

*CHANGES IN STUDENT AND TEACHER RESPONSES IN OBSERVED AND GENERALIZED SETTINGS AS A FUNCTION OF SUPERVISOR OBSERVATIONS*

PEGGY INGHAM AND R. DOUGLAS GREER

COLUMBIA UNIVERSITY TEACHERS COLLEGE

Two studies are reported in which the effects of supervisor observations of teachers' performance rate and accuracy on both teachers' and severely handicapped students' behaviors were compared with baseline supervisor observations that did not specify rate and accuracy feedback. The latter observation procedure (nonspecific feedback) was more typical of the existing practices of school supervisors. The dependent variables for the teachers were rate and accuracy of teacher behaviors to student responses in individualized instructional settings involving discrete trials or task-analysis steps. The dependent variables for students were the rates of correct and incorrect responding to teacher presentations during the supervisor observation periods. Both studies used a multiple baseline design. The results of Study 1 showed that there were educationally significant changes in teacher and, in turn, student performance as a result of the use of the rate and accuracy procedure. The results of Study 2 replicated those of Study 1 while correcting limitations of Study 1. This latter study also demonstrated that the observation effects of the procedure generalized to teacher performance throughout the day. The results are discussed in terms of the efficiency and cost effectiveness of the procedure to train, monitor, and reinforce teacher effectiveness.

DESCRIPTORS: teacher effectiveness, supervision, observation, rate and accuracy feedback

Some studies suggest that a major cause of ineffective schooling is the lack of the widespread use of scientifically based pedagogical practices (Greer, 1989; Keller, 1978; Skinner, 1968, 1984). Teachers' use of effective instructional practices is key to adequate schooling. The studies reported herein test the use of an observation procedure for evaluating selected effective instructional procedures by teachers as a means of improving schooling.

Certain behaviors of teachers have a substantial effect on the behavior of students (Hall, Lund, & Jackson, 1968; Hall, Panyan, Rabon, & Broden, 1968). These behaviors include teacher antecedents to student responses (Greenwood, Delquadri, & Hall, 1984; Hall, Delquadri, Greenwood, & Thurstone, 1982; Lovitt & Curtiss, 1968) as well as teacher consequences to student responses (Brig-

ham, Graubard, & Strans, 1972; Madsen, Becker, & Thomas, 1968). The literature suggests that these two teacher repertoires are critical variables in effective educational practices (Barrett et al., 1989; Greer, 1989).

Procedures for observing teacher behaviors are numerous (Madsen et al., 1968; White, 1986). However, few procedures incorporate collection of data on the responses of students simultaneously with data on the behavior of teachers. Incorporating both student responses and teacher behavior in an observational period allows the detection of functional relations between teacher behavior and student responses. Moreover, these procedures provide potentially useful tools for training teachers and monitoring their performance with regard to critical ingredients of effective teaching. These measures include higher rates of opportunities to respond (Greenwood et al., 1984), higher rates of correct responding by students, and decreases in or maintenance of low rates of incorrect responding. Based on the importance of assessing this student-teacher relationship, an observational procedure was developed to collect data on student and teacher responding, and to convert responses to rates of teach-

---

These studies were part of a dissertation completed by the first author under the sponsorship of the second author. The first author is now at Bergen County Special Services School District. We would like to acknowledge the assistance of Nyla Lamm in completing independent observations of videotapes of the teachers in Study 2.

Reprints may be obtained from the second author at Box 76, Teachers College Columbia University, New York, New York 10027.

er and student behavior (Greer, McCorkle, & Williams, 1989). The procedure, termed teacher performance rate and accuracy (TPRA), has been used for over 10,000 observations of teachers by supervisors (Greer, 1991; Selinske, Greer, & Lodhi, 1991).

The TPRA observation procedure was found to correlate with student responses over an entire academic school year (Greer et al., 1989). Weekly or biweekly observations of teachers during short instructional sessions were related to the number of correct responses by all students in the teachers' classroom. The TPRA was also a component in a teacher supervision package that was functionally related to increases in correct student responses in a multiple baseline across all teachers in a school for a 2-year period (Selinske et al., 1991). Tests of the relationships between the TPRA procedure and correct student responding have thus far been indirect. Prior to the studies reported herein, it was not known whether the TPRA procedure, isolated from other supervisory procedures, affected student responding, nor was it known whether or not a more general observation procedure was equally effective.

There have been numerous studies in behavior analysis that have demonstrated functional relationships between teacher practices and student behavior (Sulzer-Azaroff et al., 1988). Surprisingly, there has been little research on the effects of supervisor behaviors on effective teaching practices, defined as teacher behaviors that increase correct student responses to academic instruction. Supervisory behaviors have been shown to affect the performance of staff members in human service agencies, including direct observation with feedback (Reid & Shoemaker, 1984).

In the educational research literature, no functional relationships have been demonstrated for supervisor performance and effective teaching practices beyond the relationship between a package of practices used in the Selinske et al. (1991) study and correlations found in educational research (McCormick, Cooper, & Goldman, 1979). To date, the educational literature has identified correlations between the following supervisory practices and

mean scores of students on standardized achievement tests: time devoted to curricular issues, time spent in the classroom, and provision of atmospheres conducive to academic achievement (Edmonds, 1979). Parsons, Schepis, Reid, McCarn, and Green (1987) showed that training supervisors to observe and provide functional curricular activities resulted in significantly more functional activity in special education classes. None of the existing literature has included direct assessment of students' correct and incorrect responses or of specific teacher behaviors.

