct responses were counted toward criterion. Criterion was 100% correct responding for three consecutive daily probe sessions.

Instructive feedback and observational learning probe sessions. Following each full probe condition, instructive feedback and observational learning probe sessions were conducted in the same manner as the daily probe sessions. Two instructive feedback stimuli were presented for each target skill across the students in the study (see Table 1). One instructive feedback stimulus was presented as visual stimulus (the picture of the location of an organ in a human body) and the other was presented as verbal stimulus (e.g., "Which body system do the kidneys belong to?"). A total of 18 trials occurred for instructive feedback stimuli sets during a session for each student.

Observational learning probe sessions conducted to test the acquisition of the observational learning stimuli immediately after instructive feedback probe sessions. Each student was tested during these sessions whether he acquired the target skills and instructive feedback stimuli of other participating students in the group. A total of 27 trials (i. e., nine trials for target skills and 18 trials for two - instructive feedback stimuli sets) were presented during observational learning probe sessions to test the acquisition of his peer's target skills and nontarget information for each student. Same protocol was repeated to test other peer's target skills too. An observational learning probe session was conduced as follows: The teacher secured the student's attention (e.g., "Olgun, I am going to ask you several questions. Are you ready?) and provided reinforcement for this affirmative response ("Great! Let's start."). Then the teacher provided task direction (e.g., "What is the means of living of Mersin?") and waited for a response for 4 s. The correct response of the student was verbally reinforced (e.g., "Great!") and incorrect response/no response was ignored. The teacher collected data in the same manner as explained in screening sessions during instructive feedback and observational learning probe sessions.

Training Sessions. After obtaining stable data during first full probe condition (i.e., baseline condition), the teacher started to use the simultaneous prompting procedure to teach target skills to the participating students in a small group instructional arrangement. During training, the presentation of instructive feedback stimuli and the opportunity of providing observational learning were also designed. There were two training sessions in each week-day and each session included nine trials (three trials were delivered for each target skill in a training set). At the end of second training sessions in a training day, activity reinforcers (e.g., watching a movie via Virtual Reality Headset) were delivered to the students for their cooperation and attendance. The instructional trials were delivered as massed trials (three trials in a row for a student) in a distributed format (distribution of a chunk of skills across the students). The teacher delivered these chunks in a random order across the students. That is to say, the teacher delivered three trials (a chunk) with one student and then started to deliver another chunk with other students subsequently until nine trials were provided to each student. The students were requested to deliver choral responding during training. When a student provided incorrect response or did not respond during choral responding, he was requested to repeat the controlling prompt individually.

An instructional trial was conducted as follows: The teacher explained the rules during these sessions and secured the students' attention. She told "Today we will start to learn the functions of the organs in our body, the name of the capital cities of some countries, and means of living of some provinces in Turkey. I will ask a question to each of you and then provide the answer of this question immediately. You need to listen carefully to each question. I want you to repeat the answer that I provide to you. I will start by counting to three, like 1, 2, and 3, and you will repeat the answer. Are you ready?". She reinforced their affirmative responses (e.g., "Great. You are awesome. ", if they do not provide affirmative responses the teacher told them they need to answer whether they want to continue to study). Then the teacher called a student by his name and said: "Let's start with Olgun!" and delivered task direction "As an organ of urinary system, what is the function of kidneys? (task direction included two instructive feedback stimuli as well. In this case, the first instructive feedback stimulus was "Kidney is an organ of urinary system." and showing a card representing the location of a kidney in a human body is the second instructive feedback stimulus) and immediately presented controlling prompt "It balances water, salt, and minerals of a body". Meanwhile she reinforced the attending and observing skills of the students (e.g., "Great you listened very carefully!"). Then she verbally counted to three, saying 1, 2, and 3, and waited 4 s for a choral response from the participants. Their correct responses were verbally reinforced (e.g., "You are awesome!"). If a student or more responded incorrectly, the teacher wanted him/them to respond individually. The teacher waited 4 s and started to deliver the next instructional trial.

Maintenance and Generalization Probe Sessions

Maintenance sessions were conducted 10 days after the final full probe session to test the acquisition of target skills, instructive feedback stimuli, and observational learning stimuli. They were conducted just like full probe sessions. Generalization sessions were conducted in a pretest-posttest manner to test the generalization of the acquired target skills and instructive feedback stimuli. Moreover, maintenance of the generalization of both target skills and instructive feedback stimuli were tested 10 days after the generalization posttest measures. Nine trials were conducted in each of these sessions. Generalization of the target skills and instructive feedback stimuli were assessed across persons and materials.

