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A Randomized Evaluation of Group Training for Paraprofessionals to Implement Systematic Instruction Strategies With Students With Severe Disabilities

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Abstract

Paraprofessionals are often tasked with providing instruction to students with severe disabilities despite little or no training in evidence-based practices. Previous studies have demonstrated that specific strategies (i.e., didactic instruction, modeling, and immediate performance feedback) in a 1-to-1 format can enable paraprofessionals to implement practices with fidelity; however, training all paraprofessionals exclusively in a 1-to-1 format with immediate feedback is not feasible. We tested two modifications to improve feasibility: delivery in a group and delayed performance feedback from video recordings. We randomized 17 paraprofessionals to a control condition or group training condition focused on simultaneous and least-to-most prompting. Paraprofessionals in the training condition implemented the prompting strategies with better adherence to steps ($d = 0.91$ and $d = 1.56$), better implementation quality ($d = 0.60$), and their students made more progress ($d = 0.29$). These findings provide evidence that effective coaching strategies can be utilized in a group context.

Keywords

paraprofessional training, group training, behavioral skills training, severe disabilities

Students with severe disabilities—like all students—deserve to receive instruction that is effective and enables them to make progress on educational outcomes. Such instruction, according to the Every Student Succeeds Act (2015), must feature evidence-based practices that have been shown to be effective in rigorous research studies across different participants and researchers. Systematic reviews of the research literature have identified many evidence-based practices that improve outcomes for students with severe disabilities, including students with intellectual disability (Spooner et al., 2019), autism (Wong et al., 2015), and multiple disabilities (Brock & Huber, 2017).

In particular, there are some very simple and versatile systematic instruction practices that have an extensive evidence base and could

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enhance the quality of instruction across many content areas. Specifically, task analytic instruction and systematic prompting are associated with improved outcomes for students with severe disabilities across academic (Spooner et al., 2019), daily living skills (Cullen & Alber-Morgan, 2015), and vocational (Cannella-Malone & Schaefer, 2017) outcomes. Task analysis involves breaking a multistep skill into its component parts so that each step can be targeted and monitored (Franzone, 2009). Systematic prompting involves a clear plan for when prompts will be delivered and how they will be faded over time (Neitzel & Wolery, 2009c). Different prompting strategies may be a better fit for different phases of instruction. For example, simultaneous prompting is especially well suited for teaching a skill that is new to a student (Neitzel & Wolery, 2009b). Designed to promote immediate success and prevent the student from practicing errors, simultaneous prompting involves delivering the instructional cue and the prompt at the same time. In contrast, least-to-most prompting is a better match when a student has partially acquired the teaching target. In this procedure, the student is given an opportunity to respond independently before a teacher provides prompts of increasing intensity (Neitzel & Wolery, 2009a).

These evidence-based practices are powerful, but they are only effective to the degree that they are implemented with fidelity. A research-to-practice gap in special education separates evidence-based practices and the instruction that is actually occurring in schools. Surveys of teachers suggest that this gap is quite wide. Many special educators do not have a clear understanding of the term "evidence-based practice" (Stahmer et al., 2005), are unsure which practices are evidence-based (Brock, Dynia et al., 2020), or report implementing non-evidence-based practices at similar rates to evidence-based practices (Burns & Ysseldyke, 2009). Even when educators are attempting to implement evidence-based practices, they may struggle to implement with fidelity, which can compromise the effectiveness of their instruction (Odom et al., 2013).

The research-to-practice gap is especially pronounced for paraprofessionals who are often tasked with providing instruction despite little or no training in evidence-based practices (Carter et al., 2009). Federal law allows for these paraprofessionals to deliver instruction under the direction and supervision of licensed special education teachers (Individuals With Disabilities Education Improvement Act [IDEIA], 2004), but teachers often struggle with how to effectively train and supervise paraprofessionals (French, 2001). In the absence of effective training and supervision, there is no reason to believe that paraprofessionals will deliver instruction using evidence-based practices.

There is emerging evidence for how teachers might effectively train paraprofessionals to implement evidence-based practices with fidelity. In two systematic reviews of this literature, researchers identified some effective features of paraprofessional training (i.e., Brock & Carter, 2013; Rispoli et al., 2011). Specifically, these features include (a) provision of an implementation checklist that clearly delineates implementation steps, (b) modeling of implementation steps, and (c) performance feedback on paraprofessional implementation. Performance feedback was delivered either during or immediately after paraprofessional-delivered instruction. This is consistent with recommendations in the broader professional development literature, because immediate feedback may stop paraprofessionals from continuing to practice errors and may better enable them to link the feedback to their performance (Scheeler et al., 2004). Although these approaches have shown great promise, there are some significant limitations about how these features have been delivered in experimental studies.

