

*SELF-INSTRUCTIONAL TRAINING TO INCREASE
INDEPENDENT WORK PERFORMANCE
IN PRESCHOOLERS*

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The generalized effects of self-instructional training on the classroom performance of three "impulsive" preschool children were investigated using a multiple-baseline design across subjects. Measures of child and teacher behavior in the classroom were obtained through direct observations during a daily independent work period. Self-instructional training followed Meichenbaum and Goodman's (1971) approach, except that training materials consisted of naturalistic task worksheets rather than psychometric test items and training sessions were of shorter duration. For all three children, self-instructional training resulted in increased levels of accuracy on worksheets in the classroom that were similar to those used in training. Results related to several supplementary measures were less clear; however, they suggested that rates of on-task behavior may also have improved, and that a mild classroom intervention further strengthened on-task rates and effected consistent work completion for all three children. The findings suggested that generalized increases in accuracy on classroom worksheets were related to the naturalistic format of the self-instructional training sessions. The level of teacher attention was controlled to rule out its effect on changes in child behavior.

DESCRIPTORS: academic behavior, on-task behavior, self-instruction, generalization, preschool children

Self-instruction is a procedure designed to enhance an individual's self-control through verbal statements that prompt, guide, and maintain nonverbal actions. Meichenbaum and Goodman (1971) were among the first researchers to apply a self-instructional training paradigm explicitly to the solution of clinical problems. Their research was directed toward training elementary

school children described as "impulsive" to use self-instruction as a means of improving their performance on academic tasks. Following the promising outcome of their research, numerous studies have been conducted to investigate the parameters of self-instruction with children (see Craighead, Craighead-Wilcoxin, & Meyers, 1978; Karoly, 1977; Kendall, 1977; Meichenbaum, 1977, 1978; Meichenbaum & Asarnow, 1979; O'Leary & Dubey, 1979, for reviews of the research literature). The present experiment focused on an extension of that research as it applies to the remediation of school performance problems. Specifically, this study examined aspects of the generalization of self-instructional training to children's academic behavior in everyday classroom activities.

In self-instructional training, children are taught to verbalize a series of steps relating to the task in which they (a) define the nature of the task, (b) focus their attention on required

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responses, (c) emit coping statements regarding mistakes, and (d) acknowledge their task accomplishments (Meichenbaum & Goodman, 1971). This training is intended to provide children with a problem-solving strategy they can apply outside the one-to-one training setting. As Meichenbaum and Asarnow (1979) commented, it is meant to teach children not "what" but "how" to think and, in so doing, to facilitate the extension of cognitive mediation procedures to the solution of other problems. Self-instruction has an inherent appeal as an intervention strategy because it places the child in the role of treatment agent and does not rely on other agents for continuation (Kazdin, 1975, chap. 8).

The effectiveness of self-instructional training has been examined with impulsive, hyperactive, and disruptive children in elementary grades and, to a much lesser extent, preschool. Most studies have found self-instructional training to be effective in increasing children's performance of standardized laboratory tasks identical or similar to those used in training (Douglas, Parry, Marton, & Garson, 1976; Kendall & Finch, 1978; Meichenbaum & Goodman, 1971; Palkes, Stewart, & Freedman, 1972; Palkes, Stewart, & Kahana, 1968; Robin, Armel, & O'Leary, 1975). Component analyses of the training package have shown that training children in the self-instructional steps is important, in that it leads to better performance on the laboratory measures than direct training (e.g., adult instructions, modeling, and reinforcement) without self-instruction (Arnold & Forehand, 1978; Meichenbaum & Goodman, 1971; Robin et al., 1975).

However, far less uniform results have been obtained regarding the effects of self-instructional training outside the training situation. Arnold and Forehand (1978) found generalized improvements following training on a classroom matching task, whereas Robin et al. (1975) found no such effect on an untrained task similar to that used during self-instructional training. Teacher ratings of children's classroom behavior have shown improvement following training

in some studies (Burgio, Whitman, & Johnson, 1980; Kendall & Finch, 1978) but not in other cases (Douglas et al., 1976; Meichenbaum & Goodman, 1971).