Interobserver Agreement and Treatment Integrity

Reliability observer collected reliability data for at least 30% of each experimental condition. The researchers calculated interobserver agreement (IOA) data using a point-by-point method (i.e., number of correct responses/number of correct plus incorrect responses X 100). IOA analyses showed 100% agreement across all sessions and students.

Treatment integrity data were collected at least 33.33% of each experimental session in the study. Treatment integrity data were calculated using the following formula: Observed teacher behaviors/planned teacher behaviors X 100 (Billingsley, White, & Munson, 1980). The teacher delivered full and daily probe sessions with 100% compliance with the planned steps of these sessions and 97.22% (range = 87.50% - 100%) compliance with the planned steps of training sessions across the students. In addition, she delivered instructive feedback and observational learning probe sessions and maintenance and generalization probe sessions with 100% compliance.

Social Validity

Social validity data were collected from the participating students through interview. The teacher asked seven questions to each student to understand their opinions about the appropriateness of the goals and instructional procedures, and importance of the findings. The teacher asked questions about whether they liked the way their teacher taught them, what they thought about their target skills, the possibility of using these target skills in their daily and school life, whether it was fun to learn with this way, whether they would like to learn new skills this way and what the three most liked and least liked parts of the study. The researcher took notes during the interview and descriptively analyzed the social validity data.

Results

Effectiveness Findings for the Target Skills and Instructive Feedback Stimuli: Acquisition, Maintenance, and Generalization

Figures 1 through 3 display the effectiveness findings for the acquisition and maintenance of the target skills' sets (each set includes three target skills) and instructive feedback stimuli sets (two instructive feedback stimuli sets are developed for each training set) for Olgun, Orhan, and Enes respectively. In evaluating the effectiveness of the simultaneous prompting procedure on the students' acquisition of their target skills' sets and instructive feedback stimuli sets, the researchers plotted the percentages of correct responses in daily probe sessions during the simultaneous prompting training condition.

As seen in Figure 1, Olgun made no correct responses during first full probe sessions (i.e., baseline sessions) in any of his training sets. Once simultaneous prompting procedure had been introduced, the trend and level of his data changed immediately and he reached criterion in three sessions in his first training set, in two sessions in his second and third training sets. Figure 1 also shows the acquisition of instructive feedback stimuli sets for him. He made no correct responses on any of his instructive feedback stimuli sets developed for his first training set and he performed between 0% and 33% accuracy during first full probe condition on the instructive feedback stimuli sets developed for his second and third training sets. Once the trainer had started to provide instructive feedback stimuli during simultaneous prompting procedure, he reached criterion in three sessions in his first instructive feedback stimuli set developed for his first training set and only in one session for the other instructive feedback stimuli sets.

