A COMPARISON OF PERFORMANCE FEEDBACK PROCEDURES ON TEACHERS' TREATMENT IMPLEMENTATION INTEGRITY AND STUDENTS' INAPPROPRIATE BEHAVIOR IN SPECIAL EDUCATION CLASSROOMS

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This study examined the extent to which treatment integrity of 4 special education teachers was affected by goal setting, performance feedback regarding student or teacher performance, and a meeting cancellation contingency. Teachers were trained to implement function-based treatment packages to address student problem behavior. In one condition, teachers set a goal for student behavior and received daily written feedback about student performance. In a second condition, teachers received daily written feedback about student performance as well as their own accuracy in implementing the intervention and would be able to avoid meeting with a consultant to practice missed steps by implementing the intervention with 100% integrity. This latter package increased treatment integrity the most above baseline levels. Higher levels of treatment integrity were significantly correlated with lower levels of student problem behavior for 3 of the 4 teacher–student dyads. Three of the 4 teachers also rated both feedback procedures as highly acceptable. Implications for increasing and maintaining treatment integrity by teachers via a consultation model are discussed.

DESCRIPTORS: avoidance contingency, directed rehearsal, feedback, functional behavior assessment, treatment integrity, special education

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Recent demands for high levels of accountability in our education system (e.g., Individuals with Disabilities Education Improvement Act of 2004, No Child Left Behind Act of 2001) have placed increased pressure on educators to use evidence-based practices (Vaughn & Fuchs, 2003; Walker, 2004). The use of evidence-based practices is particularly important during school consultation in which a psychologist (consultant) works cooperatively with a teacher to design, implement, and evaluate an intervention plan for a student (Erchul &

Martens, 2002). During the consultation process, responsibility for plan implementation rests primarily with teachers (Gutkin & Curtis, 1999). Moreover, most intervention plans require teachers to acquire new instructional and behavior-management skills and to incorporate these skills into their teaching repertoire (Martens & DiGennaro, in press). A critical aspect of effective consultation, therefore, is to ensure that teachers have acquired the skills needed for plan implementation and that teacher behavior has changed (Erchul & Martens).

The extent to which teachers implement school-based interventions consistently and accurately has been referred to as *treatment integrity* (Gresham, 1989; Noell et al., 2000). Assessment of treatment integrity is typically accomplished by directly observing teachers during plan implementation and calculating

the percentage of treatment steps implemented correctly (e.g., DiGennaro, Martens, & McIntyre, 2005; Wickstrom, Jones, LaFleur, & Witt, 1998). A series of investigations by Noell and his colleagues examined teachers' treatment integrity after initial training and following implementation of performance feedback (Mortenson & Witt, 1998; Noell, Duhon, Gatti, & Connell, 2002; Noell, Witt, Gilbertson, Ranier, & Freeland, 1997; Witt, Noell, LaFleur, & Mortenson, 1997). For example, Noell et al. (2002) examined the effectiveness of data review and performance feedback on the integrity with which 4 general education teachers implemented intervention plans. During data review, the consultant met with the teachers for 3 to 5 min to review a monitoring form, missed steps of the intervention, plan implementation, student functioning, and to solve problems for the following session. During performance feedback, the consultant no longer reviewed the monitoring form. Instead, two graphs depicting student progress and teacher integrity were shared with the teacher. These data reviews increased treatment integrity for 1 teacher, slightly improved integrity for 2 teachers, and had no effect on a 4th teacher. Application of performance feedback resulted in high levels of treatment integrity for all teachers.

Previous studies have also shown that the integrity of plan implementation by teachers may be affected by reinforcement contingencies (Gillat & Sulzer-Azaroff, 1994; Noell et al., 1997, 2000) in much the same way that student behavior is subject to contingencies of reinforcement (see also Lentz & Daly, 1996; Martens & Witt, 1988; Tharp & Wetzel, 1969). For example, Ward, Johnson, and Konukman (1998) established a negative reinforcement contingency by asking preservice teachers to rehearse 10 times those teaching behaviors that were implemented incorrectly during a physical education practicum course. Results revealed that all teachers reached 100% correct steps under the directed rehearsal condition. The authors speculated that an effective avoidance contingency was established, under which teachers were motivated to exhibit appropriate teaching behaviors to avoid meeting with the consultant.

DiGennaro et al. (2005) continued the analysis of strategies for improving treatment integrity by evaluating the extent to which daily performance feedback, practice, and the opportunity to avoid meetings with the consultant influenced the treatment integrity of 4 teachers and reduced students' problem behaviors. Teachers were instructed to use directed rehearsal (repeating missed intervention steps three times) during a brief meeting with a consultant, thus establishing a negative reinforcement contingency for correct implementation. Results of the study showed that integrity increased to 100% for all teachers following implementation of performance feedback. Integrity was maintained at high levels when the package was faded to once a week and then once every 2 weeks. Moderate decreases in problem behavior were also observed for all 4 students.

Researchers have also examined the use of goal setting in combination with performance feedback (Martens, Hiralall, & Bradley, 1997). Martens et al. asked a teacher to identify appropriate alternative behaviors to praise in 2 students who exhibited problem behaviors. The teacher was then asked to set a goal for herself regarding the number of praise statements she would provide for these behaviors within daily 30-min sessions. Following each session, the teacher was provided with written feedback as to whether she met her goal. Results revealed increases in appropriate student behavior and the number of praise statements provided by the teacher. In addition, the intervention was rated as highly acceptable by the teacher.