The most critical limitation of paraprofessional training models is a reliance on approaches that are not feasible on a large scale. Specifically, existing training models rely on (a) delivery of part or all of the training in a 1-to-1 format for every paraprofessional, and (b) conducting live observations of paraprofessionals and then delivering immediate feedback after those observations (Brock & Carter,

2013). These features present significant logistical challenges for special education teachers and administrators. First, it simply is not feasible for teachers and administrators to provide 1-to-1 training to every paraprofessional (Russo, 2004). Effective training models are needed that allow trainers to support multiple paraprofessionals at the same time. Second, it often is not feasible for special education teachers to conduct live observations of their paraprofessionals and provide immediate feedback. Typically, instructional responsibilities are delegated to paraprofessionals because the teacher is engaged in teaching other students. Furthermore, delivering feedback to the paraprofessional immediately after an observation can be awkward if the student is still present, and impossible if the paraprofessional or teacher needs to transition to other responsibilities. In sum, it is not particularly surprising that this training model (i.e., one-to-one coaching with live observations and immediate feedback) is rarely utilized in schools (Carter et al., 2009).

There are potential solutions that may address these problems with feasibility while maintaining the core training strategies that have been shown to be effective. One solution might be delivering a tiered training model in which paraprofessionals are first trained in a group context, implementation fidelity is monitored, and 1-to-1 coaching is only delivered in situations where the paraprofessional did not meet a fidelity criterion after the group training. There is evidence in a pilot study (Brock, Barczak, et al., 2020) that it is feasible and promising to utilize effective strategies from 1-to-1 coaching (i.e., didactic instruction on an implementation checklist, modeling, and performance feedback) in a group training format. A second solution might be video recording paraprofessional implementation, and then viewing the video and delivering performance feedback at a time that is convenient. While there is strong evidence that immediate feedback is effective (Scheeler et al., 2004), there has been little research on whether delayed performance feedback might also be sufficient for promoting implementation fidelity. In one study that did focus on delayed, video-based feedback, results were very promising (Brock, Barczak et al., 2020).

In the present study, both of these proposed solutions are tested in the context of a randomized controlled trial. The following research questions were addressed:

Research Question 1: What are the effects of a group training on paraprofessional implementation of systematic prompting strategies (i.e., simultaneous prompting and least-to-most prompting)? Specifically, what are the effects on adherence to implementation steps and implementation quality?

Research Question 2: What are the effects of systematic prompting strategies on individualized student outcomes? Specifically, do students who are taught by paraprofessionals in the training group outperform students who were taught by paraprofessionals in the control group?

Method

Participants and Settings

We recruited 20 paraprofessionals who delivered instruction to students with severe disabilities (i.e., students eligible for their state's alternate assessment) from three school districts in a Midwestern state that served students from rural and suburban communities. To be included, we had to secure consent from the paraprofessional, permission from the family of a target student with a severe disability, and assent from the target student. Twelve paraprofessionals were randomized to the experimental group, and eight were randomized to the control group. Three paraprofessionals withdrew from the study due to personal health reasons (i.e., two from the control group and one from the experimental group). All three withdrew after randomization, but before any data had been collected. We retained 17 paraprofessionals in the final sample; demographic information for both paraprofessionals and their target students is described in Table 1.

Table 1. Participant Demographics.

Demographic Variables	Students		Paraprofessionals	
	Control ($n = 6$)	Treatment ($n = 11$)	Control ($n = 6$)	Treatment ($n = 11$)
Gender				
Male	4 (66.7%)	6 (54.5%)	0 (0.0%)	2 (18.2%)
Female	2 (33.3%)	5 (45.5%)	6 (100.0%)	9 (81.8%)
Grade level				
Elementary	4 (66.7%)	7 (63.6%)	—	—
Middle	0 (0.0%)	4 (36.4%)	—	—
High	2 (33.3%)	0 (0.0%)	—	—
Disability label				
Intellectual disability	0 (0.0%)	2 (18.2%)	—	—
Autism	3 (50.0%)	2 (18.2%)	—	—
Other health impairment	1 (16.7%)	0 (0.0%)	—	—
Multiple disabilities	2 (33.3%)	7 (63.6%)	—	—
Race/ethnicity				
European American	6 (100.0%)	5 (45.5%)	5 (83.3%)	10 (90.9%)
African American	0 (0.0%)	2 (18.2%)	0 (0.0%)	0 (0.0%)
Hispanic or Latino/a	0 (0.0%)	0 (0.0%)	1 (16.7%)	0 (0.0%)
Asian/Pacific Islander	0 (0.0%)	4 (36.4%)	0 (0.0%)	1 (9.1%)
Other or Multiple	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Time in current job				
<1 year	—	—	1 (16.7%)	1 (9.1%)
1 year	—	—	1 (16.7%)	4 (36.4%)
2 years	—	—	2 (33.3%)	3 (27.3%)
3 years	—	—	1 (16.7%)	0 (0.0%)
4 years	—	—	0 (0.0%)	1 (9.1%)
5 years	—	—	1 (16.7%)	1 (9.1%)
>5 years	—	—	0 (0.0%)	1 (9.1%)
Education level				
High school diploma	—	—	1 (20.0%)	1 (9.1%)
Associate's degree	—	—	0 (0.0%)	1 (9.1%)
Bachelor's degree	—	—	5 (83.3%)	6 (54.5%)
Master's degree	—	—	0 (0.0%)	3 (27.3%)