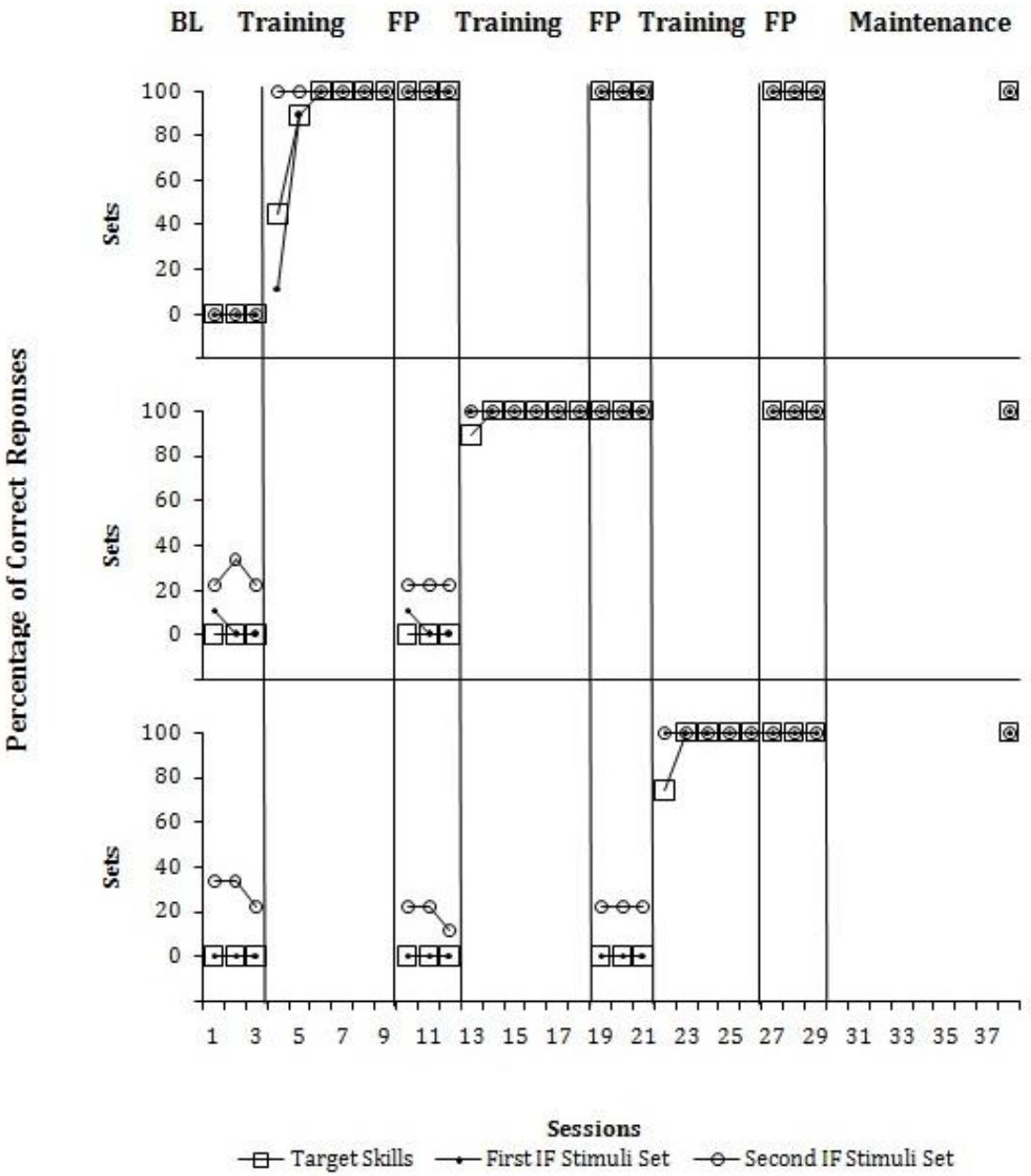

Figure 1. *Percentage of correct responses for target skills and instructive feedback stimuli for Olgun during full probe, training, and maintenance sessions. Data collected during daily probe session are plotted as training data.*

Figure 2 shows that Orhan made no correct responses during first full probe condition in any of his training sets. Once simultaneous prompting procedure had been introduced, the trend and level of his data changed immediately and he reached criterion in his first and third training sets in three sessions and in one session in his second training set. Figure 2 also shows the acquisition of sets of instructive feedback stimuli for Orhan. He made no correct responses on the instructive feedback stimuli sets developed for his training sets. Once the teacher had started to provide instructive feedback stimuli during simultaneous prompting procedure, he reached criterion in two sessions in both of his instructive feedback stimuli sets developed for his first training set. He reached criterion in one session in his instructive feedback stimuli sets developed for his second training set and in three sessions for the rest of his instructive feedback stimuli sets.