Taken together, these findings suggest that teachers' treatment implementation is sensitive to contingencies of reinforcement, that teachers require ongoing support from consultants to

implement intervention plans consistently and accurately, and that teachers can maintain high levels of treatment integrity following progressive thinning of performance feedback and reinforcement schedules. Furthermore, collateral effects on student performance as a result of intervention implementation have been reported (DiGennaro et al., 2005).

Despite these findings, previous research has not examined whether daily written feedback about *student* progress toward an agreed-upon goal is sufficient to maintain high rates of accurate plan implementation by teachers. Support provided in this manner requires minimal time investment on the part of both teacher and consultant compared to previously examined treatment packages. One goal of this study was to examine teachers' treatment integrity after setting a goal for student behavior and then receiving feedback about student progress toward that goal. In this condition, contingencies for treatment integrity were not programmed or communicated explicitly. Thus, a unique contribution of this study was examination of the extent to which observing students' progress toward a stated goal would affect treatment implementation by teachers.

A second goal of this study was to replicate the findings of DiGennaro et al. (2005) and to extend these to special education teachers. Specifically, we compared the effects of goal setting and performance feedback about student behavior to a condition in which teachers received daily written feedback about their own implementation accuracy. In this latter condition, teachers were also able to avoid meeting with a consultant to practice missed steps by implementing the intervention with 100% integrity. A third goal of this study was to determine if high levels of treatment integrity would be maintained when the schedule of feedback was progressively thinned from daily to once every 2 weeks, thus further replicating the findings of Noell et al. (2000) and DiGennaro et al. Finally, a fourth aim of this

study was to replicate previous findings that suggested a relation between teacher treatment integrity and student behavior (e.g., DiGennaro et al.).

METHOD

Participants and Setting

Four special education teachers, employed in a setting that provides educational and residential services to students with brain injuries, were recruited by the first author. Each teacher sought assistance to address the off-task behavior, work refusal, and disruptive verbalizations of particular students. These 4 students also served as participants. Teachers were informed that the study investigated different ways of helping teachers implement school-based interventions, and that trained observers would visit the classroom daily at specified times.

Dyad A. Teacher A, a Haitian Creole male teacher of 1 year, taught a special education class comprised of 6 students. He had a BA and was certified in elementary education in two states. Student A, a 13-year-old Caucasian boy, had attended the school for just over 3 years. He had suffered a right hemispheric stroke followed by hydrocephalus for which a V-P shunt was successfully placed when he was 1 year old. He also experienced left hemiplegia, seizure disorder, anxiety, attentional difficulties, and moderate mental retardation. His prescription medications included Abilify® and Tenex®. The teacher indicated that the problem behaviors of most concern were the student's refusal to complete assigned work and lack of active involvement in classroom group activities. Therefore, the identified target behavior for Student A was off-task behavior, defined as any motor behaviors that lasted a minimum of 3 s or verbalizations that were not permitted or were unrelated to the assigned academic task. Before an intervention was introduced (i.e., during baseline), Student A successfully avoided and escaped small-group instruction by engaging in a variety of off-task behaviors (e.g., placed

Table 1

Intervention Components for Student A

1. Allow the student to select a reward icon from back of chart (reward that allows him to leave work area) and move the icon to the choice box.
2. Tell student, "After you get five stickers for participating in group you can earn a break."
3. After 3 min the teacher should present the student with a question or instruction. Remind the student that he can earn a sticker if he tries to answer or follows the direction.
4. Student will earn one sticker paired with verbal praise if he attempts to respond even if he responds with an incorrect answer.
5. After 6 min the teacher should present the student with a question or instruction. Remind the student that he can earn a sticker if he tries to answer or follows the direction.
6. Student will earn one sticker paired with verbal praise if he attempts to respond even if he responds with an incorrect answer.
7. After 9 min the teacher should present the student with a question or instruction. Remind the student that he can earn a sticker if he tries to answer or follows the direction.
8. Student will earn one sticker paired with verbal praise if he attempts to respond even if he responds with an incorrect answer.
9. After 12 min the teacher should present the student with a question or instruction. Remind the student that he can earn a sticker if he tries to answer or follows the direction.
10. Student will earn one sticker paired with verbal praise if he attempts to respond even if he responds with an incorrect answer.
11. After 15 min the teacher should present the student with a question or instruction. Remind the student that he can earn a sticker if he tries to answer or follows the direction.
12. Student will earn one sticker paired with verbal praise if he attempts to respond even if he responds with an incorrect answer.
13. After the student earns five stickers he should receive his reward of a break.

his head on the desk, turned his body from the lesson, responded "who cares?"). In addition, consistent consequences for staying on task and completing work were not observed. As a result, we implemented an intervention that allowed Student A to earn token reinforcement (stickers) about once every 3 min and then exchange these tokens to leave group instruction (e.g., take a walk) when five had been acquired (see Table 1 for an intervention example).

