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Teaching Special Education Teachers How to Conduct Functional Analysis in Natural Settings

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Abstract: Effects of a training program utilized to teach how to conduct functional analysis process to teachers of children with developmental disabilities was examined. Furthermore, teachers' opinions regarding this process were investigated. A multiple probe design across subjects with probe conditions was used. Teacher training was in two phases. In the first phase, teachers were given information about functional analysis methods. Then, in the second phase, teachers were asked to implement the functional analysis process with their students who had problem behaviors. Results showed that the training program was effective in teaching special education teachers how to conduct a functional analysis process. However, teachers needed intensive consultation about how to conduct the functional analysis process during the study. Responses of teachers to Social Validity Form revealed that opinions concerning functional analysis changed positively after training.

Functional assessment and analysis processes have been used to find environmental factors that cause and/or maintain problem behaviors, and to determine effective behavior management strategies to deal with these problem behaviors for the last two decades (e.g., Iwata, Dorsey, Slifer, Bauman, & Richman, 1982; Iwata, Pace, Cowdery, & Miltenberger, 1994; Kern, Childs, Dunlap, Clarke, & Falk, 1994; Umbreit, 1995).

Functional analysis procedures are defined as an instruction set for identifying sources of

stimuli that cause and/or maintain the problem behaviors (Stichter, 2001). The purposes of conducting functional analysis are: (a) defining problem behaviors, (b) finding stimuli that elicit or extinguish problem behaviors, and (c) finding functions of problem behaviors (Foster-Johnson & Dunlap, 1993; Horner & Carr, 1997; Lalli & Goh, 1993; O'Neill, Horner, Albin, Storey, & Sprague, 1994).

Although review of literature shows that the number of research studies examining the effectiveness of functional analysis has been increasing in the recent years (Carr, Yarbrough, Langdon, 1997; LeVelle, 1998; Peck, Sasso, & Jolivette, 1997; Roane, Lerman, Kelley, & Van Camp, 1999; Sasso et al., 1992), several areas warrant future research. First, despite our knowledge of the efficacy of functional analysis, there are still gaps in practical usage of functional analysis in school settings. Although functional analysis processes have been mandated in some countries in the regulations about education of students with developmental disabilities with severe behavior disorders, training on conducting functional analysis across special education teacher training programs is not common (Iwata et al., 2000; Stichter, Peck, Shellady, Sealander, & Eigenbergerl, 2000). Also, there is a lack of information about how to train teachers to get knowledge and experience to provide func-

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tional analysis in natural settings, their classrooms (Shellady & Stichter, 1999). There are a few studies that used simulated settings to train teachers to conduct functional analysis (Iwata et al.; Moore, Edwards, Sterling-Turner, Riley, DuBard, & McGeorge, 2002). Iwata et al. trained undergraduate psychology students to implement functional analysis (i.e., attention, demand, play condition) in simulated sessions. Training program consisted of reading materials about functional analysis, watching a videotaped simulation, demonstration of correct procedural implementation, passing a written quiz, and receiving feedback on performance during sessions. Results showed that service providers who had limited clinical experience on conducting functional analysis were trained to acquire the basic skills necessary for conducting functional analysis. Moore et al. replicated the Iwata et al. (2000) study, and conducted in vivo probes in which generalization of training of functional analysis (i.e., demand and attention condition) was demonstrated from more controlled training settings into classroom settings with actual students.

While social validity aspects of functional analysis also warrants additional evidence based data, some studies examined social validity aspects of conducting functional analysis in the school settings (Broussard & Northrup, 1995; Doggett, Edwards, Moore, Tingstrom, & Wilczynski, 2001; Kamps et al., 1995; Moore, Doggett, Edwards, & Olmi, 1999; Storey, Lawry, Ashworth, Danko, & Strain, 1994; Umbreit, 1995). In these studies, the majority of teachers reported that they found functional analysis acceptable (Broussard & Northrup; Doggett et al.; Moore et al.). However, in one study, two teachers reported that they did not want to conduct functional analysis procedure in their classrooms, and two reported that they conducted functional analysis in their classrooms only by the help of intensive consultation from the researchers (Kamps et al., 1995).