Note. Primary disability labels were recorded from the student's individual education program; All students were eligible for the state's alternate assessment for students with severe disabilities.

Paraprofessionals worked in elementary ($n = 11$), middle ($n = 4$), and high schools ($n = 2$). All 17 paraprofessionals supported students with severe disabilities across self-contained and general education classrooms, although most spent the majority of the day in self-contained classrooms. We observed paraprofessional in the setting when they were already targeting the selected Individualized Education Program (IEP) objective. For 15 paraprofessionals, this took place in a self-contained special education room. For two paraprofessionals, this took place in a general education classroom, but in an area away from other students that was designed for teachers and paraprofessionals to work with individual students.

Study Design and Conditions

We implemented a randomized controlled trial with growth modeling, in which we

randomized participants to two groups, collected 5 data points per group, and modeled growth over time within a multilevel model in which time was nested within participant (Snijders & Bosker, 2011). The control group ($n = 6$) only received written materials that included implementation checklists for all targeted practices. The experimental group ($n = 11$) received group training that featured promising strategies from the one-to-one coaching literature (i.e., didactic instruction on implementation steps, a written implementation checklist, modeling, and performance feedback). The first data point, which served as a baseline, was collected after paraprofessionals in both groups were exposed to the control condition.

Control condition. Paraprofessionals in the control group only received written direction that included implementation checklists for simultaneous prompting and least-to-most prompting. No other training or support was provided. The written materials were identical to those shared with the experimental group, enabling us to isolate the effects of the other training strategies (i.e., didactic instruction on implementation steps, modeling, and performance feedback).

Experimental large-group training. Paraprofessionals in the experimental group attended four weekly 1-hour training sessions (i.e., 4 hours total) in a large-group format. The 11 paraprofessionals worked in three different school districts. For them to receive training simultaneously as a single group, we used video-conferencing technology to link together three conference rooms (i.e., one conference room in each district). The trainer (the first author) delivered the training from the conference room with the most participants ($n = 7$). In the other two districts, a graduate student was present with the participants to facilitate the video-conferencing technology and distribute materials.

We leveraged promising staff training strategies: didactic instruction, modeling, and performance feedback (Brock, Cannella-Malone, et al., 2017). The first training session focused on task analysis. The trainer provided didactic instruction to explain the difference between discrete and chained skills, explained how to break down chained skills into discrete steps, and provided multiple examples of task analyses for chained skills. Then, participants worked in partners to break down their own chained skills into discrete steps.

The second session focused on introducing simultaneous prompting. After providing a rationale for using simultaneous prompting to initially teach a skill, the trainer directed the paraprofessionals to a written implementation checklist, and explained and modeled each implementation step. Then, the trainer demonstrated multiple exemplars and common errors until all paraprofessionals could consistently distinguish between five examples of correct and incorrect implementation. Next, the trainer modeled how to provide performance feedback by praising steps that were implemented well and providing corrective feedback for errors. Then, paraprofessionals worked in partners to practice implementing simultaneous prompting to target a generic skill (i.e., teaching sight words). Paraprofessionals provided performance feedback to one another, and the trainer rotated from group to group to ensure that feedback was accurate and provide additional feedback when appropriate. Next, paraprofessionals completed a written plan for how they would implement simultaneous prompting with their target student to teach their target skill. At the end of the first training session, the trainer distributed computer tablets with tripods, and instructed the paraprofessionals to video record their implementation of simultaneous prompting with the target student.

