THE GENERALITY AND SOCIAL VALIDITY OF A COMPETENCY-BASED SELF-CONTROL TRAINING INTERVENTION FOR UNDERACHIEVING STUDENTS

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We evaluated the effectiveness, generality, and social validity of a modified version of a competency-based self-control package developed by Stevenson and Fantuzzo (1984). Three underachieving fifth-grade students were trained to use this intervention to increase their arithmetic proficiency. Results indicated that the intervention produced improved arithmetic performance. Moreover, all possible classes of generalization were evidenced for the participants. Social validity data showed that the children's arithmetic performance either surpassed or approached the mean performance of their higher achieving classmates. Additionally, teachers reported that the intervention was effective, appropriate for classroom use, and easy to implement.

DESCRIPTORS: self-control, generalization, social validation, academic behavior

Reviews of behavioral treatment and prevention strategies for children have underscored the untapped potential of school-based, self-control training interventions (e.g., Durlak & Jason, 1984). To date, applied behavior analysts have demonstrated that a variety of self-control procedures can be used successfully to modify a wide range of classroom behaviors (see Rosenbaum & Drabman, 1979, for a review). Increasingly, however, researchers are being charged to go beyond a demonstration of behavior change and assess important dimensions, such as the generality (Drabman, Hammer, & Rosenbaum, 1979; Stokes & Baer, 1977) and social validity (Kazdin, 1977; Wolf, 1978) of treatment effects.

Stevenson and Fantuzzo (1984) implemented a competency-based, self-control training package with an underachieving fifth grader and assessed

the effects of this intervention across all possible classes of generalization. Results indicated that the intervention produced generalized effects for all classes of generalization except for the behavior/time, behavior/setting/time, and subject/behavior/time classes.

We describe an attempt to replicate the findings of Stevenson and Fantuzzo (1984) and to extend them by assessing the social validity of both treatment and generalization effects in the school setting. Additionally, the original set of training procedures was modified to enhance generalization further.

METHOD

Subjects and Settings

Six black elementary school students from three regular fifth-grade classes participated. Two children were selected from each class based on the following criteria: (a) history of poor arithmetic performance, (b) one grade level behind in arithmetic skills, (c) low socioeconomic status, and (d) children who lived within 3 km of each other. One of the two students was randomly selected to serve as the treated student; the other served as the control.

The research was conducted in three standard elementary school classrooms and in the homes of the treated students. School data were collected

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during regularly occurring arithmetic drill sessions. Home data were collected within the context of "homework" sessions, which were held in a relatively distraction-free area of the treated student's home following the dinner hour.

General Procedure

Arithmetic drill sessions in school occurred during the morning at the same time each school day. For the first arithmetic drill session (AD #1), the teacher distributed specially prepared arithmetic sheets to each student in the class. These sheets were equivalent (i.e., same number of operations and equivalent level of difficulty); however, the number combinations on each sheet were randomly determined so that no two sheets were identical. The teachers then instructed the students to complete as many problems as possible. The students were allowed 7 min to work, after which the arithmetic sheets were collected and students were shown their results as soon as the worksheets were corrected. During treatment conditions, the teacher notified the treated student that he could use the treatment procedure if he chose.

AD #1 was followed by the teacher's regular 30-min arithmetic lesson. The first part of the lesson (20 min) was typically devoted to arithmetic instruction. During the second part of the lesson, the students were instructed to work independently on worksheets provided by the teacher that corresponded to the arithmetic lesson. These worksheets contained a variety of arithmetic problems that were qualitatively different from the straightforward number problems presented in AD #1. They included various word problems, money problems, Roman numerals, computing averages, and converting numbers to the nearest place. This second arithmetic drill (AD #2) was also conducted for a standard 7-min period.

The procedures in the home were identical to those in school, except that a research assistant assumed the role of the teacher and transported the control student to and from the home of the treated student. In contrast to the prior study (Stevenson & Fantuzzo, 1984), the parents of the

treated students were included in the design and organization of the homework session as a strategy to enhance generalization (natural maintaining contingencies strategy; Stokes & Baer, 1977). No consequences were provided for arithmetic performance in the home.

Experimental Conditions

Baseline. The teacher and home tutor of each student pair collected data on the number of accurately completed problems (AD #1 and AD #2) for both students in their respective settings. Other than allowing students to see their corrected worksheets, no consequences were given to either student for target or generalization arithmetic performance.

Self-control intervention. A self-control training package was implemented during AD #1 in school with the target students. This training package was a modified version of the procedures introduced by Stevenson and Fantuzzo (1984). In order to enhance generalization further, the following modifications were made: (a) A "self-scorecard" was added, and (b) the treated students received training in environments similar to the natural school and home settings.