These studies illustrate how important practitioners' opinions are. Effectiveness alone was not enough to implement these procedures in the classroom. Therefore, it is important to evaluate the acceptability of functional analysis to try to identify factors that influence it and affect teachers' use of it.

The purpose of the current study was to examine the effectiveness of a program for training special education teachers on conducting functional analysis in natural settings, and to compose opinions of teachers about functional analysis and its relevance to problem behavior observed in their classrooms before and after training.

Method

Participants and Setting

Five special education teachers and one student teacher participated. There were two males and four females. All had experience working with children with behavior problems. Teachers' experiences ranged from three to 14 years. Two participants had MA degrees, and the rest had BA degrees in special education.

Participants were selected based on two criteria: (a) had students with problem behaviors in their classroom, (b) had no experience conducting functional analysis. Target students were chosen based on their problem behaviors. While disruptive, problem behaviors that were addressed did not put the child at risk for injury.

The study was conducted in six classrooms for students with developmental disabilities at the Research Institute for the Handicapped at Anadolu University in Turkey. There were four to six students with developmental disabilities, four teacher candidates (senior students in special education), and a teacher in each classroom.

Functional Analysis Test Conditions

Test conditions (attention, demand, play, and tangible) were similar those in Iwata et al. (1982, 2000) and Moore et al. (2002) except a tangible condition was conducted instead of an alone condition.

During attention condition, students were directed to access toys and educational materials throughout the sessions. When students exhibited target behaviors, a disapproval statement was delivered by the teacher (e.g., "stop, do not do that"), and the teacher approached the student and touched the student's head or arm briefly to show how sad the teacher was.

During escape condition, a task direction for an activity was presented every 30 s to the student who exhibited problem behaviors. A three step prompting was delivered to help the student complete the activity (e.g., task direction, task direction plus modeling, task direction plus physical prompt). When the student exhibited target behavior, the teacher withdrew the activity items and sat down by turning his back. During play condition, the teacher directed students towards favorite toys or activities. The teacher delivered attention every 30 s during the sessions. When the student exhibited target behavior, the teacher ignored the behavior. When a target behavior occurred immediately after 30 s, 5 more seconds were waited before delivering attention. During tangible condition, the teacher sat down next to the student and gave preferred or edible items. After about 15 s, the item was removed. When the student exhibited target behavior, the teacher gave the item to play for 30 s or gave a piece of edible item. Teachers were interviewed to identify preferred items to use in this condition.

The sequence of test conditions was determined randomly both in probe and training sessions and the number of sessions was the same for each teacher.

Target Behaviors for the Students

To implement functional analysis in natural settings, the following target behaviors were selected: (a) throwing objects, defined as throwing any object at least half a meter, (b) being out of seat, defined as hanging around in the classroom without first completing activity or going to the door without any reason, (c) screaming, defined as any yelling or screaming behavior, (d) not following verbal direction, defined as not performing behaviors that teachers asked, and (e) temper tantrums, defined as chained behaviors such as hanging around, biting his/her clothes, and making noise.

Experimental Design

A multiple probe design across teachers was used to investigate the effectiveness of a program for training teachers on conducting functional analysis in natural settings. The de-

pendent measure was number of correct responses in each test condition (i.e., attention, demand, play, and tangible), and the independent variable was functional analysis training program. Teacher dyads were formed randomly and the independent variable was introduced to two teachers at a time simultaneously. Experimental control was built in when teachers responded at or near baseline levels during full probe conditions before the program was introduced (Wolery, Bailey, & Sugai, 1988).

Baseline and Full Probe Conditions

Full probe sessions were conducted simultaneously before introducing the intervention to the first two teacher dyads as a baseline and after criterion was met for each teacher.

Without providing training on functional analysis, it is almost impossible for a teacher to conduct it (Iwata et al., 2000). Prior to baseline, frequently cited research article was translated into Turkish and distributed to the teachers (Iwata et al., 1982). Five days after receiving article, teachers were asked to implement test conditions to identify functions of the problem behaviors of their students. Teachers were expected to use the same test conditions used in the Iwata et al. (1982) article. No feedback was given to the teachers when they tried to conduct functional analysis in their classrooms. All full probe sessions were videotaped.