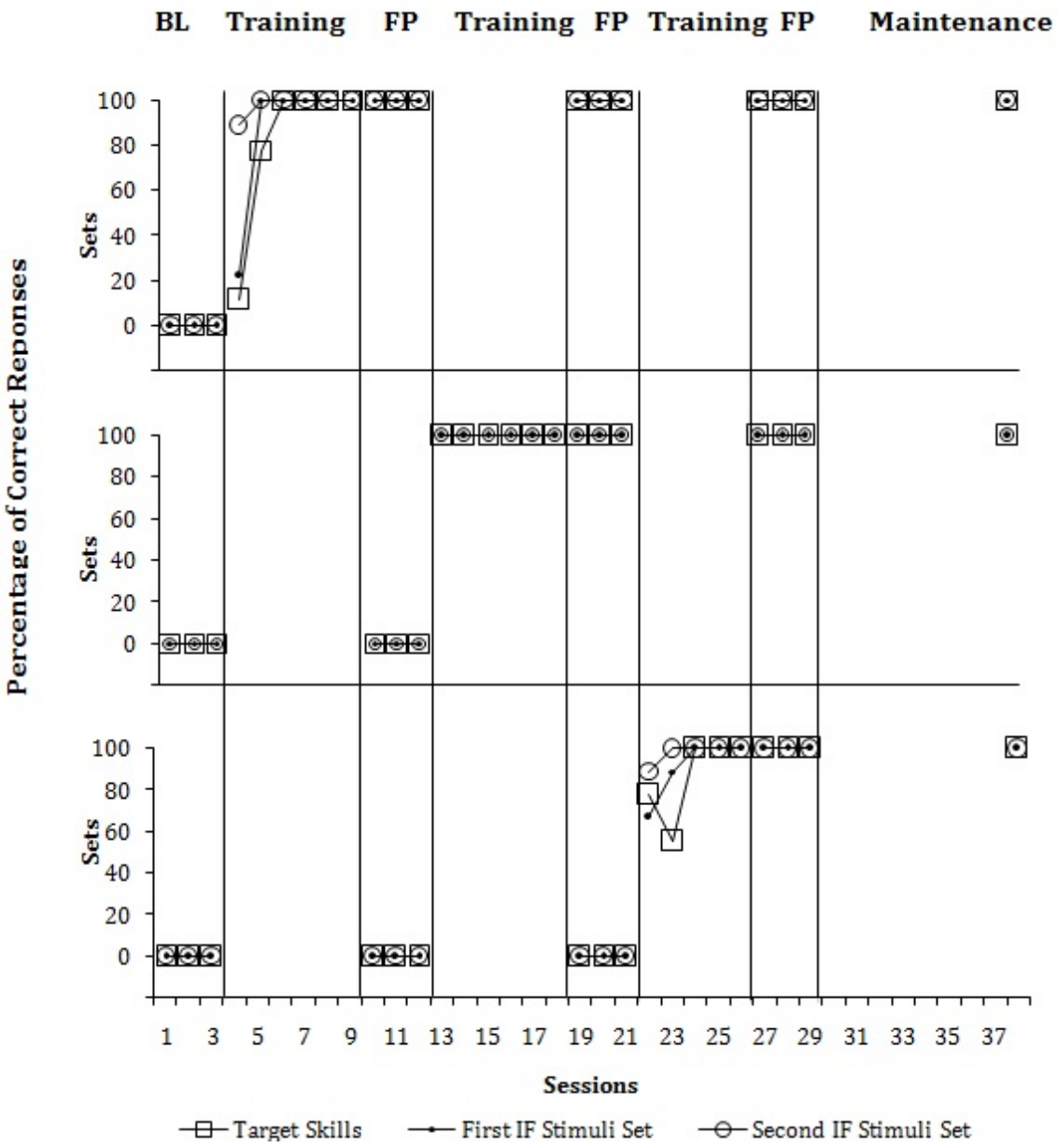

Figure 2. *Percentage of correct responses for target skills and instructive feedback stimuli for Orhan during full probe, training, and maintenance sessions. Data collected during daily probe session are plotted as training data*.

As can be seen in Figure 3, Enes made no correct responses during first full probe condition in any of his training sets. Once simultaneous prompting procedure had been introduced, the trend and level of his data changed immediately too. He reached criterion in four sessions in his first and second training sets and in three sessions in his third training sets. Figure 3 also shows that Enes made no correct responses on the instructive feedback stimuli sets. Once the trainer had started to provide instructive feedback stimuli during simultaneous prompting procedure, he reached criterion in three instructive feedback stimuli sets out of six sets. He did not reach criterion in his first instructive feedback stimuli set developed for the first training set. He reached the criterion in three sessions in the instructive feedback stimuli sets developed for his second target skills set

and in four sessions in the instructive feedback stimuli sets developed for his third training sets.

