
USING INTERNATIONAL VIDEOCONFERENCING TO PROVIDE STAFF TRAINING ON FUNCTIONAL BEHAVIORAL ASSESSMENT

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Videoconferencing has been successfully implemented to teach functional analysis (FA) procedures to service providers who support individuals with autism spectrum disorders. The purpose of the current study was to evaluate the acquisition of the competencies for implementing FA methodology for special education teachers after participation in a group-format workshop via a videoconferencing program in which the training site and the remote site were located on different continents, connected through the internet. Four special education teachers in Saudi Arabia who did not have previous exposure to functional behavior assessment participated in the study. Teachers received 3 h of group-format training via Skype followed by individualized feedback. Training involved role-playing, video modeling, and reading materials. Results indicate that all four participants mastered the skills across at least two of the conditions with one participant demonstrating mastery across all four conditions. Copyright © 2015 John Wiley & Sons, Ltd.

Implementing functional behavior assessments (FBA) prior to designing behavior support plans is considered a behavior analytic best practice and is mandated by federal law (Individuals with Disabilities Education Act, 20 U.S.C. 1400 et seq. 1975, as amended, 1997). Depending on the method of collecting data and the situations under which observations are conducted, there are three general approaches used to comprise a complete FBA. These include indirect assessments, direct assessments, and functional analyses (FA; Iwata, Kahng, Wallace & Lindberg, 2000a; O'Neill, Horner, Albin, Storey, & Sprague, 1997). Indirect assessments include record reviews and interviews with people familiar with the behavior under study. Direct assessments include direct observation of the target behavior, preferably in the natural environment in which the behavior is typically exhibited. In the standard FA, which is the

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most systematic and precise approach, variables associated with the target problem behavior(s) (i.e., antecedents and consequences) are directly manipulated to test the effects of those variables on the problem behavior and to see if the function(s) of behavior can be determined (Carr, LeBlanc, & Love, 2009; Cooper et al., 2007). A complete FBA includes all three means of assessment, beginning with hypothesis formulation based on indirect assessment and direct observations through to testing those hypotheses with some form of an FA.

Some experts have suggested that one limitation of FA is that extensive training and clinical experience are necessary to perform them (Durand & Crimmins, 1988). However, studies show that implementing FA procedures can be taught in a short training period for those who have little or no knowledge or experience in FBA. Such trainings have been provided utilizing either face-to-face training (e.g., via workshop, individualized instruction, and role play) or distance or virtual training such as similar content delivered via videoconferencing (Frieder, Peterson, Woodward, Crane, & Garner, 2009; Machalicek et al., 2010). Face-to-face training is more traditional with both trainers and trainees being present at the training location (Erbas, Tekin-Iftar, & Yucesoy, 2006; Iwata et al., 2000b; Moore et al., 2002; Moore & Fisher, 2007; Wallace, Doney, Mintz-Resudek, & Tarbox, 2004).

The traditional approach is a viable option when experts in FA and trainers are available in the same geographic area. A lack of experts in FA is a substantial obstacle to providing effective service worldwide, and experts are often in urban areas while many of those needing training are in rural areas (Graeff-Martins et al., 2008). Barriers, such as insufficient contact frequency and duration, high financial costs for travel and expert consultative time, and inability to receive on demand support in crisis situations may also exist when consultation is needed (Gibson, Pennington, Stenhoff, & Hopper, 2010). As a result, students with problem behavior, including students with ASD, may not receive appropriate function-based intervention or might be evaluated and treated by unqualified personnel (Mercier et al., 2008). As an example, in Saudi Arabia at the time of this study, there were only five Board Certified Behavior Analysts (BCBAs; only two of whom speak Arabic as their first language) and two Board Certified Assistant Behavior Analysts (BCaBAs) to serve a population of around 27 million and a size of approximately 770,000 sq mi (Central Department of Statistics and Information, 2011). All five BCBAs reside in one small geographic area, Jeddah, which is located on the west coast of the country on the Red Sea.