The purpose of the studies reported herein was to test the effects of the TPRA procedure compared to a general observation procedure on teacher performance and in turn on students' responding. The second experiment tested the generalization of teachers' performance during the supervisor's observations to the remainder of the day when the teachers were not observed.

## GENERAL METHOD

### *Method*

*Setting.* Both studies were conducted at a small state-funded private school for multiple handicapped children in a suburb of a large metropolitan area. All teachers were evaluated annually, using a rating scale with descriptors. This contractual evaluation specified the length and type of classroom observations of teachers by the supervisor. Classroom instruction was largely at the teachers' discretion. All staff members implemented both acceleration and deceleration behavior-change projects (nonacademic responses) for the students that were written and supervised by the school psychologist. Beyond these programs, teachers adhered to behavioral technology according to their own preferences.

*Participants.* The 16 students attending the small school ranged in age from 6 to 21 years; all were severely to profoundly retarded and had at least one other handicapping condition (e.g., deafness, blindness, seizure disorders, autism, cerebral

palsy). Their IQ scores ranged from 8 to 49. Eight of the students lived in residential placements (intermediate care facilities); 6 of these had lived at home as younger children. The remaining 8 students lived at home with their parents.

Three of the 16 students were verbal; 9 others used manual signs for communication and 4 did not emit vocal or gestural behavior. All were being trained in communication, social skills, fine and gross motor skills, activities of daily living, and prevocational skills. Student goals ranged from tolerating various therapeutic positions, developing head control, exhibiting consistent responses to environmental stimuli, and tolerating activities of daily living (Classroom A), to basic attending and object manipulation skills (e.g., put in/take out, matching to object, sorting by size, shape and color, packaging objects by number using jigs and adaptive equipment; Classroom B), to functional academic skills relating to number (count to 20). One student was identifying basic sight words (Classroom C).

The 4 teachers held master's degrees and had 3 to 8 years of experience teaching in the school in which the experiments were conducted. Teachers B and C participated in Study 1; Teachers A, C, and D participated in Study 2. The teacher in Classroom B left during the baseline phase of Study 2. For the second study, there were 2 new teachers (Teachers A and D), whereas Teacher C was a participant in both studies. However, there was only a single new classroom (Classroom A). The change of teachers is reflected in the designation of Teacher D, who assumed the role of Teacher B for Classroom D for the second study. This teacher change also resulted in the use of a delayed multiple baseline component in Experiment 2.

*Supervisor.* The supervisor (the first author) had worked in the school for 7 years; the first 3 years as school psychologist and assistant director and the last 4 years as director. During the last 4 years, she was in a doctoral training program in special education administration and behavior analysis.

*Data collection.* Teachers were observed using a procedure developed by Greer (1985) and used and discussed in the studies by Greer et al. (1989)

and Selinske et al. (1991). The observations were 10 to 20 min long; all sessions included at least 20 instructional trials or task-analysis steps. Teaching sessions involved teachers instructing a single student using discrete trials, incidental trials, or task-analyses procedures. Teacher performance rate and accuracy was computed by totaling all correct reinforcements and corrections given by the teacher for a given session and subtracting reinforcement errors or correction errors from the correct teacher total and dividing by the total elapsed time for the session.

Failure by the teacher to reinforce correct student responses and reinforcement delivered before the termination of the target response were scored as reinforcement errors, as were reinforcements of incorrect responses. Failure to correct inappropriate student responses was scored as correction errors, as were corrections of correct student responses. Responses by teachers, or the lack of responses, were tallied for all student response opportunities. The result of the subtraction of teacher errors from teacher correct performance was then divided by the duration of the instructional session to obtain the rate. Using this formula provided a single datum to represent accuracy (correct teaching behavior), inaccuracy (incorrect teaching behavior), and the rate of presentation of opportunities to respond by the teachers.

Student responses, or lack of responses, to instruction were recorded as correct or incorrect by the teacher and supervisor independently. Failure by the student to respond to the antecedent stimulus within 5 s of its presentation was recorded as an incorrect response. Criteria for student success and acceptable prompt levels were discussed with the teacher prior to the beginning of each observation, as was the type and schedule of reinforcement. The totals for students' correct and incorrect responses were divided by the duration of the instructional session in minutes to obtain rates of correct and incorrect responses.

*Baseline conditions: General observation and feedback.* Baseline conditions in both experiments consisted of the supervisor observing in the classrooms and recording teacher and student responses.

In Study 2 only, teacher assistants were observed for accuracy in recording student responses. These observations were unannounced and occurred during scheduled individual instruction time. The supervisor also visited each classroom at other times and for other purposes. Following each observation, during the baseline phase, the supervisor met with the teacher and provided general nonspecific feedback on the observation. Praise was given (e.g., "That was a nice lesson"), as well as comments on student behavior; the instructional task and materials were also discussed. Student success was commented on generally (e.g., "He seemed to do better today"). Graphs of data were not shown to the teacher in this phase. This type of feedback is probably typical of many nontechnical observations of teachers by supervisors (Parsons et al., 1987).

It is important to note that for experimental reasons, teacher rate and accuracy data and student rates of correct and incorrect responses, as described above, were collected in both the baseline and treatment conditions, but were not presented to the teachers until the treatment condition.