Teacher Training

Phase I initial training. Teachers participated in this phase as a group. An instructional material including theoretical and practical information about functional analysis was given to the teachers to be read. Four days after distributing this material, the first author lectured on functional analysis methodology. Also, a videotaped simulation for the correct implementation of each test condition was shown to the teachers twice. In the first demonstration all test conditions were shown consecutively without any break. In the second demonstration, a break between test conditions was taken, and correct implementation for each test condition was discussed in the group. At the end of this phase, teachers took

a 20-item written open-ended quiz. The quiz was adapted from the one used in Iwata et al. (2000). When teachers scored 90 or above the phase was terminated. When teachers scored below 90, the first author discussed possible correct answers with the teachers, and they took another 20-item quiz. This continued until each teacher scored 90.

Phase II consultation meeting and performance feedback. There were two conditions in this phase. In the first condition, three 15 to 30 minute consultation meetings were provided individually to teachers by the first and third author. In the first consultation meeting, definitions of problem behaviors of target children were discussed. For the second consultation meeting, teachers were asked to conduct interviews with teacher aides and/or parents of target children by using the functional analysis interview form (Erbas, 2002). In the second consultation meeting, problems that teachers faced during interviews were discussed and their questions were answered. In addition, use of direct observation forms was explained. Then, teachers were asked to observe their students in classrooms using these forms until the third consultation meeting. In the third consultation meeting, teachers were asked to summarize interview and observation data, and to develop hypotheses for the problem behaviors of target children. Also, problems that teachers faced during observation and hypotheses development processes were discussed, and their questions were answered.

Target problem behaviors were videotaped while teachers were conducting direct observation in their classrooms. The authors watched these recorded sessions and developed hypotheses for the functions of problem behaviors. Agreement between author developed and teacher-developed hypotheses were examined. After agreement between these hypotheses was settled, the second condition of this phase was started.

In the second condition of this phase, teachers were asked to conduct functional analysis to identify functions of problem behaviors in their classroom. Immediately following each test condition, the first and third author met the participant to watch the tape and to discuss performance on the target test condition for that session. These feedback sessions were conducted in a room in the partic-

ipant's school, and lasted approximately 10-15 min. When the participant showed an incorrect behavior while implementing the test condition, the researcher stopped the video, indicated the error, and asked how to correct the behavior (e.g., "Cicek, as you see, you made a mistake. You forgot to provide a consequence for the target behavior. What should you have done after problem behavior?" or "Cicek, as you see, you made a mistake. You provide a wrong consequence for the target behavior. What should you have done after problem behavior?"). If the teacher gave a correct response to this question, then they continued to watch the session. If the teacher gave incorrect or no response to this question, then the researcher explained the correct response verbally (e.g., the author told the teachers that "As soon as the student exhibited the problem behavior, you should have gone next to her and told her -do not hit yourself, you can hurt yourself."). At the end of the feedback session, the authors delivered specific verbal praise for the teacher's performance on the target test condition. Then, the authors summarized how to conduct the new test condition for the next day to the teachers. The same procedures were used until teachers conducted each test condition without making a mistake.

Data Collection and Reliability

In order to examine the effectiveness of the training program, data were collected for teacher behaviors and reliability. Anticipated teacher responses were determined for each test condition as a control checklist. These responses can be seen in Table 1. These control checklists were adapted from Iwata et al. (1982, 2000). Sessions lasted 5 min and were videotaped. However in the absence of the anticipated behaviors for each test condition during the 5 min period, the observation interval was extended for 5 min. Videotapes were watched by the first and third authors, and the occurrence and nonoccurrence of the planned teacher behaviors were recorded using the control checklist. Plus (+) and minus (-) signs were used respectively for correct and incorrect responses. Correct response was defined as completion of each step of test condition independently. Incorrect response was