The use of advanced technologies (i.e., videoconferencing) is a promising alternative to providing face-to-face training and consultation (Boisvert, Lang, Andrianopoulos, & Boscardin, 2010; Gibson et al., 2010). Videoconferencing involves the use of communication technologies (e.g., internet and web camera

software) to deliver consultation, evaluation, and/or professional training to remote sites in real time (Dudding, 2009). Alternative terms for videoconferencing include telemedicine (Barretto, Wacker, Harding, Lee, & Berg, 2006), teleconferencing (Gibson et al., 2010; Machalicek et al., 2009), video teleconferencing (Machalicek et al., 2009), and telepractice (Dudding, 2009). Studies have reported successful use of videoconferencing for training the correct implementation of FA (Frieder et al., 2009; Machalicek et al., 2010). In this study, we aimed to evaluate the effectiveness of videoconferencing for providing staff training on FA procedures from trainers residing in the USA to practitioners residing in Saudi Arabia.

METHOD

Participant Characteristics and Recruitment

The participants in this study were four special education teachers and one student with ASD who displayed challenging behaviors. All four participant teachers were male, and the student actor was a male. (In Islamic cultures, it is not considered appropriate to combine males with females in social contexts such as training on implementing behavioral procedures because of the possible physical contact among the trainees and actors of different genders.) Participants were recruited from a private special education school in Jeddah, Saudi Arabia. All participants spoke Arabic as their primary language. The participant teachers (a) had never received any formal education in applied behavior analysis (ABA) or FBA; (b) had no previous exposure to the FA methodology; and (c) provided consent to participate in the study.

Khalid was a special education teacher with a Bachelor of Arts degree in Special Education with 5 years and 8 months experience working with individuals with ASD and related disorders. Sami was a special education teacher in his fourth year of college working toward a bachelor degree in Psychology, with 9 years experience working with individuals with ASD. Omar was a special education teacher with a Bachelor of Arts degree in Special Education with 8 years and 8 months experience working with individuals with ASD and related disorders. Aziz was a teacher aide with a Bachelor of Science degree in Computer Science with 1 year of experience working with individuals with ASD.

One student with ASD participated in the generalization phase of the study. This 12-year-old male had a diagnosis of ASD by an independent practitioner not associated with this project. The child attended the special education school and exhibited challenging behavior (e.g., screaming, crying, hitting the table by hand, or hitting others by hand).

Experimental Design and Procedures

A multiple-baseline design across teachers with an embedded multi-element design was used to evaluate the effects of the virtual group training provided via videoconferencing on the teachers' acquisition of FA methodology (e.g., ignore, attention, play, and demand conditions). The multi-element design was utilized to control for the various FA conditions.

Settings

The host site was California State University Los Angeles, USA. The host site was equipped with a laptop computer that was connected to the internet, a web camera to transmit the audio and visual information between both sites and a microphone to transmit audio information from the host site to the remote site. In addition, Microsoft PowerPoint® was utilized to deliver the presentation.

The remote site was the special education school that provides special education support for students with ASD, located in Jeddah, Saudi Arabia. At the remote site, a conference room was equipped with a desktop computer that was connected to the internet, a web camera to transmit audio and visual information between both sites, and a microphone to transmit audio information from the remote site to the host site. In addition, a multimedia projector was used to provide a larger picture from the host site.

The host and remote sites were virtually connected via free desktop videoconferencing software (Skype™) for transmitting real-time two-way audio and video communication via the internet. During all phases of the study, the investigator used Skype™ to provide instruction, training, and feedback. The approximate distance between the host and remote site was 8333 mi.