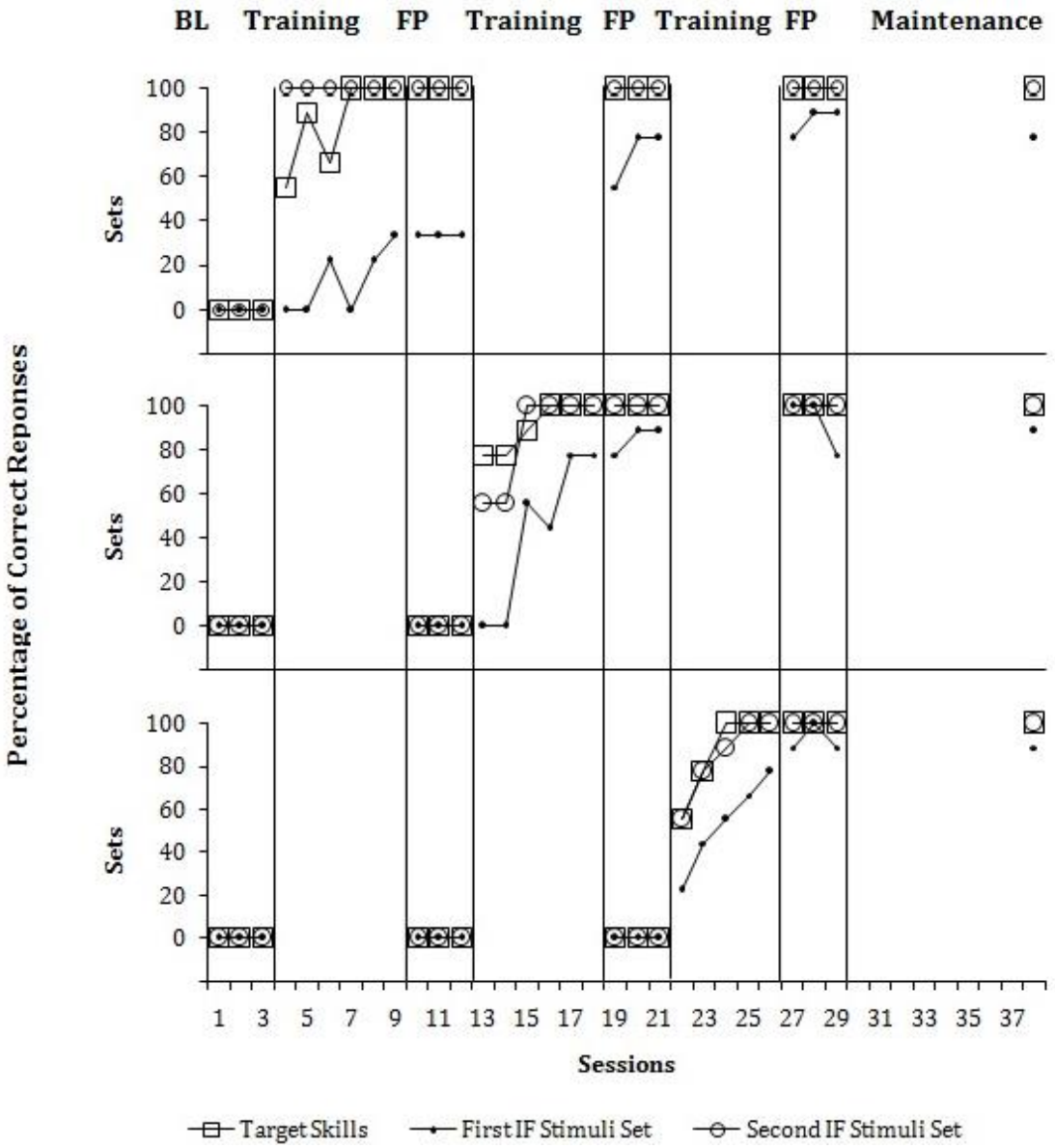

Figure 3. *Percentage of correct responses for target skills and instructive feedback stimuli for Enes during full probe, training, and maintenance sessions. Data collected during daily probe session are plotted as training data.*

Regarding maintenance, as seen in Figures 1 through 3, all students maintained their target skills' sets consistently with 100% accuracy across the full probe conditions. They also maintained their target skills' sets with 100% accuracy 10 days after final full probe session. When examined the maintenance of the acquired instructive feedback stimuli sets, Olgun and Orhan maintained their sets of instructive feedback stimuli consistently with 100% accuracy and Enes maintained his instructive feedback stimuli sets between 78% and 100% accuracy across subsequent full probe conditions. In addition, while Olgun and Orhan maintained their sets of instructive feedback stimuli with 100% accuracy, Enes maintained his instructive feedback stimuli sets with at least 71% accuracy 10 days after the final full probe conditions.

Regarding generalization, none of the students generalized their target skills across persons during pretest measures. After the training, they generalized their acquired target skills across persons with 100% accuracy. In terms of the generalization of acquired instructive feedback stimuli, none of the students generalized their first instructive feedback stimuli sets across persons during pretest measures. After training, Olgun and Orhan acquired their instructive feedback stimuli sets with 100% accuracy and Enes generalized his instructive feedback stimuli set with 78% accuracy. Findings for the generalization of the second instructive feedback stimuli set showed Olgun generalized his set with 33% accuracy across persons and materials during pretest measures and Orhan and Enes did not perform any correct responses. All students generalized their second instructive feedback stimuli set with 100% accuracy across persons and materials during posttest measures.

Effectiveness Findings for the Observational Learning Stimuli: Acquisition, Maintenance, and Generalization

The researchers analyzed acquisition, maintenance, and generalization of observational learning stimuli by calculating the percentage of correct responses conducted after each full probe condition. Furthermore, the maintenance of the acquired observational learning stimuli was tested during maintenance session. Each participating student was tested on the acquisition his peers' training sets and instructive feedback stimuli sets. The acquisitions of observational learning stimuli data are presented in Table 2.

As seen in Table 2, Olgun (he was tested on Orhan's and Enes's target skills sets and IF stimuli sets) made no correct responses during first full probe session on his observational learning stimuli sets except he performed Orhan's second instructive feedback stimuli set developed for his three training sets consistently with 26% accuracy and Enes's second instructive feedback stimuli set with at the highest 41% accuracy during full probe sessions. Once the trainer had started to provide the opportunity of observational learning during SP training sessions, he acquired Orhan's and Enes's target skills and instructive feedback stimuli with 100% accuracy during subsequent full probe sessions.