#### STUDY 1

##### *Method*

*Teacher rate and accuracy procedure.* Treatment was initiated following 6 and 11 days of baseline. At the onset of the treatment phase, the supervisor met with each teacher and explained that at the end of each observation she would be leaving written feedback with the teacher. The written feedback was accompanied by verbal feedback and praise. The written feedback consisted of the data on teacher rate and accuracy and the student rate of correct and incorrect responses, which were explained to the teacher in detail and were displayed as graphs in each classroom. Praise in this phase was specific to teacher rate and accuracy and students' rate of correct and incorrect responses. Observations occurred once or twice weekly during Study 1.

*Interobserver agreement.* The interobserver agreement for the teachers' and students' behaviors in Study 1 consisted of calibration to a standard (Johnston & Pennypacker, 1980). The target teachers did not permit videotapes, second observers, or

the use of teacher-collected data. Thus, the supervisor's accuracy for the observations of teachers' behaviors was determined by having the supervisor view previously validated videotapes of other teachers and students from another school. The supervisor was trained to use the procedure by another supervisor and by feedback from training videotapes. Four different videotape sessions were used during baseline and four different videotapes were used during treatment, with the agreement to the calibrated standards serving as an index of the supervisor's accuracy in the target school. Indices of agreement were obtained by dividing the number of point-by-point agreements on trials or task-analysis steps for both teachers' and students' responses by the number of agreements plus disagreements and multiplying by 100%. Interobserver agreement between the supervisor and the calibrated standard ranged from 85% to 97%, with a mean of 91% for the eight calibrated observations.

*Design.* The study used a multiple baseline across two classrooms. The baseline consisted of general observation procedures, and the treatment consisted of TPRA observations with verbal and visual feedback.

##### *Results and Discussion*

The results for Study 1 are shown in Figure 1. For Classroom C, in Phase 1 (general observation and feedback) the mean teacher accuracy rate was  $-0.68$  (range,  $-3.0$  to  $0.27$ ), the mean student rate of correct responses was  $1.60$  (range,  $1.0$  to  $2.83$ ), and the mean student rate of incorrect responses was  $1.29$  (range,  $0.75$  to  $2.0$ ). In Phase 2 (rate and accuracy observation and feedback), the mean teacher accuracy rate was  $3.33$  (range,  $0.15$  to  $10.0$ ), the mean student rate of correct responses was  $3.59$  (range,  $1.0$  to  $11.0$ ), and the mean student rate of incorrect responses was  $0.7$  (range,  $0$  to  $2.25$ ).

In Phase 1 the mean teacher accuracy rate for Classroom B was  $0.014$  (range,  $-2.5$  to  $2.3$ ), the mean student rate of correct responses was  $2.21$  (range,  $0.8$  to  $5.89$ ), and the mean student rate of incorrect responses was  $1.14$  (range,  $0.13$  to  $2.1$ ). In Phase 2, the mean teacher accuracy rate was  $5.35$  (range,  $0.2$  to  $8.0$ ), the mean student rate of