Dependent Variables

Paper and pen data sheets were used to record the percentage of correct responses during each condition (i.e., ignore, play, attention, and demand) across all phases and participant teachers. Based upon the specific condition a task analysis was developed regarding the behaviors the participant should engage in, in addition to scoring correct implementation of procedures, errors of omission and commission were also scored per 10-s interval. A correct response received a score of 1, while an incorrect response received a score of 0. Each session was divided in 10 s intervals. The percentage of correct responses was calculated by summing the total number of correct responses within a condition divided by the total number of responses and then multiplying by 100. All sessions were videotaped and scored later by the first author.

Ignore Condition

During the ignore condition, data were collected on participant teachers' correct practice of the condition defined as ignoring of the actor/student's target behavior throughout the session and blocking access to leisure items. In conducting a functional analysis, an alone or ignore condition is commonly used to demonstrate whether challenging behaviors are maintained by automatic reinforcement. For this study, an ignore condition was used rather than an alone condition because the training was intended for teachers who provide support solely in classroom settings where an alone condition would not be possible. Likewise, contingent blocking of access to leisure items readily available in the classroom was used to increase control of the environment to the closest approximation of an ignore condition possible given the natural environment of a busy classroom.

Attention Condition

During the attention condition, data were collected on participant teachers' correct practice of the condition defined as delivery of contingent disapproval after the occurrence of the target behavior (e.g., "You are going to hurt yourself"), ignoring appropriate behaviors, and ignoring non-targeted problem behaviors.

Play Condition

During the play condition, data were collected on the participant teachers' correct practice of the condition defined as providing 10 s of non-contingent attention every 30 s, withholding attention for 5 s every time the target behavior occurred, not placing demands, and ignoring inappropriate behaviors.

Demand Condition

During the demand condition, data were collected on the participant teachers' correct practice of the condition defined as presentation of instructional demands, modeling the task if the student did not perform the task, physically guiding the student to perform the task, removing the task contingently upon the occurrence of the target behavior, and praising task completion.

Baseline

During baseline, each participant teacher was given an Arabic-translated version of the method section of the seminal Iwata, Dorsey, Slifer, Bauman, and Richman

(1982/1994) study to review at least 1 day prior to the implementation of the four conditions of an FA. The methods section describes the steps that the participants were to follow in order to conduct each condition of the FA. After reviewing the translated materials, participant teachers were instructed to act as a therapist implementing the steps they had read about: conducting ignore, attention, play, and demand conditions with a student actor. To better establish the relations between independent and dependent variables, two of the participants, Khalid and Omar, implemented one set of the four conditions (i.e., ignore, attention, play, demand), while the other two participants, Aziz and Sami, implemented two sets of the four conditions. Each condition lasted 5 min in length.

The student actor had 10 years experience working with students with ASD, played the role of a student who engages in self-injurious behaviors (body hitting). The actor used scripts to display the self-injurious behavior, other non-targeted problem behaviors (e.g., screaming, hitting the table by hand, or hitting others by hand) and appropriate behaviors (e.g., sitting nicely during attention and ignore conditions, following instruction on the demand condition, playing appropriately with toys during the control conditions). The actor used scripts to display specific behavior and responses to the participant teacher at prescribed times.

Training

The group-format workshop was conducted in the conference room with four participant teachers and an additional 19 teachers from the same special education school. The training lasted approximately 3 h. The training was provided via videoconferencing. The trainer covered the topic of FBA, with emphasis on functional analysis (ignore, attention, play, and demand conditions). First, functions of problem behaviors were identified. Descriptions and reasons for each condition and videotaped demonstration were provided. Second, all attendees (i.e., including the four participant teachers) were instructed to alternate between playing the role of a student and the role of a therapist for all four conditions. After role-playing, the trainer answered questions regarding the conditions and how to implement them. Training was provided at the end of the school day (i.e., from 1:00 PM to 4:00 PM GMT +3:00). Time difference between the host site and remote site was 10 h.