Dyad B. Teacher B, an Asian female teacher of 3 years, was close to completing her MS degree in applied behavior analysis. She taught a class comprised of 6 students. Student B, a Caucasian boy of 14 years, suffered from cavernous hemangioma characterized by lesions in the vascular system and brain, attention deficit hyperactivity disorder, and pervasive developmental disorder (not otherwise specified). He had been attending the program for just over 6 years. He had been prescribed Flonase®, Risperdal®, DDAVP®, Zantac®, clonidine, and Lactaid®. He had been referred for a variety of off-task behaviors including work refusal, disruption, sleeping, and teasing others. Off-task behavior was defined as any motor behaviors lasting a minimum of 3 s or

verbalizations that were not permitted or were unrelated to the assigned academic task. Because the student was able to escape the lesson by engaging in these behaviors during baseline, the teacher was asked to implement an intervention plan similar to that described for Student A (on-task behavior was rewarded with escape from task demands and access to an alternative activity within a token reinforcement program).

Dyad C. Teacher C, a Caucasian man, had been a special education teacher for 4.5 years; he had an MA degree in education and preliminary certification in special education. He taught a class of 5 students. Student C was a 21-year-old Caucasian man who had been diagnosed with tuberous sclerosis, seizure disorder, and vascular tumors on the face and body. He had been enrolled in the school for just under 4 years. He had been prescribed Risperdal®, valproic acid, Dilantin®, amoxicillin, Mederma® gel, benzoyl peroxide, and ketoconazole. Teacher C referred his student due to his refusal to participate in classroom group activities, defined as any verbal (e.g., swearing) or gestural (e.g., flopping on the floor, positioning his body 90° in his chair away from the group) refusal to a request made by the

teacher. During baseline, Student C successfully escaped group instruction by engaging in these behaviors. An intervention was introduced that allowed him to leave the area of group instruction after 3 min without work refusals and to relax in a beanbag chair for 2 min.

Dyad D. Teacher D, a Caucasian woman, had been a teacher in a special education class of 6 students for 1 year. She had an MA degree in elementary education and was certified in preschool and elementary education. Student D was a 9-year-old Caucasian girl who had attended the school for just over 3 years. She had been diagnosed with subdural and subarachnoid hemorrhages and seizures secondary to shaken baby syndrome. She had also been diagnosed with traumatic brain injury, microcephaly, lead poisoning, and legal blindness. She presented with features associated with a diagnosis of autism and commonly engaged in self-injurious head banging. She had been prescribed trazodone, Risperdal®, Topamax®, Depakote®, and Ambien®, some of which were adjusted during the study. The problem behavior of most concern was off-task behavior, defined as any motor behaviors that lasted a minimum of 3 s or verbalizations that were not permitted or were unrelated to the assigned academic task. Common behaviors included walking around the room, flopping on the floor, and looking through books during times when this was not allowed. During baseline, consistent consequences for on-task behavior were not observed. In addition, Student D was allowed access to books as she desired and was observed to walk around the room during instructional time. Thus, an intervention was designed that provided teacher attention every 10 to 15 s for being on task and 1-min access to a preferred item for every 1 min of on-task behavior.

The first author served as the consultant for all four dyads. Teacher interviews, training, plan implementation, and performance feedback occurred in the teachers' classrooms.

Classrooms were similar in size and contained a teacher's desk, a computer, bulletin boards, a small-group teaching station, and individual student workstations consisting of a desk or small table. During observations, Student A was seated at his desk behind the small group with approximately three adults present. Students B, C, and D were seated in their classroom groups with three adults, four adults, and five adults present, respectively. During small-group instruction, students were exposed to grade-appropriate general education curriculum (e.g., history, science, and reading) that was modified given the developmental level of the students.

Dependent Measures

Treatment integrity. The primary dependent measure was the integrity with which teachers implemented the agreed-upon plans. Treatment integrity was assessed through daily 15-min direct observations of the teacher by the first and third authors and was calculated by dividing the number of 13 treatment steps implemented correctly during the observation period by the total number of treatment steps, multiplied by 100% (see Table 1 for an example of the 13 steps for Student A). Teachers were observed at the same time each day. A treatment step was considered correct if it (a) was implemented as written or (b) was implemented within 30 s of the specified time, if indicated.

Treatment effectiveness. To assess the effectiveness of the intervention, the first and third authors also collected data on student problem behavior. This observation was conducted during the treatment integrity observation (e.g., a 15-min observation conducted at the same time each day). Partial-interval 10-s recording was used to score occurrences of target behavior across all phases. The percentage of intervals in which students exhibited target behavior was calculated by dividing the number of intervals during which target behavior occurred by the total number of intervals multiplied by 100%.

Interobserver Agreement and Procedural Fidelity

A second observer simultaneously collected data on teacher treatment integrity during 30%, 43%, 37%, and 47% of sessions for Teachers A, B, C, and D, respectively, to assess interobserver agreement. The observers were in agreement when they independently scored the teacher's implementation of a treatment step similarly (i.e., as correct or incorrect). Interobserver agreement was calculated as the number of instances of agreement divided by agreements plus disagreements multiplied by 100%. Mean percentage of agreement for Teacher A was 97% (range, 85% to 100%), for Teacher B was 97% (range, 92% to 100%), for Teacher C was 100%, and for Teacher D was 94% (range, 77% to 100%). A second observer also collected data on student target behavior during 30%, 40%, 49%, and 43% of sessions for Students A, B, C, and D, respectively. Interobserver agreement was scored on an interval-by-interval basis and was calculated as the number of agreements divided by agreements plus disagreements multiplied by 100%. Mean percentage agreement for Student A was 85% (range, 77% to 92%), for Student B was 91% (range, 78% to 100%), for Student C was 98% (range, 95% to 100%), and for Student D was 91% (range, 75% to 100%).