Table 2 shows Orhan (he was tested on Olgun's and Enes's target skills sets and instructive feedback stimuli sets) performed no correct responses during first full probe session on his observational learning stimuli sets except he performed Olgun's and Enes's second instructive feedback stimuli set developed for his three training sets with 33% accuracy at the highest during full probe sessions. Once the trainer had started to provide the opportunity of observational learning during simultaneous prompting training sessions, he acquired his peers' target skills and instructive feedback stimuli with 100% accuracy during subsequent full probe sessions.

As seen in Table 2, Enes (he was tested on Olgun's and Orhan's target skills sets and instructive feedback stimuli sets) performed no correct responses during first full probe session on any of his observational learning stimuli sets. Once the trainer had started to provide the opportunity of observational learning during simultaneous prompting training sessions, he acquired his peers' target skills and instructive feedback stimuli between 59% and 100% accuracy during subsequent full probe sessions.

Maintenance data presented in Table 2 show Olgun and Orhan maintained their observational learning stimuli with 100% accuracy 10 days after the final full probe condition. Enes was able to maintain his observational learning stimuli between 59% and 100% accuracy. Last, as seen in Table 2, when generalization across persons and materials of observational learning stimuli was examined none of the students performed any correct responses during pretest measures and Olgun and Orhan performed

generalization of acquired observational learning stimuli with 100% accuracy during posttest measures and Enes performed between 67% and 100% accuracy.

Social Validity Findings

All participating students stated that they liked the way their teacher taught them (e.g., Orhan told that "to me all children should be taught with this method"). All three students reported the skills their teacher taught to them were important, they would use them while they were on vacation, and they would use them in school and during daily life (e.g., Olgun reported that "I would use them in the exams in my school and in the hospital when I am sick"). They reported that learning this way was fun. They stated that they would like to learn new things with this way. They stated the three most liked parts of the study as learning with their friends altogether, learning new things, and having some rules during learning. They stated there is nothing that they did not like about their learning process.

Discussion

This study was designed to investigate the effectiveness of (a) the simultaneous prompting procedure delivered in a group arrangement in teaching academic skills to students with ASD, (b) the acquisition of instructive feedback stimuli presented as nontarget information, and (c) the acquisition of observational learning stimuli. Moreover, maintenance and generalization effects of the intervention were tested on the target skills as well as on the instructive feedback stimuli and observational learning stimuli. Last, we evaluated social validity of the training in the study. The simultaneous promoting procedure delivered in a group arrangement in teaching academic skills to students with ASD was effective and the students acquired their instructive feedback and observational learning stimuli which were exposed during the course of training. Furthermore, the simultaneous promoting procedure was effective in the maintenance and generalization of the acquired target skills and the students maintained the instructive feedback and observational learning stimuli over time and across persons and materials. Finally, social validity findings of the study were positive. These findings provide the groundwork for suggesting teachers to use the simultaneous prompting procedure with the presentation of nontarget information and providing opportunity of observational learning when teaching academic skills to students with ASD. Based on the data, several findings and implications are worth to discuss.

First, the data indicated the simultaneous prompting procedure delivered in a group arrangement was effective in teaching various academic skills to students with ASD. Moreover, the participating students maintained the acquired academic skills 10 days after the intervention and generalized them across materials and persons. This is the only study investigating the effects of simultaneous promoting procedure in a group arrangement for teaching academic skills to students with ASD. However, there have been studies examining the effects of simultaneous promoting procedure in teaching various skills to student with intellectual disabilities (e.g., Gursel et al., 2006; Karl et al., 2013; Maciag et al., 2000). The findings of this study are consistent with the findings of these studies and extend the use of simultaneous promoting procedure in a group arrangement in teaching academic skills to students with ASD.

Second, the participants acquired the nontarget information presented as instructive feedback stimuli during the course of simultaneous promoting training. They were exposed to two instructive feedback stimuli for each target skill. In this study it could be argued that students with ASD acquired the skills besides their target skills and this might help them to close the gap with their peers. To make education more efficient, teachers may use other strategies, such as presenting nontarget information along with the simultaneous promoting procedure, which in the current study resulted in broader

learning. By doing that, the teachers decrease the time that would be devoted to teach the content of instructive feedback stimuli directly. The findings of the present study are consistent with the findings of the previous studies investigating the presentation of instructive feedback stimuli during simultaneous promoting procedure delivered in small group arrangement (Gursel et al., 2006; Parker & Schuster, 2002; Singleton et al., 1995), and may encourage the use of nontarget information with students with ASD.

The findings of this study provide information about the impact of providing instructive feedback to students with ASD in a group arrangement. To the knowledge of authors, this is the only study with this age group with ASD including two different instructive feedback stimuli for each target skill of the student; therefore, future researchers may consider designing studies to replicate these effects.