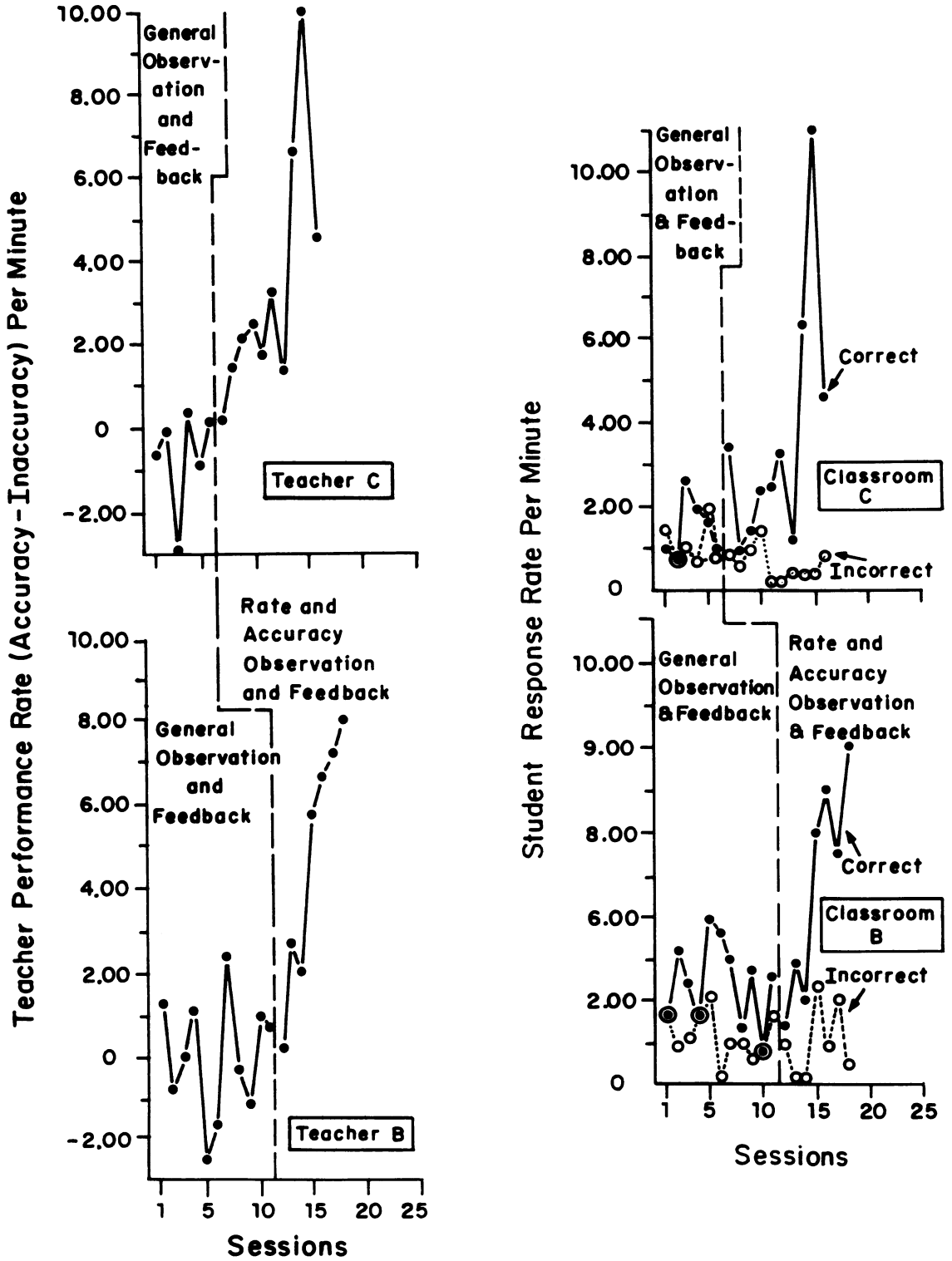


Figure 1. Rate of teacher performance (TPRA) during general observation and TPRA phases of Study 1, and rate of correct and incorrect students' responses during supervisor observations of teachers.

correct responses was 5.21 (range, 1.2 to 9.0), and the mean student rate of incorrect responses was 0.97 (range, 0 to 2.33).

The data from Study 1 showed functional relationships between supervisor's use of the rate and accuracy procedure on both teacher and student performance rates. However, the interpretation of these data was limited by the lack of direct interobserver agreement tests for teacher and student behaviors and variability in the interval of time between the occurrences of teacher observations. Observations occurred every day for Teacher B and every other day for Teacher C during treatment, whereas during baseline the observations occurred every 4 days for Teacher B and every 5 days for Teacher C. The result was that teachers received more observations during treatment than during baseline.

Study 2 was designed to extend the results of Study 1 by eliminating the potential confounding effect of differential observation rates across conditions. Moreover, Study 2 tested the generalization of teacher behavior from the performance during observation to performance throughout the day with all students taught in all instructional sessions.

## STUDY 2

### *Method*

*Data collection.* Observations of teachers were conducted once weekly during both baseline and treatment conditions. Teachers also permitted the use of videotapes of the sessions; these were also observed by the supervisor.

*Collection of all-day total classroom data.* The second dependent variable for Study 2 consisted of the data collected by the teacher throughout the day for all individual instruction, in addition to data collected on individual students during the single weekly TPRA observation and feedback procedure. The data from all teacher sessions for all students were collected each day by the supervisor at the end of each day. The data included all correct and incorrect responses to all instructional trials on which data were collected. Teachers were not given verbal or visual feedback regarding these data at any point in the study.

*Interobserver agreement.* Interobserver agreement on teacher observations was assessed during 25% of baseline and treatment sessions using videotapes. The supervisor collected the data for all sessions, and the second observer viewed a videotape of the observation at a later date. The teachers agreed to being videotaped after having experienced the observation procedures in Study 1 during the previous year. Another graduate student, trained in the use of TPRA observation procedures, viewed the tape independently at a later date and recorded teacher and student behaviors. She was naive as to baseline and treatment sessions, as well as to the nature of the treatment procedures. Indices of agreement were obtained as previously described. The mean for correct teacher behavior was 95% (range, 80% to 100%); for incorrect teacher behavior, the mean was 97% (range, 83% to 100%). Student total trials was 98% (range, 88% to 100%); for correct student responses, the mean was 96% (range, 80% to 100%); and incorrect student responses, the mean was 96% (range, 75% to 100%). The agreement between the supervisor and the teachers ranged between 85% and 100%, with a mean of 94%.

Interobserver agreements for the teachers in the classroom were based on the weekly TPRA observations for 93 single instructional sessions. Observations of teachers and assistants in each class were conducted on the same day. The teacher assistants were observed for accuracy but were not given feedback. The students taught and the particular programs taught were rotated across students and teacher assistants in each classroom. Single observation sessions were conducted on 20% of the baseline days for teachers and teacher assistants. The percentage of agreement was totaled across (a) the teacher agreement with the supervisor and (b) the teacher assistant agreement with the supervisor, in order to obtain an estimate of the accuracy of teachers and assistants for all-day instruction. Observations of teachers and assistants were conducted on the same day. Agreements and disagreements were calculated as previously described.

For Classroom A, the mean percentage agreement for correct student responses was 93% (range, 83% to 100%). For Classroom C, the mean per-

centage agreement for correct student responses was 95% (range, 80% to 100%). For Classroom D, the mean percentage agreement for correct student responses was 89% (range, 67% to 100%); for incorrect student responses, the mean was 87% (range, 67% to 100%).