Treatment acceptability. Teachers completed the Intervention Rating Profile-15 (IRP-15) (Martens, Witt, Elliot, & Darveaux, 1985) to assess their judgments about the intervention used with their students. The IRP-15 contains 15 items rated on a six-point Likert-type scale (1 = *strongly disagree* to 6 = *strongly agree*), with the total score used as a global index of intervention acceptability. This instrument has been shown to have high internal consistency (Cronbach's alpha = .98). Previous factor analyses revealed that all items loaded onto a single factor, termed *general acceptability* (Martens et al.). Teachers were also asked to complete two additional acceptability questionnaires modified from the IRP-15. These

questionnaires were created for the purposes of this study to evaluate the teachers' judgments about the specific interventions. The number of questions was a reflection of the number of interventions included within a condition. In one condition, a package of three interventions was used with teachers. As a result, the acceptability questionnaire had a higher number of items than the questionnaire inquiring about acceptability of a condition with only two interventions. A copy of the adapted version of this scale is available from the first author.

Experimental Design and Procedure

A multiple baseline design across the four dyads was used to evaluate the effects of goal setting, child and teacher performance feedback, directed rehearsal, and meeting cancellation on teachers' treatment integrity and student behavior. The treatment integrity analysis included six phases: (a) pretraining baseline, (b) training, (c) implementation baseline, (d) goal setting and student performance feedback, (e) teacher performance feedback and directed rehearsal with meeting cancellation, and (f) fading. The first three phases occurred in the order specified above for all teachers. Goal setting and student performance feedback preceded teacher performance feedback and directed rehearsal with meeting cancellation for Teachers A and B, whereas teacher performance feedback and directed rehearsal with meeting cancellation occurred prior to goal setting and student performance feedback for Teachers C and D. A brief reversal to teacher performance feedback and directed rehearsal with meeting cancellation occurred for these individuals as well. Thus, Teachers A and B were exposed to the staggering of phases in the order of ABCDE. Teachers C and D were exposed to the staggering of phases in the order of ABCEDE. The final phase consisted of fading for all teachers.

Pretraining baseline. During this phase, teachers were asked to teach their classes and respond to any behavioral difficulty in accor-

dance with the behavior plan already in place for each student. Existing intervention plans did not address target behaviors identified for this study for Students A, B, and D. During pretraining baseline, teachers had not yet been trained on the intervention procedures. The next phase was introduced after a minimum of four classroom observations had been conducted and student behavior was generally stable.

Training. Initial training in the various steps of the intervention occurred in the teachers' classrooms and was comprised of didactic instruction, modeling, coaching, and immediate corrective feedback. The intervention consisted of differential negative reinforcement of alternative behaviors (DNRA) and differential reinforcement of alternative behaviors (DRA) and was based on the results of a functional assessment for each student. Following both indirect and descriptive functional assessments, the consultant met with each teacher individually, reviewed the function-based intervention plan, modeled the intervention steps, answered questions, and obtained agreement to implement the plan. The following day, the consultant began training while the teacher implemented the intervention in the classroom. The training consisted of coaching and immediate corrective feedback. Training continued until teachers implemented the plan with 100% integrity on two consecutive occasions with the consultant's assistance. Teachers were provided all necessary materials (e.g., tokens or sticker charts, reinforcers, or protocols) for implementation in this and subsequent phases.

Implementation baseline. Following initial training, teachers implemented the plan without assistance or feedback from the consultant. Trained observers collected data on integrity of plan implementation by the teacher and on students' target behaviors.

Goal setting and student performance feedback. The purpose of this phase was to examine the accuracy of teachers' plan implementation after setting a goal for student behavior and then receiving feedback about the student's progress toward that goal. Students' goals were determined based on their pretraining baseline levels and were set at a 50% reduction from this baseline mean. Once treatment integrity decreased and was stable (two consecutive data points within 20 percentage points) following initial training, the consultant met with each teacher to set a goal for student behavior based on baseline performance. During this phase, teachers were provided with daily written feedback and time-series line graphs of student behavior. Although each teacher received daily feedback regarding his or her student's behavior, he or she did not receive feedback regarding the accuracy of implementation of the intervention. Once treatment integrity decreased or was stable, the next phase was introduced.

Teacher performance feedback and directed rehearsal with meeting cancellation. The purpose of this phase was to examine the effects of performance feedback combined with negative reinforcement in the form of avoiding a meeting to practice missed steps (i.e., directed rehearsal). This phase was introduced when treatment integrity decreased from the previous phase and was stable. Teachers were provided with daily written feedback and time-series line graphs of their performance and that of their respective students. If a teacher did not obtain 100% integrity on that day's observation, a meeting with the consultant was held the following day prior to the next scheduled observation. During this meeting, any missed or incorrect steps were reviewed and practiced three times. If, however, a teacher obtained 100% integrity, the meeting with the consultant was not held. At the start of this phase, the consultant explicitly described the contingency to each teacher. A performance criterion of three consecutive days with 100% integrity was required before moving to the next phase.

Fading. All procedures from the previous condition were in place; however, teachers

received reduced performance feedback if integrity remained high. Specifically, if integrity was maintained at 100% for three consecutive observations, the schedule was thinned to once every other day, once per week and, subsequently, once every 2 weeks. Teachers who did not maintain 100% integrity for three consecutive observations were returned to the previous schedule until the criterion was again met. Due to time constraints associated with the school calendar, the schedules were not thinned to once every 2 weeks for all teachers.