Post-training Evaluation

Following the training, simulated analyses identical to those in baseline were conducted to evaluate whether the participant teachers learned how to implement ignore, attention, play and demand conditions of a FA. When the participant teacher met mastery level of implementing ignore, attention, play, and demand conditions

(which was 90% correct implementation across all conditions), he was asked to conduct all the conditions with a student in a therapy room during the generalization probe (refer to the succeeding texts). When the participant teacher did not meet criteria for mastery (i.e., below 90% correct implementation across all conditions), an individualized feedback procedure was utilized to instruct him until his implementation of the procedures met the mastery criteria for each condition.

Individualized Feedback

This phase was introduced at least 2 days after the post-training evaluation when a participant failed to conduct a simulated analysis condition with more than 90% accuracy. During the individualized feedback phase, the trainer provided verbal feedback specific to the participant's performance (e.g., "Make sure you physically guide the student to complete the task if he or she has not responded to the model and has not engaged in the target behavior"), reviewed the steps for correct implementation, and played a video modeling the correct implementation of the condition. After feedback had been given, simulated analyses were conducted again. This phase lasted for approximately 30 min for each participant. To evaluate acquisition of correct implementation of FA, one additional session for each condition was conducted. If a participant failed to master the skills, it was considered non-mastered and generalization data were not collected. Thus, participation in the study was terminated.

Generalization Probe

One of the four participants met the mastery level and entered the generalization phase 5 days after the individualized feedback phase. During this phase, analyses identical similar to those in baseline and post-training evaluation were conducted to examine whether the participant generalized the learned skills with a student with ASD who exhibited high rates of problem behaviors (i.e., screaming, crying, hitting the table by hand, or hitting others by hand) which were different than the problem behaviors exhibited by the student actor when training was provided. Neither feedback nor additional training was provided in this phase.

Reliability

Interobserver agreement (IOA) was conducted for 25–30% of sessions across all phases and all participants. The percentage of IOA was calculated by a block-by-block method, in which the session was broken into consecutive 10-s intervals and the observers' records were compared. Interobserver agreement was 90% for Khalid, 97% for Omar, 87% for Aziz, and 92% for Sami, respectively (range, 74–100%).

Social Validity

Immediately following the training, a social validity measure was administered to all four participant teachers to assess the degree to which they found the training via videoconferencing acceptable. This measure included a 6-item self-report questionnaire using a Likert scale followed by a comments section that allowed participants to write in comments or feedback. Participants rated each item on a score of 1, strongly disagree, to 5, strongly agree.

RESULTS

The results indicated that all participants met criteria levels of correct implementation of functional analysis across at least two of the conditions (ignore, attention, play, and demand). One participant (Sami) demonstrated mastery across all four conditions and entered the generalization phase, implementing FA with a student with ASD. The results of the correct implementation of the FA methodology are presented in Figure 1. The shaded bar represents the level of mastery (90% or higher) for each condition.

As shown on the graph, during the baseline phase, Khalid scored above 90% accuracy across ignore and attention conditions, but after the group-format training, he scored above 90% accuracy across three conditions, ignore, attention and play. That is, he implemented ignore session with 100% accuracy, an attention session with 93% accuracy, a play session with 94% accuracy, and demand with 65% accuracy. After entering the individualized feedback phase and receiving individualized specific feedback on the errors he made in demand session, he implemented the demand session with 73% accuracy. Even though he did not meet criteria for mastery level for the demand session, steady improvement was shown across the experimental phases.

During baseline, Omar reached the mastery level for the ignore condition only, but after the group training phase, he showed improvement in all four conditions and met mastery level for two sessions, ignore and attention both at 100% accuracy. During individualized feedback phase, while he did not meet mastery levels for two of the conditions, a steady improvement was shown across both sessions.