The third training session focused on performance feedback on simultaneous prompting and introducing least-to-most prompting. First, the trainer briefly reviewed the implementation steps of simultaneous prompting, and then demonstrated multiple exemplars and common errors to ensure that paraprofessionals could still distinguish between correct and incorrect implementation. Then, paraprofessionals worked in partners to share their videos of implementation

and identify which steps were implemented correctly and which steps could be improved. The trainer rotated from group to group to ensure that feedback was accurate and provide additional feedback when appropriate. After explaining why least-to-most prompting would be used to fade instructor prompts after a student demonstrated partial mastery, the trainer reviewed and modeled implementation steps for least-to-most prompting. Then the trainer demonstrated multiple exemplars and common errors until paraprofessionals could consistently distinguish between correct and incorrect implementation. Then paraprofessionals worked in partners to practice implementing least-to-most prompting to target the same generic skill (i.e., teaching sight words). Paraprofessionals provided performance feedback to one another, and the trainer rotated from group to group to ensure that feedback was accurate and provide additional feedback when appropriate. Next, paraprofessionals completed a written plan for how they would implement least-to-most prompting with their target student to teach their target skill. At the end of the training session, the trainer instructed the paraprofessionals to video record their implementation of both simultaneous prompting and least-to-most prompting with the target student.

The fourth and final training session focused on performance feedback on simultaneous prompting and least-to-most prompting. After the trainer briefly reviewed implementation steps for both procedures and demonstrated multiple exemplar and common errors, paraprofessionals worked in partners to share their videos and identify which steps were implemented correctly and which steps could be improved. The trainer rotated from group to group to ensure that feedback was accurate and provide additional feedback when appropriate. At the end of the session, the paraprofessionals returned the computer tablets to the trainer.

Measures

Classroom observations. We observed each paraprofessional 5 times in the classroom delivering instruction to a target student, and we administered a probe to the target student on the target skill at the end of each observation. The first observation preceded any training, and each subsequent observation occurred after each of the training sessions. All observations involved the paraprofessional delivering instruction focused on a preselected objective from the student's IEP, and then the student being probed on the objective. First, we directed paraprofessionals to implement simultaneous prompting as if they were targeting the skill for the first time. Next, we directed paraprofessionals to implement least-to-most prompting as if they had already targeted the skill for several days and the student had demonstrated initial progress. Last, we directed paraprofessionals to deliver a student probe to gauge student progress. We directed the paraprofessional to withhold any prompts during this probe so that we could gauge independent student performance.

We measured implementation fidelity of systematic prompting in two ways. First, we measured adherence to implementation steps for simultaneous prompting and least-to-most prompting using implementation checklists. Steps for simultaneous prompting included delivering a prompt within 1 second of providing a cue or task direction, delivering the same topography of controlling prompt in each trial, delivering specific praise after correct responses, and repeating a trial after incorrect responses. Steps for least-to-most prompting included providing 3 to 5 seconds for the student to respond independently, delivering specific praise after correct responses, and delivering prompts of increasing intensity after incorrect responses. These steps were based on implementation checklists developed by the National Professional Development Center on Autism Spectrum Disorders (Neitzel & Wolery, 2009b, 2009c). We calculated the percentage of steps implemented correctly.

We measured implementation quality as a second dimension of implementation fidelity. We scored six items on a 4-point Likert-type scale, with 3 being the highest quality and 0 being the poorest quality. Items focused on pacing of instruction, consistency of delivering the same cue or task direction, immediacy

Table 2. Items Scored for Measure of Quality of Implementation Fidelity.

Item focus	Score	Descriptor
Pacing	0	Virtually no pause (<1 second between all trials) *or* long pause (>5 seconds) between all trials
	1	Brief pause for less than half of trials
	2	Brief pause for at least half, but not all trials
	3	Brief pause (1–5 seconds) between all trials
Consistency of cue	0	Topography differed across multiple trials
	1	Topography differed for one trial
	2	Identical in topography, but differed in presentation (e.g., verbal directions with different wording)
	3	Topography and presentation consistent across all trials
Immediacy of prompt after error	0	No prompt is delivered
	1	Prompt is very delayed after error is apparent (>3 seconds)
	2	Prompt is somewhat delayed after error is apparent (1–3 seconds)
	3	Prompt is delivered immediately after error is apparent (≤1 second)
Verbal praise	0	Some praise has negative tone that sounds insincere and disingenuous
	1	All praise have a neutral tone that is neither negative nor positive
	2	Tone is inconsistent; sometimes positive and sometimes neutral
	3	All praise have a positive tone that is sincere and genuine
Immediacy of reinforcement	0	Reinforcement is never delivered
	1	Reinforcement is very delayed (>3 seconds) after a correct response
	2	Reinforcement is somewhat delayed (1–3 seconds) after a correct response
	3	Reinforcement is immediate (≤1 second) after a correct response
Overall impression	0	*Poor*: There is one significant problem with implementation quality (e.g., negative tone, poorly chosen prompt, ineffective reinforcer)
	1	*Fair*: Overall, there were no significant problems with implementation quality, but there are two or more minor issues that could be improved (e.g., sometimes reinforcement is slightly delayed, wording of task direction is sometimes slightly different)
	2	*Good*: Overall, there were no significant problems with implementation quality, but there is one minor issue that could be improved
	3	*Excellent*: Overall, there are no significant or minor issues related to quality of implementation that could be improved