The self-scorecard was a 10 cm × 13 cm card that contained spaces for the following information: *date*, *child's name*, *target behavior* (e.g., arithmetic problems), *goal options* (three choices of numbers of arithmetic problems to be completed accurately), *reinforcer menu* (list of six back-up reinforcers), *daily score*, and *goal completion rating* (completion or noncompletion). The goal option included three numbers (low, medium, and high), the least of which was 20% above the treated student's mean baseline rate. Following the procedure used by Brownell, Colletti, Ersner-Hershfield, Hershfield, and Wilson (1977), the treated students were prompted to choose the more stringent criteria when they showed more than two consecutive days of choosing the easiest goals. The reinforcer menu was modified occasionally to include reinforcers from a larger menu that the treated student had preselected.

Students were individually trained by a coach of the same sex and race (a) to choose a goal option and a reinforcer from his or her self-scorecard, (b) to count the number of problems completed correctly on the corrected arithmetic sheet and record the number on his or her scorecard and on a chart adjacent to his or her desk (displayed in a place that was easily visible to the control student), (c) to compare the number with the predetermined goal to determine whether criterion had been met, and (d) to decide at the end of the week whether to exchange or save the points on the scorecard for the predetermined reinforcers. These skills were modeled and subsequently practiced during simulated arithmetic drills until, after two 3-hr training sessions, students achieved a level of competency of at least 90%.

Follow-up. This phase was identical to baseline, except that the sessions were: (a) preceded by a month of treatment sessions, and (b) conducted over a 2- to 3-month period. Because the control student in Class #3 moved at the end of the second treatment phase, there were no follow-up data to report.

Social Validation

Both the social importance of the treatment effects and the social appropriateness of the procedures were assessed. Significance of effects was determined by comparing the arithmetic performance of the treated and untreated pair of underachieving students with the mean performance of the remaining untreated children in the class (i.e., 26, 25, and 28 untreated students in classrooms #1, #2, and #3, respectively). Additionally, teachers were asked to fill out anonymously a 5-item questionnaire designed to elicit their evaluations of the appropriateness and acceptability of this classroom treatment strategy. The following dimensions were assessed using a 5-point Likert-type scale: effectiveness of the procedures, amount of teacher time required, degree of difficulty to implement the procedures in the classroom, likelihood that the teacher would use the intervention again, and likelihood

that the teacher would recommend this intervention to other teachers.

Data Collection and Reliability

Accuracy of arithmetic problems. Arithmetic performance was assessed by: (a) counting the number of arithmetic problems completed correctly each day during the standard "classwork" or "homework" arithmetic sessions in both settings, and (b) computing the child's percentage of accuracy by dividing the number of problems completed accurately by the number of the problems attempted. Reliability was assessed three times during each experimental phase by randomly selecting arithmetic sheets completed by all subjects and independently scoring the worksheets. A point-by-point agreement method was used to calculate reliability. Agreement percentages were calculated as the number of agreements divided by the number of agreements plus disagreements, multiplied by 100. Mean agreement across teachers' aides and home tutors was 96% (range, 79%–100%).

Accuracy of self-control skills. A behavioral checklist was used to assess the treated students' use of the self-control procedures during training and treatment sessions in school. The checklist contained behavioral definitions of each task in the self-control sequence. Competency was determined by dividing the number of tasks completed accurately by the total number of tasks. During treatment, accuracy was checked twice a week following a random schedule and the mean scores were: treated student #1, 80%; #2, 94%; and #3, 89%. An independent observer made reliability checks on the accuracy of the teachers' assessments twice during each treatment phase using the same checklist. Mean agreement for these checks was 96% (range, 85%–100%).

Accuracy of self-recording. This was determined by counting the number of problems marked correct on the arithmetic sheet of the treated student and comparing this number with the number of problems he had scored as correct on his self-scorecard. Accuracy was determined by dividing the smaller number of the comparison by the large-

er. The mean accuracy for the three treated students was 98% (range, 96%–100%).

Experimental Design

A reversal design with follow-up was used to assess the efficacy of the self-control intervention for the treated students' arithmetic drill performance in the classroom and the effect this intervention had on untreated dimensions for the treated and control students. The degree of generalization was calculated according to the generalization ratio, a descriptive statistic designed by Fantuzzo and Clement (1981). This ratio quantifies generalization by dividing the percent change for the desired generalization dimension (the untreated student/setting/behavior/time) by the percent change for the treated student's targeted behavior during treatment in the treatment setting $\times 100$.

RESULTS

Self-Control Intervention

The academic performances of the three pairs of students and their classmates across all five phases of the investigation both in school and at home are displayed in Figures 1, 2, and 3, respectively. Instituting the self-control procedures during AD #1 resulted in increased arithmetic proficiency for all three treated students. Their gains in the number (percentage) of arithmetic problems completed correctly from baseline to treatment phases during AD #1 were: Class #1, 15.6 (18.4%); Class #2, 16.0 (16.1%); Class #3, 9.7 (35.1%) (a detailed summary of the phase means for the percentage of accuracy data can be obtained by writing the second author). With respect to the stringency of self-determined performance standards, the treated students selected the low, medium, and high goal options 43%, 41%, and 16% of the time, respectively.