Aziz reached the level of mastery for the ignore condition and one of the play sessions during baseline. After the group training phase, he reached the mastery level when implementing an ignore session with a score of 100% accuracy, an attention session with 97% accuracy but failed to meet the mastery levels for play session with a score of 66% accuracy, and demand session with a score of 56% accuracy. After receiving feedback (i.e., in individualized feedback phase) related to the errors made during both sessions, he implemented play with 80% accuracy and demand sessions

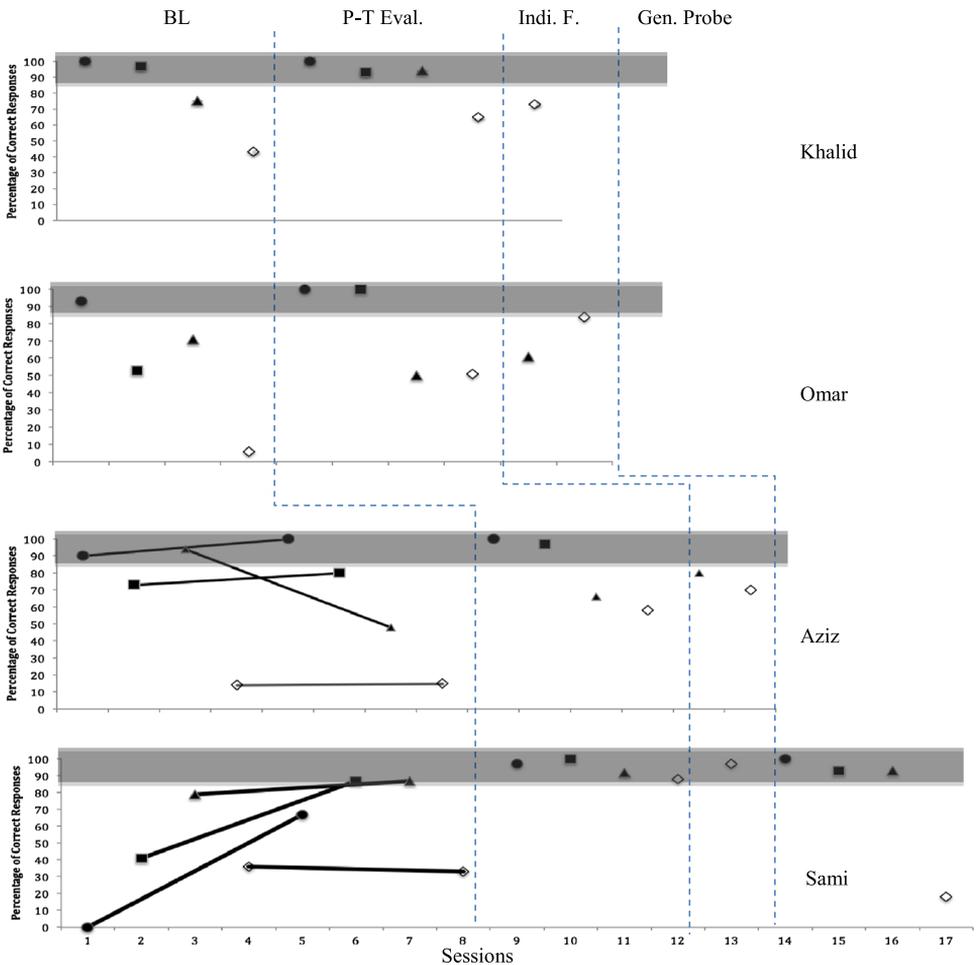


Figure 1. Percentage of correct responses during the implementation of functional analysis for Khalid (first panel), Omar (second panel), Aziz (third panel), and Sami (fourth panel). *BL*, baseline; *P-T Eval.*, post-training evaluation; *Indi. F.*, individualized feedback; *Gen. Probe*, generalization probe; closed circle, ignore condition; square, attention condition; triangle, play (control); open diamond, demand condition.

with 70% accuracy, failing to meet mastery level, yet demonstrating improvements across both play and demand sessions.