*Design.* The second experiment used a multiple baseline across 3 teachers and their classrooms with a delayed baseline component. Teacher B from Study 1 left the school during the baseline of Study 2, resulting in a modification in the design. The new teacher, Teacher D, assumed responsibilities for Classroom B. Another new teacher (Teacher A) and her classroom were included in this study. Observations were conducted once per week throughout Study 2; whereas in Study 1, the frequency of observations was variable, as described earlier. The dependent and independent variables were the same with the addition of a second dependent variable, correct and incorrect responses of all students all day, as a test of the generalization of the effects of the observation procedures on the teachers' performance when not being observed.

### *Results and Discussion*

The data on teacher performance are shown in Figure 2. During the first phase (general observation and feedback), the mean (and ranges in parentheses) for teacher rate and accuracy in Classrooms A, C, and D were 0.32 (0.05 to 0.75), 0.66 (−0.48 to 2.49), and 0.23 (−0.70 to 1.87), respectively. The corresponding mean (and ranges) during the rate and accuracy phases were 2.71 (0.28 to 4.09), 4.0 (1.34 to 6.70), and 3.1 (0.54 to 5.35).

The student rate means are also shown in Figure 2 for correct and incorrect responses (ranges in parentheses). During the general observation and feedback phase, the rates were 0.46 correct (0.07 to 0.8) and 0.24 incorrect (0.05 to 0.55) for Classroom A, 2.07 correct (0.43 to 6.6) and 0.7 incorrect (0.12 to 2.12) for Classroom C, and 1.0 correct (0.23 to 2.11) and 0.68 incorrect (0.66 to 1.28) for Classroom D. During teacher performance rate/accuracy observations and feedback, the corresponding data were 2.17 correct (0.28 to 4.24) and 0.58 incorrect (0.0 to 2.11) for Class-

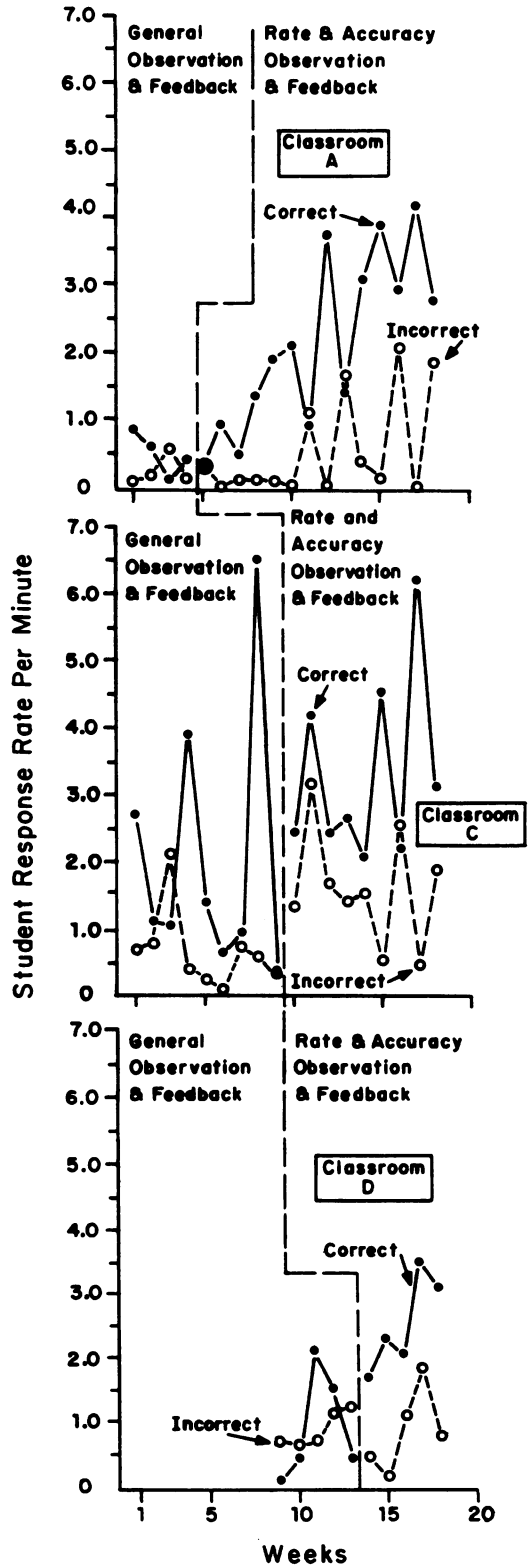
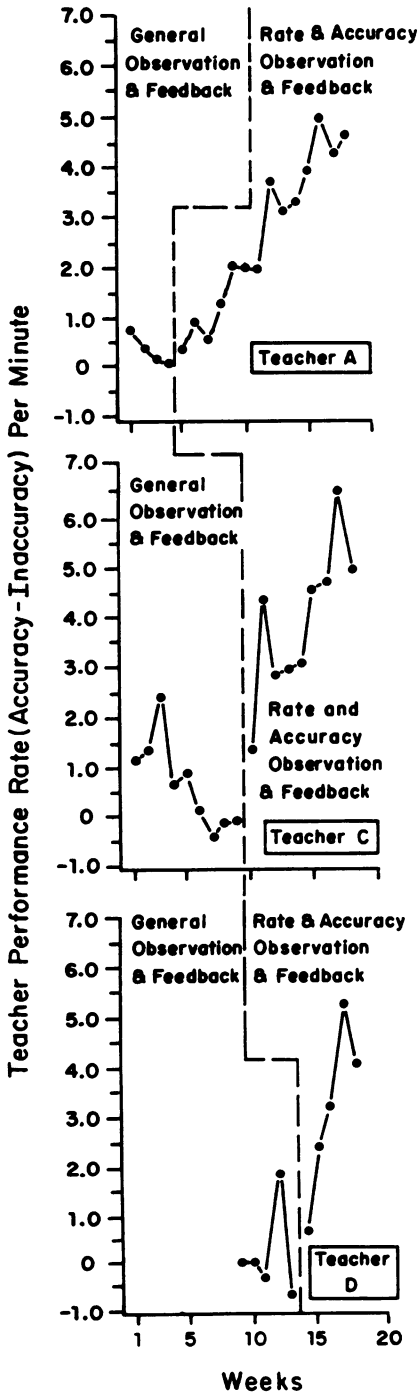
room A, 3.29 correct (2.04 to 6.16) and 1.63 incorrect (0.54 to 3.16) for Classroom C, and 2.52 correct (1.52 to 3.49) and 0.93 incorrect (0.21 to 1.86) for Classroom D.