Generalization Assessment

The treated students' successful implementation of the self-control procedures yielded generalization across the following classes for the treated students:

behavior, setting, behavior/setting, time, setting/time, behavior/time, and behavior/setting/time with a mean (range) generalization ratio of 102 (68–152). The effect of intervention with the treated students on the performance of untreated students showed generalization across subject, subject/behavior, subject/setting, subject/behavior/setting, subject/time, subject/setting/time, subject/behavior/time, and subject/behavior/setting/time with a mean (range) generalization ratio of 86 (49–139). (A table of the generalization ratios for each of the 15 generalization dimensions reported can be obtained by writing the second author).

Social Validation

In addition to the arithmetic performance of the treated and untreated pair of students, Figures 1, 2, and 3 display the mean daily arithmetic performance for the higher functioning untreated classmates. During baseline conditions, the overall performance on AD #1 for the treated and control students was below the average performance of their classmates. During treatment conditions, treated and control students improved their performance to a level equal to or better than that of the average classmate. The untreated student in Class #3 was the exception; he did not quite reach the average class level. For the most part, this pattern of "at or above the norm" was maintained during follow-up for AD #1, although a decreasing trend was evident for the treated student in Class #2. The data for AD #2 followed a similar pattern to AD #1, with the following exceptions: (a) in Classes #1 and #2, the untreated student had a higher initial base rate; and (b) the treated student in Class #1 increased his performance level but did not quite reach the norm.

In response to the questionnaires, the teachers rated the self-control program as being either "helpful" or "very helpful" for the treated students (one 4- and two 5-point ratings). All of the teachers felt that the program was not difficult to implement (5-point rating), and they rated the amount of time required to implement the procedure in the classroom as "reasonable" or "very

Figure 1. Class #1. Number of accurate arithmetic problems for treated and untreated students and their peers at school (Arithmetic Drills 1 and 2), and for treated and untreated students at home.

reasonable" (one 4- and two 5-point ratings). All of the teachers reported they would use the self-control program in the future and recommended that the intervention be used in other classrooms with children having similar difficulties with arith-

metic (both 5-point ratings). During the school year following completion of the study, the teachers were asked whether they had, in fact, implemented the program. Two of the three teachers reported that they used the procedures.

Figure 2. Class #2. Number of accurate arithmetic problems for treated and untreated students and their peers at school (Arithmetic Drills 1 and 2), and for treated and untreated students at home.

DISCUSSION

These findings are consistent with investigations documenting that self-control strategies can be successfully taught and applied to academic behaviors and that they have considerable generalization po-

tential (e.g., Fantuzzo & Clement, 1981). These findings also replicate the assessment of self-control training conducted by Stevenson and Fantuzzo (1984) and extend this research in two ways. First, this investigation documented the social validity of

Figure 3. Class #3. Number of accurate arithmetic problems for treated and untreated students and their peers at school (Arithmetic Drills 1 and 2), and for treated and untreated students at home.

treatment and generalization effects. The arithmetic performance of each pair of students compared favorably, for the most part, with the average performance of higher functioning classmates during treatment and follow-up phases. In addition, all

of the teachers indicated that the treatment procedures were helpful to the treated students, appropriate for classroom use, and easy to implement. Second, this study demonstrated that a modified version of the original training package

(Stevenson & Fantuzzo, 1984) extended generalization effects to all classes of generalization. In contrast, the original training package failed to yield behavior/time, behavior/setting/time, and subject/behavior/time generalization.

Three factors may account for the relative success of the control students (i.e., those paired with the treated students) compared to the other untreated classmates. First, the treated and control students were of the same sex, race, and social class and the coach was of the same sex and race. Research findings suggest that the social class and race of the participating children and instructor play a major role in subject generalization (Liebert, Sobol, & Copeman, 1972; Turner & Forehand, 1976). Second, proximity to the treated student and conspicuousness of reinforcement delivery may also be important factors (Kazdin, Silverman, & Sittler, 1975). The control student was closest to the treated student in the classroom and was in the best position to observe reinforcement delivery. A third factor that may account for the gains of the control students was their added exposure to the treated student in the home environment during homework sessions.

Future research efforts should assess the relative effectiveness of the components of this treatment package and both treated and untreated students' implementation of the procedures (i.e., the integrity of the independent variable) in nontraining settings and during maintenance. Given the significant financial cutbacks in public school education, a cost analysis should be included in future evaluations and refinements of this training package to further extend and maximize the use of this type of school-based self-control training intervention (Yeaton, 1982). Additionally, future research should explore practical means of training groups of children in the same classroom, in order to extend the therapeutic value of these procedures to large groups of students.

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