Note. All items were scored on a 4-point scale, with 0 reflecting the poorest quality and 3 reflecting the highest quality. The scores across items were averaged to compute an overall score of quality.

of prompting after an error, verbal praise, immediacy of reinforcement after a correct response, and overall quality of implementation (see Table 2). We computed an average score across items as a measure of overall quality. The possible range of this average was 0 to 3.0. We rated one measure of implementation quality across both prompting procedures, because (a) the items apply similarly to both systematic prompting procedures, and (b) when we piloted the quality measure and scored the two procedures separately, we did not detect meaningful differences.

We reviewed each student's IEP with the supervising special education teacher, and worked together with the teacher to select an objective that could be appropriately targeted with systematic prompting. One IEP objective was selected for each student. Objectives focused on reading high-frequency sight words, spelling high-frequency words, answering reading comprehension questions, answering personal information questions (e.g., what is your name, how old are you), identifying community signs (e.g., stop sign, caution sign), counting objects 1 to 10, matching numbers to

quantities of objects, subtracting one dollar amount from another, counting coins and bills, single-digit addition, two-by-one digit subtraction, three-digit subtraction with borrowing, and single-digit multiplication. For each objective, we designed student probes to capture 10 discrete responses (e.g., 10 sight words) or 10 chained responses (e.g., the first 10 discrete steps that were complete when the student solved three 3-digit subtraction problems). We calculated the percentage of correct responses across the 10 trials, which was treated as a single data point. We collected 5 data points per student across all 17 students.

Observer Training and Interobserver Agreement

The second author, a graduate student in special education, was the primary data collector for this study. She was already trained by the first author on the same observation protocol in a prior study. The second author trained an additional observer, an undergraduate student who collected data for reliability purposes. Before collecting data, the undergraduate student was required to (a) review the coding manual, (b) score 100% on a written test of coding definitions, (c) achieve at least 95% agreement with the second author when coding a training video, and (d) achieve at least 95% agreement with the second author in a live observation.

Two observers collected data during 22.9% of all observations across participants and conditions. We computed point-by-point agreement for each behavior. Average overall agreement across paraprofessional implementation behavior was 98.7% (range = 90%–100%) and student behavior was 98.9% (range = 90%–100%).

Procedural Fidelity

The first author used a written checklist to ensure that for both simultaneous prompting and least-to-most prompting, he (a) provided a rationale for each strategy, (b) provided didactic instruction on each step of the implementation checklist, (c) modeled each implementation step, (d) demonstrated exemplars and common errors, and (e) monitored the performance feedback shared among pairs of paraprofessionals while providing supplemental feedback as appropriate. These steps were followed with 100% fidelity for both prompting strategies.

To provide additional descriptive data, the second author coded the duration that each training strategy was used. Overall, 85 minutes (45.5%) of total training time involved oral didactic instruction, 18 minutes (9.6%) involved modeling, and 84 minutes (44.9%) involved performance feedback.

Social Validity Survey

After the training was complete, we used a 10-item paper–pencil questionnaire to measure paraprofessional perceptions of their own competence, the training, and their likelihood to use systematic instruction and participate in similar training opportunities in the future. Responses were provided on a 5-point Likert-type scale. Both the questions and the scaling are reported in Table 3.

Data Analysis

We used growth modeling to model change in both paraprofessional implementation fidelity and student progress over time. Specifically, we used the MIXED procedure in SPSS to run a two-level regression model with five time points nested within participant. We ran four different models with four different dependent variables: adherence to implementation steps for simultaneous prompting, adherence to implementation steps for least-to-most prompting, implementation quality, and student progress on individualized goals. Each model included four key terms for average performance at baseline (i.e., γ_{00} or fixed intercept term), individual differences at baseline (i.e., u_{0j} or random intercept term), average trajectory (γ_{10} or fixed slope term), and individual differences in the trajectory (u_{0j} or random slope term). The full model is $y_{ij} = \beta_{0j} + \beta_{1j}\text{time}_{ij} + \varepsilon_{ij}$, where $\beta_{0j} = \gamma_{00} + u_{0j}$ and $\beta_{1j} = \gamma_{00} + u_{0j}$. We tested for group differences by testing the significance of a group assignment variable (i.e., 0 for the control

Table 3. Social Validity Questionnaire Ratings by Paraprofessional Participants.