In the general observation and feedback phase (Figure 3), the mean number of correct and incorrect student responses (with ranges in parentheses) for each classroom for all students were 36 correct (33 to 44) and 17 incorrect (12 to 22) for Classroom A, 200 correct (147 to 299) and 62 incorrect (38 to 83) for Classroom C, and 59 correct (38 to 85) and 27 incorrect (22 to 35) for Classroom D. In the teacher performance rate/accuracy and feedback phase, the corresponding means and ranges were 69 correct (26 to 97) and 23 incorrect (9 to 32) for Classroom A, 305 correct (169 to 536) and 57 incorrect (32 to 120) for Classroom C, and 175 correct (89 to 225) and 29 incorrect (20 to 44) for Classroom D.

The results of Study 2 showed that use of the TPRA procedure significantly increased teacher rate and accuracy performance; this in turn increased students' correct rates and maintenance of incorrect rates relative to correct rates. The effect was strongest for Teacher C who was the only teacher who was in both studies. His data and that of his students were also slightly higher in the second baseline (Study 2) than they were in the first baseline (Study 1). In addition, the observations functioned to increase total correct responses by all students throughout the day while maintaining low rates of incorrect responses. Again, the strongest generalization occurred for Teacher C and his students. The data of Teacher D showed the smallest generalization effect. These results suggested that teachers' skills learned in the observation periods were generalized to performance with all students throughout the day.

### GENERAL DISCUSSION

The results of the first study showed that correct and incorrect responses of the students to teacher instructions changed as a result of their supervisor's use of the TPRA observation and feedback procedure. However, the lack of direct tests of reliability for the teacher data and variability in ob-



servation frequency limited interpretations of the data. The results of the second study replicated those of the first, and the method eliminated the limitations of the first study. The second study also showed that the supervisor's observations generalized to teacher and student responses during portions of the day when teachers were not being observed. This means that teachers ran more trials, collected more data, and obtained more correct responses from their students during the TPRA phase than they did in baseline.

The results showed that specific feedback to teachers regarding their rate of presentation of instructional trials and the rate at which they supplied accurate consequences to student behavior functioned to increase teacher rate of presentation, to increase teacher accuracy, to decrease teacher inaccuracy, and in turn to increase students' correct responses. The TPRA procedures included oral and written feedback by the supervisor and joint inspection of visual displays of the teachers' and students' performances concerning the variables observed. The degree of the effect varied among teachers, but performance was always stronger during treatment than during baseline. These results suggest that the TPRA taps an important component of teacher effectiveness, at least with severely handicapped students.

Teacher C was the only teacher who participated in both studies. During the first baseline his performance, in all but one case, was 0 to  $-2.0$ . Negative scores show occurrence of more errors than correct teacher responses. During the second baseline (Study 2), six of the nine baseline sessions were above 0. Thus, the second baseline was slightly higher than the first. Similar effects occurred for the student responses during observations; that is, there were higher rates of student correct rates in the second baseline. Nevertheless, if both experiments for Teacher C are conceptualized as a reversal design across the two studies, it is clear that Teacher C showed a reversal effect. This suggests that the

supervisor observation should be a constant component of teacher training and supervision. After all, supervision of quality and productivity are continuing features of organizations in which the productivity and quality of the product determines the economic viability of the organization. Perhaps instruction of teachers using a procedure similar to the TPRA is a necessary constant for teaching effectiveness. In fact, the continuous use of the TPRA procedure is a feature of schools like the one described by Selinske et al. (1991).