Sami did not meet mastery level for any of the four conditions during baseline; however, he demonstrated levels of mastery for three of the four conditions after the group-format training and needed feedback for the demand session. He conducted an ignore session with 97% accuracy, an attention session with 100% accuracy, a

play session with 92% accuracy, and demand with 88% accuracy. After the individualized feedback phase, he implemented a demand session with 97% accuracy. Only Sami entered the generalization phase where he implemented one set of the FA conditions with a student with ASD who exhibited tantrums, which included screaming, crying, hitting the table by hand, or hitting others with their hand. During the generalization probe phase, participant 2 (Sami) implemented the ignore, attention, and play conditions with mastery levels of 100%, 93%, and 93%, respectively. However, he implemented the demand condition with 18% accuracy (Figure 1). This phase was conducted 2 weeks after the feedback phase under the supervision of a BCBA physically present at the school.

Social Validity

Data from the social validity measure administered to all four participant teachers directly after the training are presented in Table 1. The mean rating score for all participants across all six items ranged from 1.25 to 4.25. The mean rating for items 2, 4 and 5 were the highest with scores of 4.0, 4.25 and 4.0, respectively, indicating their satisfaction with the skills they learned, willingness to participate in future training via videoconferencing, and willingness to recommend to other colleagues for attending training via videoconferencing. The mean ratings for items 1, 3 and 6 were 1.25, 3.5, and 2.75, respectively, indicating technical difficulties participants experienced (e.g., slowing of the connection or volume) and the limited opportunity to learn about interventions for individual with disabilities. On the last section of the survey, two participants provided open-ended feedback. One participant indicated that it would have been easier to communicate if the presenter were physically present. Another participant indicated that the inconsistent internet connection affected the flow of the presentation.

Table 1. Social validity questionnaire.

Item	Khalid	Aziz	Omar	Sami	Mean rating
1 I did not experience any technical difficulties with the videoconferencing (e.g., slowing of the connection or volume).	2.0	1.0	1.0	1.0	1.25
2 I learned skills that will be useful (e.g., functions of maladaptive behaviors) for working with my students.	5.0	3.0	4.0	4.0	4.0
3 Videoconferencing is a viable method for learning how to conduct interventions for individual with disabilities.	4.0	1.0	5.0	4.0	3.5
4 I would participate in videoconferencing training in the future.	5.0	3.0	5.0	4.0	4.25
5 I would recommend videoconferencing to my colleagues.	4.0	3.0	5.0	4.0	4.0

DISCUSSION

The outcomes of this study support the conclusions reported by Iwata et al. (2000a), Wallace et al. (2004), Moore et al. (2002), and by Moore & Fisher (2007) demonstrating that trainees can acquire skills to conduct FAs with minimal training. This study extends previous work by attempting training via technology across continents and cultures. In this study, after only one group-format training and one individualized feedback session, all participants acquired some skills towards mastery and one achieved mastery of the skills required in conducting a FA. Videoconferencing was effectively used to provide training and supervision of research-based strategies (Barretto et al., 2006; Frieder et al., 2009; Machalicek et al., 2009, Machalicek et al., 2010). Most gains were maintained during a generalization probe across three conditions when participant 2, the only participant meeting mastery criteria across all trained procedures, implemented the FA with a student with ASD who exhibited challenging behaviors.

The difficulties for three out of the four participants correctly implementing some of the conditions is a critical issue and a limitation to the findings. The current study differs from previous literature (Iwata et al., 2000b; Moore et al., 2002; Moore & Fisher, 2007; Machalicek et al., 2010; Wallace et al., 2004) in that training for three of the participants was terminated before criterion for mastery level was met across all the targeted conditions because the study was conducted at the end of the school year.