As mentioned earlier there are limited research studies investigating the acquisition of instructive feedback stimuli in students with ASD and this study is the only study inserting more than one instructive feedback stimuli to the task direction. Although two instructive feedback stimuli were presented in the study, the instructional time devoted to teaching was between 7 and 10 min. Perhaps inserting instructive feedback stimuli into task direction were highly efficient when considering inserting it into antecedent and/or consequent events as separate stimuli. When the instruction time is a concern for teachers of students with ASD, they should consider providing instructive feedback stimuli in the task direction. So, they would not spend their instructional time to provide a separate sentence/stimuli as nontarget information.

Third, the acquisition of observational learning stimuli showed the students learned their peers' target skills and instructive feedback stimuli during group arrangement. These findings are consistent with the findings of the previous studies about the acquisition of observational learning stimuli in students with ASD (Ledford et al., 2008; Tekin-Iftar & Birkan, 2010). These findings are especially important when thinking today's educational policies about educating children with special needs. Inclusion is a widely accepted educational policy for teaching students with special needs including ASD. When we consider regular classrooms, the observational learning findings of this study are very encouraging. Future researchers may consider designing the same study in a real classroom.

Fourth, maintenance and generalization effects of the SP procedure were effective. Moreover, the maintenance and generalization effects of the presentation of instructive feedback stimuli and providing the opportunity of observational learning during training were highly encouraging when considering the failure that students with ASD experience in terms of maintaining the acquired skills over time and generalizing the acquired skills into novel contexts.

Finally, social validity findings of the study were encouraging because the students want to receive training with the simultaneous prompting procedure in the future. In addition to this validation, the study was also validated by: (a) reviewing the curriculum of the students, (b) reviewing the IEPs of the students, and (c) receiving opinions of the teachers and parents of the students during the selection of target skills and nontarget skills. However, social validity data are collected only from the students via interview in the study. Future researchers may consider collecting social validity data from teachers of the students and using different social validity assessment approach such as social comparison.

There are several points worth discussing about the amount of learning the participating students achieved in the study. Two students (i.e., Olgun and Orhan) acquired and maintained both their target skills and instructive feedback stimuli and their peers' target

skills and instructive feedback stimuli at 100% accuracy. Olgun and Orhan acquired a total of 81 skills (i.e., 27 of them consisted of their own target skills and instructive feedback stimuli skills and 54 of them were their peers' skills) in a relatively small amount of time (each training sessions lasted between 7 to 10 min). These findings provided the impetus to recommend the use of simultaneous prompting procedure along with instructive feedback and observational learning stimuli to increase the efficiency of instruction in the general education settings so the students who are included in the general education settings may learn many skills. Enes had a modest performance in the group. Having intellectual disabilities and stereotypic behaviors might have prevented him to learn more during the study.

It was observed that using choral responding during group instruction may have increased on-task engagement of the students and the prevented the existence of problem behaviors. Although we did not assess existence of problem behaviors, it was observed that Olgun and Orhan had several problem behaviors at the beginning and when they got comprehend the dynamics of the instruction and were given to respond to each task direction their problem behaviors decreased significantly. Although this is not a data-based finding, there are studies supporting our observation (Haydon et al., 2009; Haydon et al., 2010; Sutherland et al., 2003). Responding chorally may have impact on the effectiveness of simultaneous prompting too. Future researchers may consider the impact of choral responding in the acquisition of target skills.

This study is limited with teaching academic skills to three high-functioning students with ASD who were instructionally under control. Teachers and researchers who want to teach academic skills to students with ASD in a group arrangement may need to consider the prerequisite skills their students need to have.

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Table 1. *Target Skills, Instructive Feedback Stimuli, and Observational Learning Stimuli for Each Participant*

Participants	Sets	Target Skills	Sets	Instructive Feedback Stimuli Sets: First Instructive Feedback Stimuli Set	Instructive Feedback Stimuli Sets: Second Instructive Feedback Stimuli Set	OL Stimuli Sets
Olgun	TS 1	What is the function of: 1. lungs? 2. small bowels? 3. kidneys?	IF Set 1	Which body system do/does : 1. the lungs belong to? 2. the small bowels belong to? 3. the kidneys belong to?	Show me where: 1. the lungs are in human body? 2. the small bowels are in human body? 3. the kidneys are in human body?	Orhan's all sets Enes's all sets
	TS 2	What is the function of : 1. ureters? 2. swallow? 3. stomach?	IF Set 2	Which body system do/does : 1. the ureters belong to? 2. the swallow belong to? 3. the stomach belong to?	Show me where: 1. the ureters are in human body? 2. the swallow is in human body? 3. the stomach are in human body?	