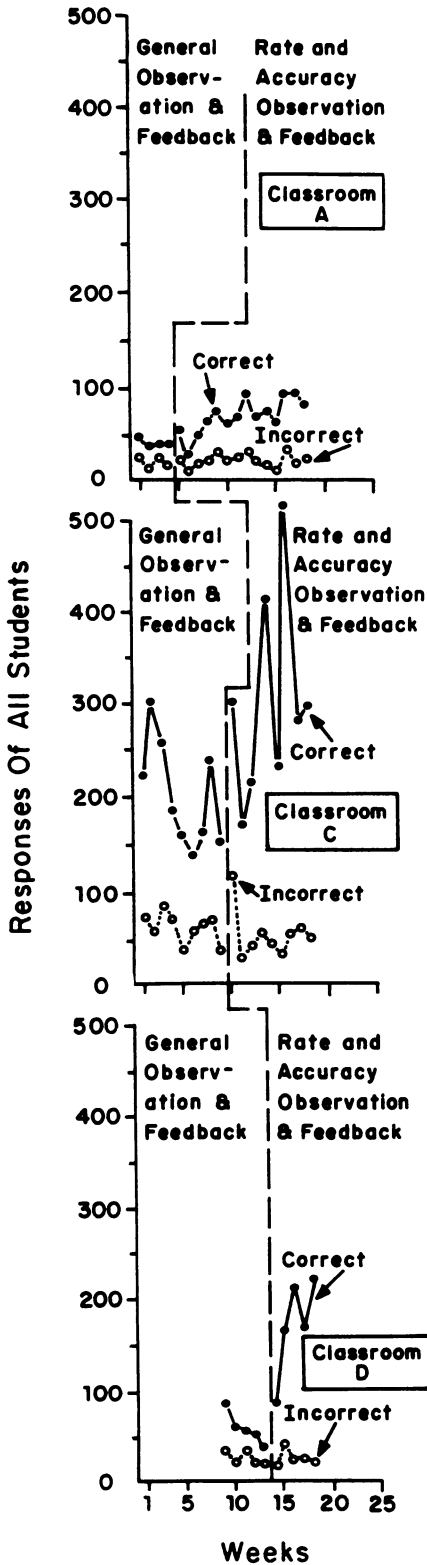
The use of the TPRA as a training and monitoring tool for teacher effectiveness shows promise. As a training tool it is particularly cost effective and efficient in terms of time. The teachers learned from the TPRA observations, and thus required no additional workshop classes or consultants. The supervisor must, however, be a trained observer.

In the initial study, the teachers' reluctance to be videotaped or to be observed by anyone other than the supervisor hampered the collection of independent observations, and therefore a calibrated agreement procedure had to be used. During the second study, the teachers agreed to allow videotaping. There was no indication that the teachers were displeased with the observations, and teachers unanimously stated that they found the observations useful. In prior studies incorporating the TPRA procedure (Greer et al., 1989; Selinske et al., 1991), incentives were used for changes in teachers' behaviors. In the present studies, however, the observations were not linked to salary or tenure decisions (per the stipulations of their contracts). Nevertheless, the procedures were effective in changing teacher performance and in turn that of their students. This suggests that monetary or employment contingencies are not a necessary ingredient to obtaining significant educational changes with the TPRA procedure.

The TPRA observation procedure is designed to improve teacher effectiveness as well as supervisor accountability. That is, the supervisor is accountable

---

←  
Figure 2. Rate of teacher performance (TPRA) during general observation and TPRA phases of Study 2, and rate of correct and incorrect students' responses during supervisor observations of teachers.



for teacher changes as is the teacher for student changes. The joint efforts towards improving student performance may function as a joint contingency leading to supervisor and teacher cooperation. In many school systems, the supervisor's observation is treated as a qualifying test for teacher employment. It is not surprising, then, for teachers to eschew the presence of the supervisor in the classroom, because the nature and frequency of the observations create an adversarial climate. Perhaps supervisor observations should be used for purposes of assistance rather than teacher selection.

The student's rate of correct responses did not always decrease as a function of the treatment. However, with the increasing rate of presentation of trials and more accurate consequences to student responses or lack of responding, actual percentages of correct responding did increase substantially over that of the baseline. Future studies should concentrate on lowering the rate of incorrect responding. The results to date suggest that increasing teacher presentations and accurate consequences to student behavior results in more opportunities for student responding and more correct responses, while maintaining incorrect responses at baseline levels.

The calculation of teacher performance rate and accuracy resulted in an algebraic product (accuracy minus inaccuracy), because incorrect consequences, errors, and omissions of correct consequences were subtracted from correct teacher responses. Thus, the data show negative scores in baseline. This allows a nonweighted single datum point to be plotted rather than plotting teacher correct and incorrect responses separately. The use of a single quantitative measure also aids in the analysis of correlations between teacher and student responses (Greer et al., 1989).

Although the use of oral and written feedback has been extensively researched in institutional settings (Reid & Shoemaker, 1984), there is a paucity of studies in school settings beyond that of Parsons

← Figure 3. Correct and incorrect responses of all students for each teacher throughout the entire day during general observation and TPRA phases of Study 2.

et al. (1987). Moreover, none of the studies have assessed incorrect and correct student or client performance relative to staff or teacher performance. Parsons et al. showed effects on the incidence of the teaching of functional skills, but there was no assessment of correct and incorrect student performance. The assessment of correct and incorrect performance is critical to effective schooling.

One of the more important results of the present studies concerns the effect of the treatment on increased opportunities to respond. During the base-lines, the opportunities were infrequent both in the observed and generalized settings (Study 2), whereas during treatment the opportunities increased dramatically. The importance of opportunities to respond has been tied to effective schooling (Greenwood et al., 1984). As suggested by Selinske et al. (1991), frequent opportunities to respond may be a necessary, if not sufficient, variable for effective schooling.