TABLE 1

Anticipated Teacher Responses for Each Test Condition

<i>Attention Condition</i>	
1. The teacher looks at the researcher to see the start sign.	
2. The teacher directs target student towards the toys and educational materials.	
3. The teacher tells target student what s/he has to as a teacher (i.e., I will prepare materials for other students) and tell him/her he/she I free to play whatever s/he wants.)	
4. The teacher sits down at place seen by the target student.	
5. The teacher ignores target student if the student does not exhibit problem behaviors.	
6. If the target student exhibits problem behaviors, the teacher goes next to the student and tells her/his disapproval statement.	
7. The teacher terminates session when shown the stop sign by the researcher.	
<i>Escape Condition</i>	
1. The teacher looks at the researcher to see the start sign.	
2. The teacher lets the target student sit at a table.	
3. The teacher looks at the researcher to see the start sign in the first 30 s of the session.	
4. The teacher provides a clear accurate task direction to the target student.	
5. The teacher waits 5 s response interval for the target student starts to perform the activity, and reinforce his/her when s/he completes the activity.	
6. If the target student does not respond within 5 s, the teacher re-provides the task direction and models the correct response.	
7. If the target student exhibits the correct response when sees the model, the teacher reinforces hi/her.	
8. If the target student does not respond within 5 s to model prompt, the teacher re-provides the task direction and provides physical prompt for the correct response.	
9. The teacher does not provide reinforcement to the correct response after receiving physical prompt.	
10. The teacher removes the materials from the table and sits his/her back to the target student if the student exhibits target behavior.	
11. The teacher starts the second session when sees the second start sign in the 30 s.	
12. The teacher terminates the session when sees the stop sign form the researcher.	
<i>Play Condition</i>	
1. The teacher looks at the researcher to see the start sign.	
2. The teacher directs the target students to go to next to his/her favorable items.	
3. The teacher sits down close to target student.	
4. If the target student exhibits problem behavior, the teacher ignores him/her.	
5. The teacher delivers his/her attention to the target student every 30 s.	
6. If the target student exhibits an appropriate behavior (e.g., ask a question to the teacher, or give a toy to the teacher), the teacher responds him/her.	
7. When a target behavior occurred immediately after 30 s, 5 more seconds were waited for delivering attention.	
8. The teacher terminates the session when sees the stop sign form the researcher.	
<i>Tangible Condition</i>	
1. The teacher sits down next to the student and gave the student preferred items or edible items.	
2. The teacher removed the item after about 15 s.	
3. When the student exhibited target behavior during sessions, the teacher gave the item to him/her to play for 30 s or gave a piece of edible item.	
4. The teacher does not comment on for the problem behavior of the target student.	

defined as not completing, miscompleting, or totally ignoring each step of test condition. Number of correct observed teacher behaviors was divided by number of planned teacher's behaviors and multiplied by 100 for each

test condition to obtain percent of correct responding.

Reliability data were collected during at least 20% of all experimental sessions. These sessions were selected randomly. The observer

was a special education graduate student. The observer was informed about the observation process. Assigned sessions were observed by both researcher and observer; then, agreement between observers was calculated.

Dependent variable reliability was calculated by using the point-by-point method with a formula of the number of agreements divided by the number of agreements plus disagreements multiplied by 100. Dependent variable reliability data collected during full probe sessions and training sessions yielded a mean percentage of agreement of 99.89% and 97.45% respectively.

Independent variable reliability data were collected to estimate whether the training program was administered reliably. The occurrence and nonoccurrence of the following researchers' behaviors were observed for the full probe and training sessions. Planned steps that the researchers were expected to demonstrate for full probe sessions were (a) to be ready in the classroom, (b) to inform the teachers which test condition was used at the moment, (c) to start recording, (d) to be silent during the session (not providing feedback). Planned steps that the researchers were expected to demonstrate for training teachers on conducting functional analysis during feedback sessions were (a) to stop watching the tape as soon as the teacher exhibited an incorrect behavior, (b) to indicate to the teacher that they had erred (c) to ask how to remedy the error, (c) if the teacher verbalized correct step, provide specific verbal praise, and continue to watch the tape, (d) if the teacher verbalized incorrectly, provide verbal description of the correct step, and (e) to provide information for the coming test condition. Independent variable reliability was calculated by dividing the number of observed researcher behaviors by the number of planned researcher behaviors, and multiplied by 100.