Orhan	TS 3	What is the function of: 1. large bowels? 2. bladder? 3. air tube?	IF Set 3	Which body system do/does : 1. large bowels belong to? 2. bladder belong to? 3. air tube belong to?	Show me where: 1. the large bowel is in human body? 2. the bladder is in human body? 3. the air tube in human body?
	TS 1	What is the mean of living of: 1. Mersin? 2. Bursa? 3. Zonguldak?	IF Set 1	Which geographical region does: 1. Mersin belong to? 2. Bursa belong to? 3. Zonguldak belong to?	Show me where is: 1. Mersin in the map? 2. Bursa in the map? 3. Zonguldak in the map?
	TS 2	What is the mean of living of: 1. Giresun? 2. Adana? **3.** Yalova?	IF Set 2	Which geographical region does: 1. Giresun belong to? 2. Adana belong to? 3. Yalova belong to?	Show me where is: 4. Giresun in the map? 5. Adana in the map? 6. Yalova in the map?
	TS 3	What is the mean of living of: 1. Balikesir? 2. Bolu? 3. Isparta?	IF Set 3	Which geographical region does: 1. Balikesir belong to? 2. Bolu belong to? 3. Isparta belong to?	Show me where is: 1. Balikesir in the map? 2. Bolu in the map? 3. Isparta in the map?

Olgun's all sets
Enes's all sets

Enes	TS 1	Where is the capital city of: 1. Japan? 2. Germany? 3. USA?	IF Set 1	Which continents does: 1. Japan belong to? 2. Germany belong to? 3. USA belong to?	Show me the flag of: 1. Japan. 2. Germany. 3. USA?
	TS 2	Where is the capital city of: 1. Brazil? 2. China? 3. Italy?	IF Set 2	Which continents does: 1. Brazil belong to? 2. China belong to? 3. Italy belong to?	Show me the flag of: 1. Brazil. 2. China. 3. Italy.
	TS 3	Where is the capital city of: 1. Greece? 2. Mexico? 3. Iran?	IF Set 3	Which continents does: 1. Greece belong to? 2. Mexico belong to? 3. Iran belong to?	Show me the flag of: 1. Greece. 2. Mexico. 3. Iran.
					Olgun's all sets Orhan's all sets

Abbreviations: TS = Training set, IF = Instructive feedback, OL = Observational learning.

Table 2. *Mean Percentage of Acquisition of Observational Learning Stimuli of Training Sets and Instructive Feedback Sets During Full Probe Sessions Across Sets*

Sessions	Olgun						Orhan						Enes					
	Orhan's Sets			Enes's Sets			Olgun's Sets			Enes's Sets			Olgun's Sets			Orhan's Sets		
	TS	IFS1	IFS2	TS	IFS1	IFS2	TS	IFS1	IFS2	TS	IFS1	IFS2	TS	IFS1	IFS2	TS	IFS1	IFS2
FPC1																		
Set 1	0	0	26	0	0	41	0	0	33	0	0	33	0	0	0	0	0	0
Set 2	0	0	26	0	0	26	0	0	22	0	0	26	0	0	0	0	0	0
Set 3	0	0	26	0	0	19	0	0	33	0	0	15	0	0	0	0	0	0
FPC2																		
Set 1	100	100	100	100	100	100	100	100	100	100	100	100	93	78	100	100	67	100
Set 2	0	19	19	0	0	33	0	0	33	0	0	19	0	0	0	0	0	0
Set 3	0	0	30	0	0	19	0	0	19	0	0	22	0	0	0	0	0	0
FPC3																		
Set 1	100	100	100	100	100	100	100	100	100	100	100	100	100	59	100	86	67	100
Set 2	100	100	100	100	100	100	100	100	100	100	100	100	89	89	100	100	67	78
Set 3	0	0	19	0	0	26	0	0	0	0	0	33	0	0	0	0	0	0
FPC4																		

Set 1	100	100	100	100	100	100	100	100	100	100	100	100	100	89	100	89	89	100
Set 2	100	100	100	100	100	100	100	100	100	100	100	100	100	67	100	100	89	100
Set 3	100	100	100	100	100	100	100	100	100	100	100	100	96	78	81	100	85	78
Main.	100	100	100	100	100	100	100	100	100	100	100	100	70	59	100	70	70	100
Gen.																		
Pretest	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0
Posttest	100	100	100	100	100	100	100	100	100	100	100	100	70	81	67	67	100	100

Note: Underlined data are obtained after observational learning stimuli were provided during the course of simultaneous prompting procedure

Abbreviations: FPC = Full probe condition, Gen. = Generalization, IF = Instructive feedback, Main. = Maintenance, TS = Training set.