Category/question	*M*	*SD*
Perception of skill after training		
How skilled are you in implementing simultaneous prompting?	4.36	0.67
How skilled are you in implementing least-to-most prompting?	4.18	0.75
How skilled are you in task analysis?	4.36	0.67
How skilled are you in data collection?	4.45	0.52
Perception of training		
How effective was the training at enabling you to implement new strategies with your student?	4.82	0.40
How much do you think that the new strategies you learned contributed to your student's progress on his or her goal?	4.00	0.89
Effectiveness of strategies		
How effective were each of the individual training components at enabling you to implement new strategies with your student?		
Written materials	4.73	0.47
Trainer description of strategies	4.91	0.30
Trainer modeling strategies	5.00	0.0
Receiving trainer feedback on videos	4.91	0.30
Receiving peer feedback on videos	4.63	0.67
Likelihood of future implementation and training		
How likely would you be to continue to use the strategies that you learned in the future with the same student?	4.91	0.30
How likely would you be to use the strategies that you learned in the future with a different student?	5.00	0.0
How likely would you be to participate in a similar training opportunity in the future?	5.00	0.0
How likely would you be to recommend a similar training opportunity to a colleague?	4.91	0.30

Note. Response options included 1 = *not at all*, 2 = *slightly*, 3 = *somewhat*, 4 = *moderately*, and 5 = *extremely*.

group, 1 for the experimental group). We calculated Cohen's *d* by dividing regression estimates by the standard deviation of the dependent variable at baseline.

Results

Multilevel Regression Analysis of Observational Data

Results from the four multilevel regression models are reported in Table 4, and key findings from each model are highlighted below.

Paraprofessional adherence to steps for simultaneous prompting. Average adherence at baseline was 21% and was not significantly different between groups, $t(63) = -0.35$, $p = .73$ The experimental group outperformed the control group by 23% at each time point. This difference was large ($d = 0.91$) and statistically significant, $t(64) = 5.89$, $p < .001$. One paraprofessional met the adherence criterion (i.e., >80%) after one training session, eight after two sessions, and two after three sessions.

Paraprofessional adherence to steps for least-to-most prompting. Average adherence at baseline was 56% and was not significantly different between groups, $t(80) = -1.54$, $p = .13$. The experimental group outperformed the control group by 13% at each time point. This difference was very large ($d = 1.56$) and statistically significant, $t(64) = 4.02$, $p < .001$. Eight paraprofessionals met the adherence criterion (i.e., >80%) after two training

Table 4. Effects of the Large-Group Training.

Dependent variable	Independent variable	Estimate	*SE*	*t*-ratio	*df*	*p* value	*SD*	ES[a]
Simultaneous prompting adherence	Intercept	0.21	0.11	1.88	68	.07	0.21	
	Time	−0.20	0.14	−1.39	70	.17	−0.20	
	Condition	−0.11	0.03	−0.35	63	.73	−0.11	
	Time × Condition	0.23	0.04	5.89	64	<.001	0.23	0.91
Least-to-most prompting adherence	Intercept	0.56	0.09	6.57	79	<.001	0.56	
	Time	−0.17	0.11	−1.54	80	.13	−0.17	
	Condition	0.00	0.02	−0.17	63	.86	0.00	
	Time × Condition	0.13	0.03	4.02	64	<.001	0.13	1.56
Implementation quality	Intercept	2.20	0.14	15.81	56	<.001	2.20	
	Time	−0.46	0.18	−2.59	59	.01	−0.46	
	Condition	0.00	0.03	−0.02	63	.99	0.00	
	Time × Condition	0.25	0.04	5.75	64	<.001	0.25	0.60
Student performance on IEP goals	Intercept	0.48	0.12	4.12	62	<.001	0.48	
	Time	−0.30	0.15	−2.00	64	.05	−0.30	
	Condition	0.03	0.03	0.92	63	.36	0.03	
	Time × Condition	0.08	0.04	2.15	64	.04	0.08	0.29

Note. IEP = Individualized Education Program; *df* = degrees of freedom; ES = Effect Size.
[a]Cohen's *d* was calculated by dividing unstandardized regression coefficients by the standard deviation of the dependent variable. The *df* were obtained by a Satterthwaite approximation.

sessions, three after three training sessions, and one paraprofessional did not meet the training criterion.