Percent compliance with the planned steps in both probe and training sessions were consistently high. The first researcher with 100% and the third researcher with a mean of 99.97% (range = 99.25-100) training session compliance. All full probe sessions had 100% compliance.

Social Validity

Teachers responded to the Social Validity Form to obtain their opinions regarding conducting functional analysis in their classrooms before and after training. There were 13 statements on this form. These statements were developed to find out the factors (e.g., feasibility, cost etc.) affecting the functional analysis process, and side effects (if any) of functional analysis both on the target children and other children in the classrooms. Each statement had four possible choices from strongly appropriate to not appropriate.

Results

Effectiveness Data

Figure 1 shows the percentage of correct teacher behaviors for conducting functional analysis in their classrooms during baseline, full probes and training sessions. As seen in Figure 1, the mean of teachers' performances on test conditions during baseline were generally low ($M = 5.01\%$; range of individual means, 0 to 7.08). However, all teachers showed progress following training. The means of teachers' performances on test conditions during training was generally high ($M = 89.98\%$; range of individual means, 80.56 to 96.10). The means of teacher performances on test conditions during final full probe sessions was generally high as well ($M = 99.83\%$; range of individual means, 99.50 - 100).

When the teachers' performances on individual test conditions were reviewed, it was seen that there was an increase in all teachers' performances during training session. The means of teachers' performances were found as 80.56% (range of individual means, 62.29 to 89.50) for escape test condition, 89.47% (range of individual means, 82.50 to 95) for tangible test condition, 80.56% (range of individual means, 62.29 to 89.50) for play test condition, and 95.94% (range of individual means, 91.25 to 98) for the attention test condition.

Social Validity

Social validity findings showed that there were overall positive changes in the opinions of