RESULTS

Treatment Integrity

The percentage of treatment steps implemented by the teachers and the percentage of intervals of student target behavior across all phases of the study are presented in Figures 1 and 2. During pretraining baseline, teachers taught their classes as they normally would and responded to severe problem behavior as outlined in each student's behavioral intervention plan that was in place before the start of this study. Because the individualized interventions implemented for the purposes of this investigation were not in place yet, teachers demonstrated zero percentages of treatment integrity. Teachers were then instructed in how to use the intervention and were provided with the consultant's assistance in the training phase. Teachers A, C, and D met the training criterion (implementation at 100% for two consecutive sessions) in four or fewer sessions, whereas Teacher B required 15 sessions to reach criterion due to high variability in implementation integrity.

Once each teacher met the training criterion, the consultant discontinued her assistance. Specifically, the consultant no longer provided cues to implement a treatment step and did not provide immediate corrective feedback. The data in Figures 1 and 2 show an immediate drop in intervention implementation by all 4 teachers. Teachers A, B, and C showed little to

no use of the intervention throughout the implementation baseline. By the end of this phase, Teacher D's implementation level decreased to 46%.

Once teachers' implementation decreased and was stable, either goal setting and student performance feedback or teacher performance feedback and directed rehearsal with meeting cancellation was introduced. In goal setting and student performance feedback, teachers set a goal for student behavior with the consultant and received daily written feedback and graphs of student progress. Teacher A showed an increase in treatment integrity levels ($M = 58\%$) compared to implementation baseline, but Teacher B showed no improvement ($M = 0\%$). During teacher performance feedback and directed rehearsal with meeting cancellation, teachers received daily written feedback and graphs of their treatment integrity and of their students' progress. Putative negative reinforcement was contingent on accurate implementation of the intervention in the form of avoiding a directed rehearsal meeting with the consultant to review every missed or incorrectly implemented step. Teacher A demonstrated the most rapid improvement in treatment integrity and averaged 100% accuracy. Teacher B was somewhat slower to demonstrate consistent improvements in treatment integrity, but did so within five sessions ($M = 79\%$).

During teacher performance feedback and directed rehearsal with meeting cancellation, Teacher C showed slower increases in treatment integrity ($M = 74\%$) than did Teacher D ($M = 97\%$); however, both met performance criterion and were accurately implementing the classroom intervention within five sessions. During goal setting and student performance feedback, Teacher C exhibited an increase in treatment integrity ($M = 67\%$) compared to implementation baseline levels of 0%. Teacher D showed similar treatment integrity in implementation baseline ($M = 66\%$) and goal setting and student performance feedback ($M = 63\%$).
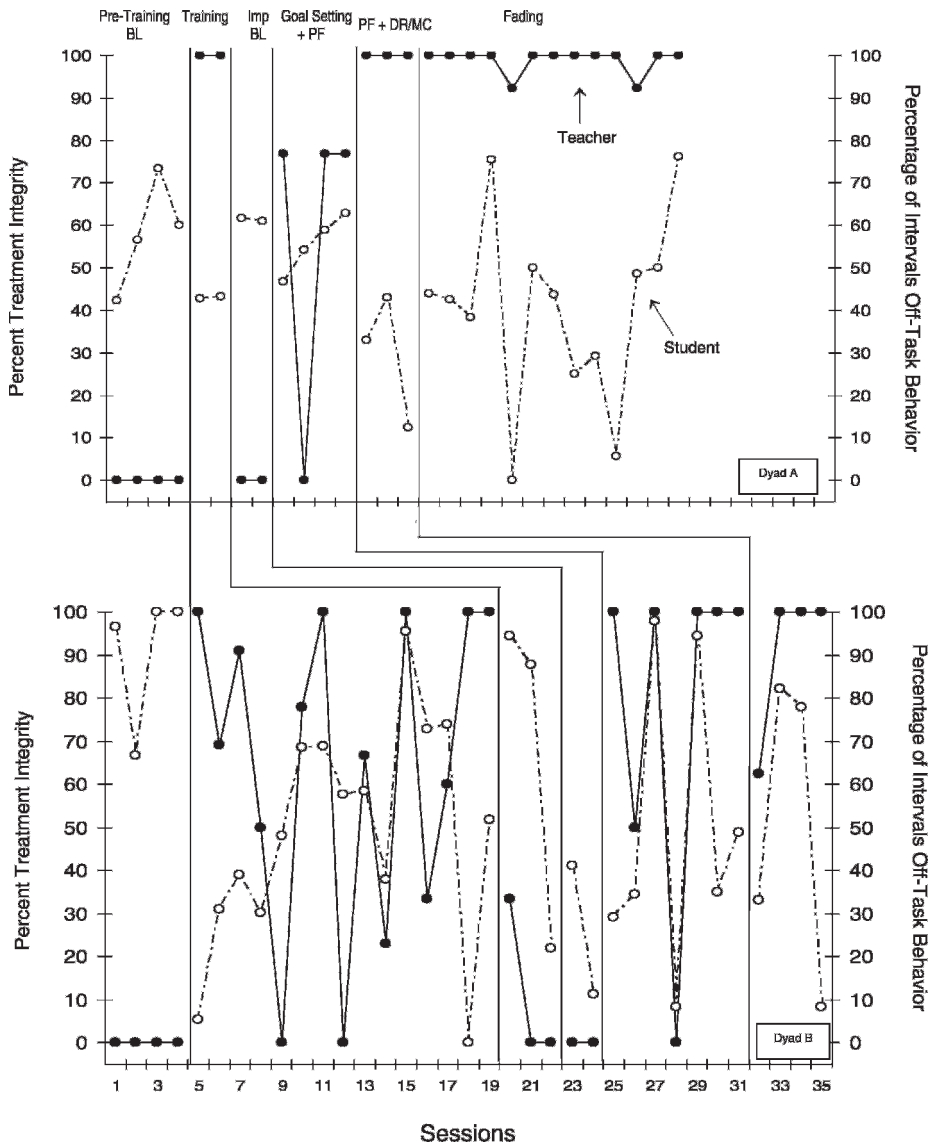
Figure 1. Percentage of treatment steps implemented by Teachers A and B and the percentage of intervals of target problem behavior by Students A and B across all phases of the study.