Paraprofessional implementation quality. Average quality at baseline was 2.20 (on 0–3 scale) and was not significantly different between groups, $t(63) = -0.02$, $p = .99$. The experimental group outperformed the control group by 0.25 at each time point. This difference was moderately large ($d = 0.60$) and statistically significant, $t(64) = 5.75$, $p < .001$.

Student progress on individualized goals. Average correct student responding at baseline was 48% and was not significantly different between groups, $t(63) = 0.92$, $p = .36$. The experimental group outperformed the control group by 8% at each time point. This difference was small ($d = 0.29$) and statistically significant, $t(64) = 2.15$, $p = .04$.

Social Validity Survey Data

Survey responses for the 11 paraprofessionals in the experimental group are reported in Table 3. On average, paraprofessionals perceived themselves to be moderately or extremely skilled at the conclusion of the training, and the training strategies to be moderately or extremely effective. Paraprofessionals indicated they would be extremely willing to participate in similar training in the future and would be extremely likely to continue to use the prompting strategies that they learned.

Discussion

There is a lack of feasible and effective approaches for training and supervising paraprofessionals who support students with severe disabilities. Existing research has focused on one-to-one coaching models that may not be feasible on a large scale. In this study, we tested the efficacy of utilizing effective coaching strategies (i.e., didactic instruction focused on implementation steps, modeling, and performance feedback) in a group training context. We found evidence that this approach both promotes paraprofessional implementation of evidence-based practices and improves student outcomes. These findings extend the research literature in a number of important ways.

First, it was both feasible and effective to utilize effective strategies from coaching in a large-group training format. We were able to deliver a combination of didactic instruction, modeling, and performance feedback to a group of 11 paraprofessionals. We demonstrated that this group training could produce similar results to those observed after one-to-one coaching. This is the first time in the published literature that a group training—without any follow-up one-to-one coaching component—resulted in special education paraprofessionals acquiring implementation fidelity of evidence-based practices. This finding supports the theory that although training format (i.e., large group, small group, or 1-to-1) does affect the intensity of training, any of these formats can be effective if they feature promising training strategies (Brock & Carter, 2013).

We were particularly encouraged that it was both feasible and effective for paraprofessionals to give performance feedback to one another. To prepare paraprofessionals to provide this feedback, we provided explicit instruction on how to provide feedback and a highly structured context for providing feedback. This model of peer feedback enables a trainer to facilitate effective feedback across a group of paraprofessionals without having to directly deliver feedback to every single paraprofessional. Although our training group only included 11 paraprofessionals, it might be possible to scale up this strategy to much larger groups.

Second, we found that delayed, video-based performance feedback was sufficient to promote criterion-level implementation fidelity. Researchers have recommended immediate feedback because of its potential advantages relative to delayed feedback (i.e., stopping paraprofessionals from continuing to practice errors and better enabling them to link the feedback to their performance; Scheeler et al., 2004). Because of these potential advantages, it makes sense to recommend immediate performance feedback when immediate and delayed feedback are both feasible options; however, in situations in which immediate feedback is not feasible, our findings show that delayed feedback may be an effective alternative.

Third, paraprofessionals who received group training contributed to better student outcomes. Alongside the improvements in paraprofessional implementation fidelity, these effects demonstrate that group training enables paraprofessionals to implement evidence-based practices that improve student outcomes. Although the effect size was small (d = 0.29), this effect is quite remarkable given that most paraprofessionals did not implement the strategies with criterion-level fidelity until the last two training sessions, leaving less than 2 weeks for the students to receive the full benefit of both prompting strategies.

Fourth, after receiving training, paraprofessionals felt confident in their skill and expressed a strong intention to continue to use systematic teaching strategies. This is critical, because developing skill competencies alone is insufficient if practitioners are not motivated to continue using these skills in everyday practice (Damschroder et al., 2009). We theorize that paraprofessionals may have embraced systematic prompting strategies because they collected data that demonstrated rapid student progress. This is consistent with another study in which a paraprofessional reported that immediate student progress was a strong motivator to continue implementing an evidence-based practice with fidelity (Brock, Seaman, & Downing et al., 2017).