The effects are currently limited to teachers of the severely handicapped. Future research should analyze the effects of the use of the TPRA on students who are more academically advanced. Although this would require some adaptation to written as well as oral presentations by teachers of more advanced students, the problems do not seem insurmountable. The results of the present research warrant the initiation of studies using the TPRA for teachers and students with no handicaps or disabilities. The procedures are cost effective and pedagogically effective for training and monitoring teacher effectiveness in the classroom. Their use required no out-of-class instruction and earned acceptance by the teachers involved. Thus, the TPRA procedure provides a new tool to improve educational effectiveness directly by altering teachers' instructional effectiveness.

## REFERENCES

- Barrett, B. H., Beck, R., Binder, C. V., Cook, D. A., Englemann, S., Greer, R. D., Johnson, K. R., Maloney, M., McCorkle, N., & Watkins, C. (1989). *Report to the ABA council: Right to effective education*. Philadelphia: Association for Behavior Analysis.
- Brigham, T. A., Graubard, P. S., & Strans, S. (1972). An analysis of the effects of sequential reinforcement on aspects of composition. *Journal of Applied Behavior Analysis*, 5, 421-430.
- Edmonds, R. (1979). Effective schools for the poor. *Educational Leadership*, 37, 15-27.
- Greenwood, C. R., Delquadri, J. C., & Hall, R. V. (1984). Opportunity to respond and student academic achievement. In W. L. Heward, T. E. Heron, D. S. Hill, & J. Trap-Porter (Eds.), *Focus on behavior analysis in education* (pp. 58-88). Columbus, OH: Merrill.
- Greer, R. D. (1985). *Handbook for professional change agents at the Margaret Chapman School*. Hawthorne, NY: The Margaret Chapman School.
- Greer, R. D. (1989). A pedagogy for survival. In A. Brownstein (Ed.), *Progress in behavioral science*. Hillsdale, NJ: Erlbaum.
- Greer, R. D. (1991). The teacher as strategic scientist: A solution to our educational crisis? *Behavior and Social Issues*, 1, 427-444.
- Greer, R. D., McCorkle, N., & Williams, G. (1989). A sustained analysis of the behaviors of schooling. *Behavioral Residential Treatment*, 4, 113-141.
- Hall, R. V., Delquadri, J., Greenwood, C. R., & Thurstone, L. (1982). The importance of opportunity to respond in children's academic success. In E. B. Edgar, J. G. Haring, J. R. Jenkins, & C. G. Pious (Eds.), *Mentally handicapped children: Education and training* (pp. 107-140). Austin, TX: Pro-Ed.
- Hall, R. V., Lund, D., & Jackson, D. (1968). Effects of teacher attention on study behavior. *Journal of Applied Behavior Analysis*, 1, 1-12.
- Hall, R. V., Panyan, M., Rabon, D., & Broden, M. (1968). Instructing beginning teachers in reinforcement procedures which improve classroom control. *Journal of Applied Behavior Analysis*, 1, 315-322.
- Johnston, J. M., & Pennypacker, H. S. (1980). *Strategies and tactics of human behavioral research*. Hillsdale, NJ: Erlbaum.
- Keller, F. S. (1978). Instructional technology and educational reform: 1977. *The Behavioral Analyst*, 1, 48-53.
- Lovitt, T. C., & Curtiss, K. (1968). Effects of manipulating an antecedent event on mathematics response rate. *Journal of Applied Behavior Analysis*, 1, 329-334.
- Madsen, C. H., Becker, W. C., & Thomas, D. R. (1968). Rules, praise, and ignoring: Elements of elementary classroom control. *Journal of Applied Behavior Analysis*, 1, 139-150.
- McCormick, L., Cooper, M., & Goldman, R. (1979). Training teachers to maximize instructional time provided to severely and profoundly handicapped children. *AAESPH Review*, 4, 301-310.
- Parsons, M. B., Schepis, M. M., Reid, D. H., McCarn, J. E., & Green, C. W. (1987). Expanding the impact of behavioral staff management: A large-scale, long-term application in schools serving severely handicapped students. *Journal of Applied Behavior Analysis*, 20, 139-150.
- Reid, D. H., & Shoemaker, J. (1984). Behavioral super-

- vision: Methods of improving institutional staff performance. In W. P. Christian, G. T. Hannah, & T. J. Glahn (Eds.), *Programming effective human services: Strategies for institutional change and client transition* (pp. 39–61). New York: Plenum.
- Selinske, J., Greer, R. D., & Lodhi, S. (1991). A functional analysis of the comprehensive application of behavior analysis to schooling. *Journal of Applied Behavior Analysis*, **24**, 107–117.
- Skinner, B. F. (1968). *The technology of teaching*. New York: Appleton-Century-Crofts.
- Skinner, B. F. (1984). The shame of American education. *American Psychologist*, **39**, 947–954.
- Sulzer-Azaroff, B., Drabman, R. M., Greer, R. D., Hall, R. V., Iwata, B. A., & O'Leary, S. G. (1988). *Behavior analysis in education from the Journal of Applied Behavior Analysis: Reprint Series Volume 3*. Society for the Experimental Analysis of Behavior.
- White, O. R. (1986). Precision teaching—precision learning. *Exceptional Children*, **52**, 522–534.

*Received December 12, 1989*

*Initial editorial decision September 19, 1990*

*Revisions received May 22, 1991; August 5, 1991*

*Final acceptance August 24, 1991*

*Action Editor, Terry J. Page*