Following goal setting and student performance feedback, a brief reversal to teacher performance feedback and directed rehearsal with meeting cancellation occurred for Teachers C and D. Both teachers demonstrated higher treatment integrity percentages during these conditions than during goal setting and student performance feedback. Teacher C averaged 100% accuracy and Teacher D averaged 97% accuracy

during the second implementation of teacher performance feedback and directed rehearsal with meeting cancellation. Thus, within-subject functional control over teacher performance feedback and directed rehearsal with meeting cancellation condition was demonstrated with Teachers C and D.

When the performance feedback schedule was thinned in the fading phase, all teachers
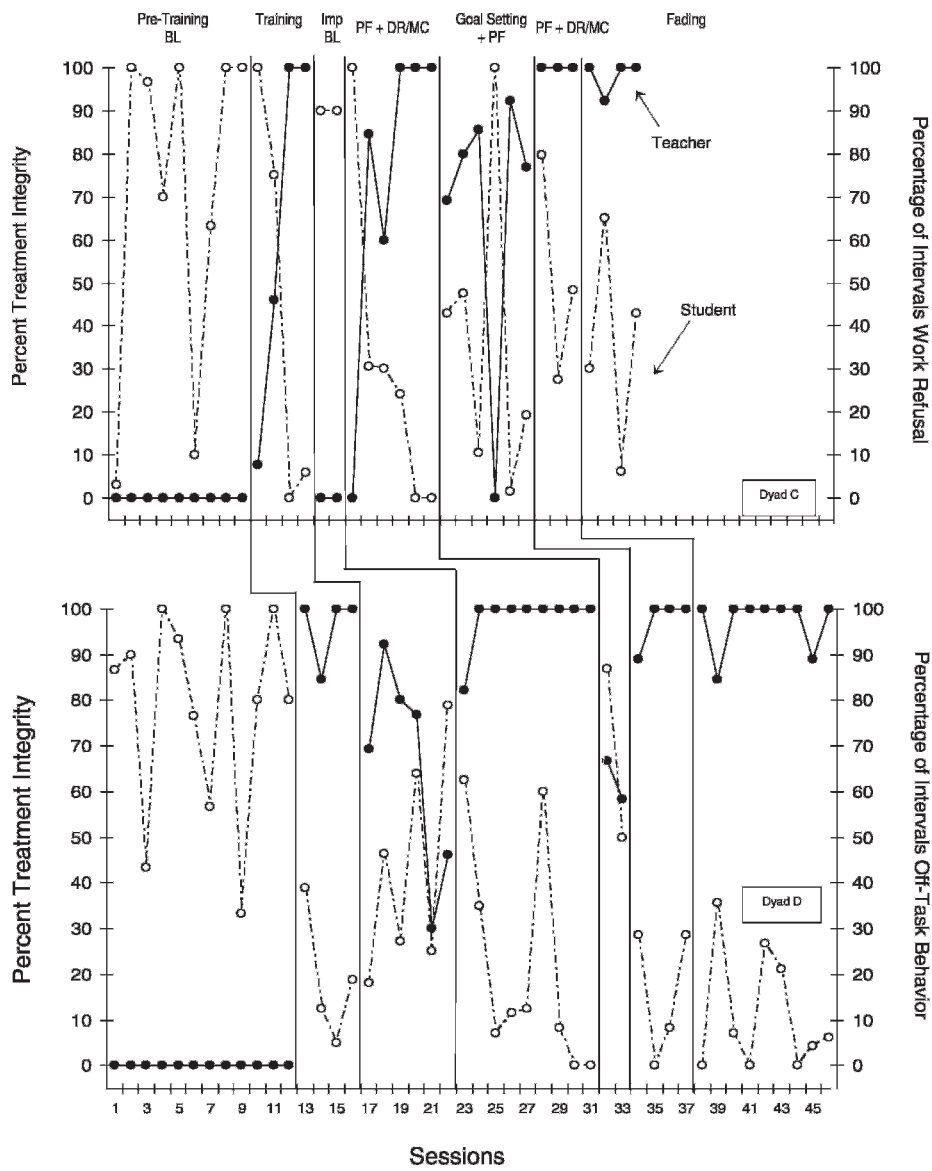
Figure 2.   Percentage of treatment steps implemented by Teachers C and D and the percentage of intervals of target problem behavior by Students C and D across all phases of the study.

continued to demonstrate high levels of treatment integrity. The reinforcement schedule was thinned to every other day for Teacher C, once per week for Teachers B and D, and once every 2 weeks for Teacher A. Teacher A averaged 98% accurate implementation, Teacher B averaged 91%, Teacher C averaged 98%, and Teacher D averaged 97%.