Implications for Practice

Our findings, in combination with the extant literature, have important implications for teachers, administrators, and teacher educators. Specifically, our findings bolster previous recommendations that training for paraprofessionals should feature didactic instruction, modeling, and performance feedback (Brock, Cannella-Malone, et al., 2017). Furthermore, our findings provide initial evidence that these strategies can be used effectively in a group training context. Therefore, if professional development providers are only able to provide training in a group context, they should ensure that their training features didactic instruction, modeling, and performance feedback. In addition, we recommend

that professional development providers consider focusing on evidence-based practices that are likely to promote immediate student progress to motivate paraprofessionals to continue implementation with fidelity.

The group training described in this study is appropriate for situations in which many paraprofessionals would benefit from learning to implement the same evidence-based practice. In the present study, we focused on versatile systematic prompting strategies that could be used by paraprofessionals who provide one-to-one instruction to target IEP goals for students with severe disabilities. Other evidence-based practices that might be relevant to paraprofessionals across a district who serve students with severe disabilities include positive reinforcement, modeling, and peer-mediated intervention (Wong et al., 2015). Group training could also be appropriate for subsets of paraprofessionals who work with students who have similar characteristics. For example, paraprofessionals who work in special education preschool classrooms might benefit from training on naturalistic interventions that target communication (Wong et al., 2015). Administrators and teachers should work together to match specific evidence-based practices with a group of paraprofessionals whose responsibilities would include opportunities to implement those practices. All instruction and support that paraprofessionals provide should be designed, directed, and supervised by licensed teachers.

Teacher educators should design coursework and fieldwork experiences that enable future teachers to build competencies in how to design paraprofessional roles, implement competency-based training for paraprofessionals, and supervise paraprofessionals and provide effective performance feedback. Currently, many teacher education programs do not adequately address management of paraprofessionals (Biggs et al., 2019), and teachers report a lack of confidence when training and supervising paraprofessionals (French, 2001). Teacher educators should emphasize the necessity of clearly defining paraprofessional roles, and ensuring that responsibility for designing instruction and making instructional decisions is left to licensed teachers (IDEIA, 2014; Uitto et al., 2016). Teacher educators should provide mentored experiences in which future teachers have the opportunity to practice using staff training strategies that are supported by research evidence in both this study and the broader literature—didactic instruction with an implementation checklist, modeling, and performance feedback (Brock, Cannella-Malone, et al., 2017). Teachers should be taught to monitor paraprofessional implementation fidelity to ensure that paraprofessionals are implementing interventions as intended (Uitto et al., 2016). Furthermore, teachers should provide ongoing supervision of paraprofessionals and continually deliver performance feedback that clearly communicates both strengths and constructive suggestions for improvement (Brock & Carter, 2013; Uitto et al., 2016).

Limitations and Future Directions for Research

A number of limitations of this study highlight opportunities for future research. First, the size of the control group was small ($n = 6$). This happened because we randomized each paraprofessional at the time that we received consent for the paraprofessionals and permission from the student's family. This approach was random and masked group assignment prior to consent but did not guarantee equal groups. This imbalance was exacerbated when two paraprofessionals in the control group withdrew from the study. In future studies, researchers could recruit larger numbers of paraprofessionals so that randomization would be more likely to produce similarly sized groups, and attrition is more likely to be equal between groups. Second, this is the first study examining training groups of paraprofessionals using promising training strategies. Although our findings are encouraging, they were demonstrated across a small number of paraprofessionals from a small number of schools. Further replication is needed to demonstrate that findings generalize to other schools and paraprofessionals before we can make strong recommendations to adopt this training model. Third, this study involved research-implemented professional development, and it

is unclear whether teachers would be able to deliver the same training with the same results. In future studies, researchers might test the efficacy of teacher-implemented group training for paraprofessionals. Fourth, this study does not address the degree to which paraprofessionals could generalize their implementation to new students or target skills. In future studies, researchers might investigate generalization of implementation. Fifth, paraprofessionals implemented both simultaneous prompting and least-to-most prompting simultaneously, so we can only make conclusions about the impact of the combination of strategies on student outcomes—and not a single strategy in isolation. In future studies, researchers might conduct a component analysis. Finally, there were more paraprofessionals with a master's degree in the experimental group compared with the control group. Although allocation to groups was random, it is possible that this difference in education level may have favored the experimental group.

Conclusion

We found that it was both feasible and effective to utilize promising strategies from coaching in a group training context. This is an exciting finding, because previous studies on paraprofessional training have focused exclusively on one-to-one coaching models that are difficult for schools to implement on a large scale. Group training may provide a more feasible alternative to enable paraprofessionals to implement evidence-based practices with high fidelity. Large-scale training of paraprofessionals in evidence-based practices has the potential to dramatically improve outcomes for students with severe disabilities.

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