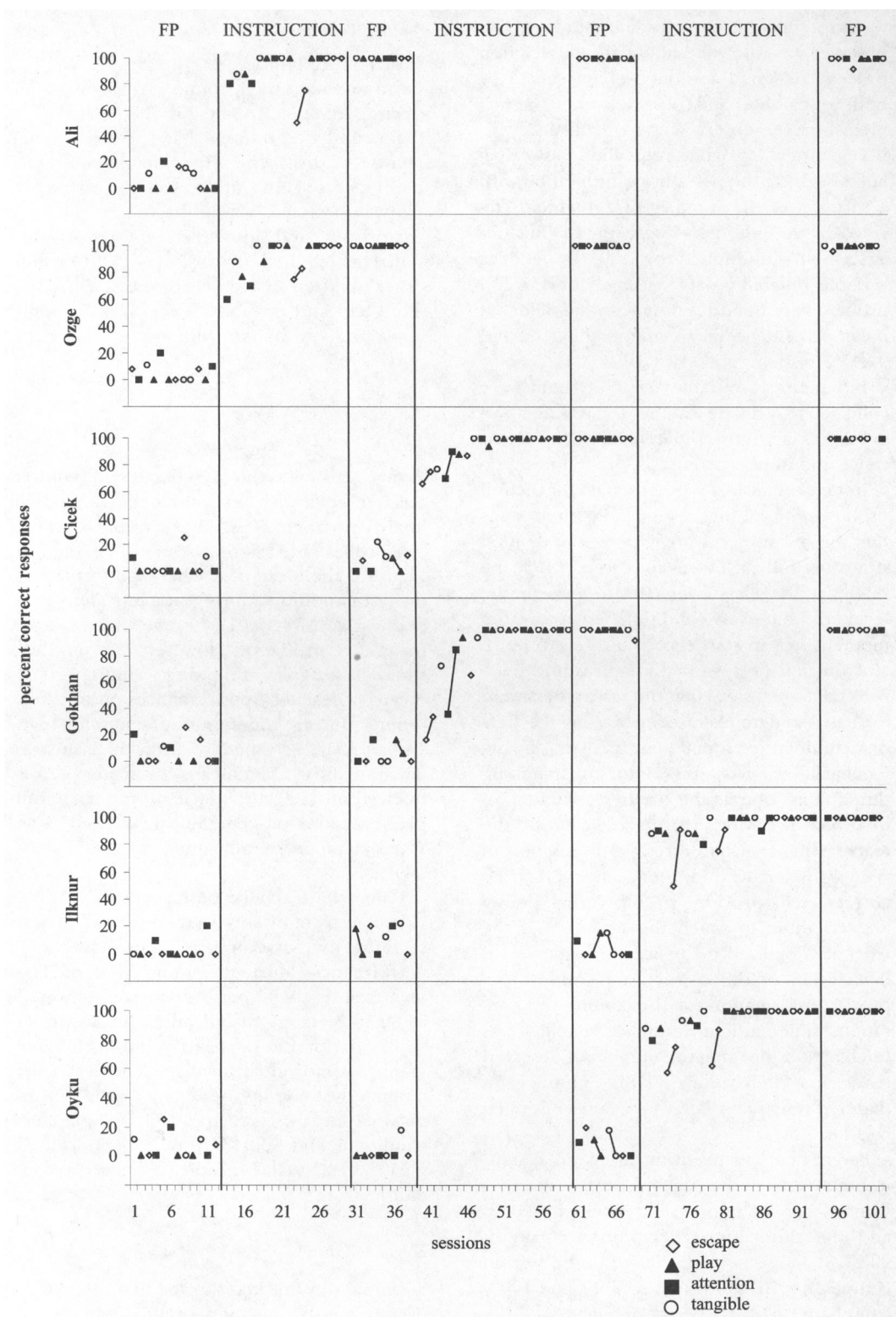


Figure 1. Percent of correct responses across four functional analysis test conditions during baseline, training, and probe sessions.

teachers towards conducting functional analysis in their classrooms after instruction.

Discussion

The present study examined effects of the training program used to teach the functional analysis process to teachers of children with developmental disabilities. In addition, teachers' opinions of this process were investigated. Several findings are worthy of discussion.

First, data indicated the training program was effective in training teachers to conduct functional assessment in their classrooms. Teachers displayed 5.01% correct responding before training and 86.64% correct responding after training. We can infer that teachers needed to have training in order to conduct functional assessment in their classrooms. Results that teachers acquired basic components of functional analysis procedures through training are consistent with the findings of Iwata et al. (2000) and Moore et al. (2002). Professionals and peers in the field may consider using this type of training program when delivering instruction to teachers and student teachers.

Second, when examining teacher performance on each test condition, data indicated that all teachers' performances were lower during escape condition than in the other three test conditions. The reason for lower performance during escape condition may be that teachers were expected to demonstrate many more steps, and they were generally more complex in the escape condition.

Third, when examining the social validity findings of the study, it was seen that the teachers' opinions towards conducting functional assessment generally changed positively after training. The social validity findings of the present study are consistent with the findings of the previous studies in general (e.g., Broussard & Northrup, 1995; Doggett et al., 2001; Moore et al., 1999; Storey et al., 1994; Umbreit, 1995).

Although findings of the study were very encouraging, some limitations were present. One limitation was that preference assessment was not conducted for the tangible condition. However, teachers were informed about the importance of the preference assessment for the tangible condition. Also, items used in the

tangible condition were chosen based on the teachers' reports. Another limitation was that skills such as modifying the program according to characteristics of students with problem behavior, controlling risky situations, and controlling individual differences during test conditions were not taught to teachers in the study. This is similar to the limitation was stated in Iwata et al. (2000).

Future research should be conducted to teach different functional analysis test conditions (i.e., changing the level and degree of attention provided to the students with problem behaviors and changing the difficulty level of the task provided to the students with problem behaviors) to the teachers. Another area for further research is examining whether teachers make more errors in the establishing operations and in the consequence phases of test conditions and whether consequence errors are more frequent for appropriate behavior or for target behavior.

In summary, the present results contributed to the literature in two ways. First, the opinions of teachers regarding functional analysis were based on their actual experiences. Second, the study represents a replication of functional analysis procedures, in that a new group of researchers applied the procedures in a new country. Replications across investigative teams and countries are needed to further advance and strengthen the use of functional analysis procedures.

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