Treatment Effectiveness

Although the primary focus of this investigation was on teacher treatment integrity, student behavior was also measured as a secondary dependent variable. In pretraining baseline, students' target behaviors were high and showed substantial variability. On average, Students A, B, and D displayed off-task behavior in more

than half of the intervals (59%, 91%, and 77%, respectively). Student C engaged in work refusal an average of 79% of intervals.

All students exhibited reductions in target behaviors upon introduction of the intervention. Students A, B, and D displayed off-task behavior an average of 24%, 49%, and 18% of intervals, respectively, during the training phase. Student C also showed decreases in work refusal ($M = 45\%$) compared to levels in pretraining baseline.

With the introduction of goal setting and student performance feedback, only 2 of the 4 students showed substantial reductions in their target behaviors (Students B and C). Student A showed a slight reduction in off-task behavior ($M = 56\%$), and Student B's off-task behavior averaged 26% of intervals. The percentage of intervals during which Student C displayed work refusal decreased to an average of 37% during this condition. Student D's off-task behavior declined slightly to a mean of 68%.

Compared to pretraining baseline levels, all students exhibited reductions in problem behavior during teacher performance feedback and directed rehearsal with meeting cancellation. Three of the 4 students showed systematic decreases in their target behaviors based on visual inspection of the data. In this condition, off-task behavior averaged 30%, 50%, and 20% for Students A, B, and D, respectively. Student C engaged in work refusal an average of 38% of intervals. Although these percentages are lower than pretraining baseline levels, Student C did not show a substantial difference in work refusal during teacher performance feedback and directed rehearsal with meeting cancellation compared to goal setting and student performance feedback. In addition, Student B demonstrated higher levels of off-task behavior in the former condition.

Decreases in problem behavior were maintained for 3 of the 4 students during fading. Students A, B, C, and D averaged 41%, 50%, 41%, and 11%, respectively.

Correlational Analyses

The relation between teacher integrity and student target behavior was calculated to determine the extent to which increased accuracy of implementation was associated with intervention effectiveness. The two variables were significantly correlated for Dyad A, $r = -.45$, $p < .05$; for Dyad C, $r = -.66$, $p < .01$; and for Dyad D, $r = -.78$, $p < .01$. A statistically significant correlation was not found for Dyad B, $r = .02$.

Treatment Acceptability

Teachers' responses on the IRP-15 were obtained to determine the acceptability of the intervention. Total acceptability scores ranged from 59 to 88 ($M = 78$) of 90, indicating general intervention acceptability. The mean item rating across all teachers was 5.2 (of 6), with 3 of the 4 teachers slightly agreeing to strongly agreeing with each item (ratings of 4, 5, or 6). Teacher B slightly disagreed with 33% of the items (a rating of 3). These items pertained to effectiveness and benefit of the intervention, suitability and fairness of the intervention given the student's problem behavior, and the extent to which he or she liked the procedures used in the intervention.

Teacher responses on the modified IRP provided information specific to the use of the integrity interventions (goal setting and student performance feedback or teacher performance feedback and directed rehearsal with meeting cancellation). Teachers indicated a general acceptability of the use of goal setting and student performance feedback, with total acceptability scores ranging from 49 to 60 ($M = 57$) of 60. The mean item rating across all teachers was 5.7 (of 6), with all teachers slightly agreeing to strongly agreeing with each item. For example, all 4 teachers agreed or strongly agreed that setting goals for student behavior and receiving daily written feedback about student performance were acceptable ways to help teachers accurately implement plans for students. Teachers indicated a general acceptability of teacher

performance feedback and directed rehearsal with meeting cancellation, with total acceptability scores ranging from 69 to 107 ($M = 87$) of 108. The mean item rating across all teachers was 4.8 (of 6), with 2 of the 4 teachers slightly agreeing to strongly agreeing with each item. All teachers agreed or strongly agreed on items specifying that the procedures used would be beneficial for teachers and that they liked the procedures used to assist them in implementing the intervention. However, Teachers A and B expressed slight disagreement or disagreement with statements pertaining to practicing missed intervention steps and avoiding a meeting. For example, Teacher A disagreed (a rating of 2) with the statements that avoiding a meeting or practicing missed intervention steps was an acceptable way to help teachers implement plans for students. Similarly, Teacher B indicated slight disagreement with the statement that she would be willing to practice missed intervention steps again in the future. The component of teacher performance feedback and directed rehearsal with meeting cancellation that Teachers A and B found most acceptable was the receipt of daily written feedback. On average, teachers rated both procedures as acceptable, with goal setting and student performance feedback rated as slightly more acceptable.

DISCUSSION

The goal of this study was to examine the extent to which treatment integrity of 4 special education classroom teachers was affected by two different strategies (goal setting and student performance feedback; teacher performance feedback and directed rehearsal with meeting cancellation). The results replicate and extend previous findings suggesting that a teacher performance feedback package plus directed rehearsal with meeting cancellation can effectively increase teachers' treatment integrity in special education classrooms (DiGennaro et al., 2005). In addition, high treatment integrity was

associated with lower percentages of student problem behavior for three of the four dyads. This relation also replicates findings by DiGennaro et al.