Participants struggled most in learning the procedures for demand and play conditions (Table 1). Three of the four participants did not meet mastery levels after the individualized feedback phase, and the fourth participant was unable to demonstrate the skill during the generalization probe. The demand condition may be more complicated for the implementer. Specifically, the implementer is required to instruct the client to perform tasks and is required to utilize a hierarchy of least-to-most prompting procedure based on the client response. Similar findings were reported by Erbas et al. (2006) in that participants had difficulties and made more errors when implementing demand conditions more than the other conditions (Iwata et al., 2000b; Machalicek et al., 2010; Wallace et al., 2004). Further, the topographies of the target problem behaviors (i.e., tantrum that included screaming, crying, tapping on the table, and hitting others) of the student were different from the topography of the targeted problem behavior (i.e., body hitting) of the actor during baseline, post-training, and feedback phases.

In regard to the play condition, two participants (i.e., Khalid and Aziz) did not meet levels of mastery for the play condition. For the play condition, the implementer was required to provide non-contingent attention and to withdraw attention every 30 s when the client engaged in inappropriate behaviors. It was observed that providing non-contingent attention was a challenge for these two participants. In the work of

Moore and Fisher (2007), one of the participants needed feedback in order to meet the mastery level for the play condition. The results from this study are similar to those of previous research showing that some participants met mastery levels following group instruction, while others needed individualized feedback (e.g., Wallace et al., 2004).

To address this issue, next steps in establishing training protocols may include errorless learning, wider variety of target behaviors, more opportunities for individual feedback with demand and play conditions specifically to ensure that people trained to conduct complicated and important procedures, such as FAs, achieve fluency and implement strategies properly, especially considering the lack of ongoing guidance or supervision in the use of these strategies available at great distances on an ongoing basis.

This study contributes to the literature in several important ways. First, unlike previous studies, which evaluated the acquisition of two of the conditions (i.e., attention and demand; Moore et al., 2002) or three of the conditions (i.e., attention, play and demand; Iwata et al., 2000b; Machalicek et al., 2010; Moore & Fisher, 2007; Wallace et al., 2004) of the standard FA, this study evaluated the acquisition of all four conditions (i.e., ignore, attention, play, and demand; with the exception of the alone condition, which was replaced by the ignore condition). Results of the current study indicated that three of the participants acquired the skills to implement the ignore condition after reading the written instruction during baseline and one participant met criteria after participation in the group-format training.

Another way in which this study contributed to the literature was that training was provided in both group and individualized formats via videoconferencing over a tremendous geographic distance. The feasibility of using a cost-effective technology may benefit special education providers who work in areas where specialists are not available on a regular basis to provide ongoing training and consultation. In many countries in the Middle East (e.g., Egypt, Algeria, Morocco, Sudan, etc.), South America (e.g., Mexico, Brazil, Argentina, etc.), and Africa (e.g., Angola, Mali, Nigeria, etc.), where there are no BCBAs®, such a service-delivery model might be significantly beneficial in not only enhancing the front-line specialists' competencies but also in providing services to individuals who are in extreme need for research-based strategies where there are no interventionists. In addition, for safety considerations, videoconferencing might be the only option when providing on-site training and consultation. Mali, Syria, Libya, Iraq, Somalia, Yemen, Chad, Haiti, Niger, and Pakistan are some of the countries identified to be unsafe to travel to (U.S Department of State, 2011).

A unique contribution of this study is that all aspects were conducted in Arabic. Currently, no similar trainings have been conducted in the Arabic-speaking community. Arabic is spoken as the first language by more than 200 million people

(Encyclopaedia Britannica, 2014). Such work might pave the path for behavior analysis and other research-based practices to be disseminated in this region of the world. A social validity questionnaire assessed participants' level of acceptance about receiving training via videoconferencing. This was important in identifying the impact of less than optimal electronic technologies. Because the internet connection was interrupted several times during the training, participants might have experienced frustration. Although videoconferencing technology holds promise in expanding the availability of specialized training to distant participants, careful planning and troubleshooting are necessary to maintain treatment fidelity. We are far from understanding how to effectively train staff to support students with challenging behavior using a distance model; yet, the results of this study demonstrate the potential and also the importance of improved efforts for those who otherwise would not have resources available.

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