This study provides some evidence that daily meetings may not be necessary to maintain treatment integrity over time. Instead, high levels of integrity were demonstrated when teachers were allowed to avoid a meeting with a consultant that included directed rehearsal following written performance feedback. These results replicate the findings of DiGennaro et al. (2005) showing that accurate plan implementation can be maintained on leaner schedules. The present findings suggest that implicit positive reinforcement contingencies (i.e., receiving written feedback about a student's progress toward a preestablished goal) may not be sufficient to maintain teacher treatment integrity. This is unfortunate, given that the goal-setting procedures were generally time-efficient for both the consultant and teacher and that teachers rated these procedures as more acceptable.

Despite receiving initial training superior to that typically provided to teachers when a new plan is introduced, implementation integrity decreased substantially when consultant assistance was removed. This finding emphasizes the importance of providing teachers with ongoing support, specifically feedback about their own performance. Inclusion of directed rehearsal permits focused, repeated practice of missed components of an intervention plan in the needed areas. Thus, allowing teachers to practice a skill and then avoid meeting with a consultant once skill acquisition in the natural setting is observed appears to be an effective means to promote treatment integrity. As stated previously, a critical aspect of effective consultation is to ensure that teachers have acquired the skills needed for plan implementation and that teacher behavior change has occurred (Erchul & Martens, 2002). The present findings suggest that use of performance feedback,

directed rehearsal, and meeting cancellation as a packaged intervention can produce desired changes in teacher behavior. Finally, the negative correlation found between teachers' implementation integrity and students' problem behavior for 3 of the 4 teachers underscores the importance of consultants monitoring and programming for treatment integrity in their work with teachers. These findings have direct implications for behavioral consultants. This study demonstrated an effective application of behavioral consultation that incorporated applied behavior-analytic techniques (e.g., Martens, Witt, Daly, & Vollmer, 1999). Components of this consultation process included (a) functional assessments to inform the design of school-based interventions; (b) modeling, coaching, and prompting to train teachers to implement interventions; (c) antecedent- and consequence-based interventions for teachers and students; (d) formative evaluation of teachers and students; and (e) data-based decision making.

There were several limitations that should be noted and may be addressed in future research. First, it is unknown what components of teacher performance feedback and directed rehearsal with meeting cancellation may have produced increases in treatment integrity. For example, either directed rehearsal of missed steps or performance feedback about teacher behavior may have been sufficient to strengthen teachers' repertoires enough to promote high levels of implementation integrity. On the other hand, the meeting cancellation contingency alone or in combination with these other practice variables may have accounted for the results that were obtained. Future research should examine the effects of these interventions implemented in isolation before combining them into a packaged intervention. However, it would be impossible to examine either directed rehearsal or meeting cancellation in the absence of some type of feedback.

One can presume that the teachers contacted negative reinforcement through the meeting cancellation contingency or directed rehearsal.

We do not know, however, if the consultant will take on aversive properties or if unintended long-term consequences will result if this is indeed the case. Considering the teacher survey results of Costenbader, Swartz, and Petrix (1992), who found that the most frequently reported barrier to effective school-based consultation was lack of teacher time, we believe that the teachers in this study may also have been motivated to engage in behaviors that saved time (Elliot, 1988) and were not simply avoiding the consultant. Furthermore, only 2 of the teachers rated the procedures used in teacher performance feedback and directed rehearsal with meeting cancellation as unacceptable. Thus, teachers' implementation behavior may have been strengthened through a positive reinforcement contingency (i.e., more time to engage in preferred activities) or through escape or avoidance of unpleasant consequences (i.e., practicing missed steps). Additional investigations are warranted to examine this issue more fully and to examine what effects, if any, use of directed rehearsal with meeting cancellation has on the consultation relationship.

Third, Teacher B consistently demonstrated variability in her treatment integrity, suggesting a limitation of the strategies used to facilitate teacher performance. During the initial training, she did not always respond effectively to prompting by the consultant even though she originally agreed to the treatment plan. In addition, her accuracy in implementation remained variable through much of teacher performance feedback and directed rehearsal with meeting cancellation. This is probably related to the relatively low acceptability ratings she gave Student B's intervention and the directed rehearsal with meeting cancellation components, and suggests that ongoing assessment of the social acceptability of both student and teacher interventions may be an important component for effective classroom consultation.

Next, student performance remained variable throughout all phases of the study. This may

have been due to our reliance on indirect and descriptive functional assessments to design interventions appropriate for each dyad. It is possible that different interventions may have been developed had we conducted a functional analysis; having teachers implement a different set of interventions, in turn, would have likely influenced the correlation between treatment integrity and student problem behavior.

Finally, an additional limitation is that the support schedules for 3 of the 4 teachers were not thinned to the desired goal (i.e., feedback provided every 2 weeks). This is an important area for future research.

Notwithstanding these limitations, the study's main findings suggest that teacher performance feedback with a meeting avoidance contingency can be an effective means to promote teacher treatment integrity in special education classrooms. Furthermore, integrity levels were higher under these conditions than when teachers were provided feedback on the extent to which the students were meeting agreed-upon behavioral goals. Finally, this study demonstrated that improvements in student behavior are indeed associated with implementation accuracy, thus providing perhaps the most compelling reason to continue the search for strategies that promote accurate treatment implementation in the absence of a consultant.

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