Only a few studies to date have directly measured children's behavior in routine classroom activities as a means of evaluating the generalized effects of self-instructional training, and their results have been equivocal. The most positive findings were reported by Bornstein and Quevillon (1976), who taught disruptive preschoolers to use a self-instructional procedure and observed large increases in the children's on-task behavior in the classroom that maintained in postchecks after training was completed. Friedling and O'Leary (1979), however, attempted to replicate the above study's findings with second- and third-graders, and they found no increase in on-task rates as a result of self-instructional training. Similarly, Meichenbaum and Goodman (1971) observed no reduction in second-graders' inappropriate behavior in the classroom correlated with training. Burgio et al. (1980) provided self-instructional training to two developmentally delayed children, aged 9 and 11 years. Their results showed an eventual reduction in off-task behavior in the classroom, but the decrease was not clear until 15 or more sessions of exposure to self-instructional training. Two of the above studies also examined changes in academic performance in the classroom associated with self-instructional training by comparing average rates of accuracy on classroom assignments before and after training. Friedling and O'Leary (1979) reported an overall improvement in accuracy on only one of four types of tasks measured, and Burgio et al. (1980) on only one of three academic tasks.

These studies raise several questions regarding the impact of self-instructional training. It appears that training enhances children's performance of standardized laboratory tasks, but only on some occasions do the children then work more consistently, diligently, or accurately in the classroom. Further study is essential to an understanding of the practical value of self-instruc-

tional training as an educational intervention strategy.

The present research investigated the generalized effects of self-instructional training on the academic behavior of preschoolers who demonstrated poor independent work performance. Of primary interest was the effects of training on accuracy of classroom tasks. Because of the paucity of data on how, if at all, self-instructional training affects academic performance in the classroom, this study examined daily records of accuracy on academic tasks, differentiating between tasks that were similar to those used in training and tasks that were dissimilar to training. In this way, the direct effects of self-instructional training on accuracy of classroom tasks could be analyzed.

Two other aspects of generalization were examined as secondary issues. First, this research evaluated the effect of self-instructional training on children's daily completion of classroom assignments in an allotted time frame, a variable that has not been specifically examined in previous studies. One might presume that if self-instructional training enhances children's skill at problem-solving, they should become more efficient at completing assigned independent work. Second, the two prior studies that found an increase in on-task behavior (Bornstein & Quevillon, 1976) or decrease in off-task behavior (Burgio et al., 1980) following self-instructional training did not include teacher attention data to rule out the effect of this variable on the children's behavior. The present study controlled teacher attention in the classroom to assure it remained constant from day to day and could not be responsible for any observed changes in on-task levels.

By focusing on preschool children, this research tested the effectiveness of self-instruction with an age group that has only rarely been examined in previous studies (Arnold & Forehand, 1978; Bornstein & Quevillon, 1976). Preschoolers would seem to be an optimal population for the study of self-instruction, considering that they are verbal and yet have a relatively

short history (if any) of verbal control over non-verbal actions (cf. Luria, 1961) and may be more likely than older children to self-instruct overtly. If self-instruction is found to be successful with preschoolers, it could be a valuable strategy for preventing or minimizing later school problems.

Because of the young age of the children and the interest in obtaining generalized effects to the classroom, the present research used a naturalistic training format. Typical academic worksheets were used as training materials, instead of items from psychometric tests as in most previous studies. Training sessions were conducted daily for only 10 min per day across several days, in contrast to the 20-min to 2-hr sessions in other research. In other respects, however, the self-instructional training was typical of that described by Meichenbaum and Goodman (1971) and other researchers.

In addition to addressing the generalization questions outlined above, this study extended previous research in self-instructional training in two ways. First, recent research reviews of self-instructional training (Kendall & Finch, 1978; Meichenbaum & Asarnow, 1979; O'Leary & Dubey, 1979) have advocated that training should include systematic programming for generalized use of the procedures outside the training setting, based on the accumulating evidence of limited spontaneous transfer to classroom contexts. The present study investigated the additive effects of a mild classroom intervention procedure following self-instructional training as a method of enhancing the generalized impact of self-instructional training. Second, this study used behavioral checklists to measure adult and child responses during training sessions, in order to ensure that training proceeded as planned.

METHOD

Participants

Three children, aged 4 and 5 years, participated in the study. They attended a university sponsored remedial classroom composed of

seven children who had experienced disciplinary and/or learning problems in preschool or kindergarten. The classroom program, entitled PASS (an acronym for Programmed Activities for School Success), used procedures of behavior analysis and learning theory in a structured educational setting.

One child, Cindy, began kindergarten in the fall but was dismissed and placed in the PASS program after 2 mo because of noncompliance and poor independent work skills. The other two children, Edward and Josh, were referred to the program because of noncompliant and inattentive behavior in preschool. All three children were of low average academic abilities, as assessed by a screening evaluation before admission to the classroom. These three children were selected for this study because of their low rates of on-task behavior in the PASS classroom, poor performance on a problem-solving subtest of the CIRCUS kindergarten readiness test (1974), and teacher reports of high distractibility. In addition, these children made more errors and had shorter response latencies than their classroom peers on Kagan's Matching Familiar Figures Test (MFFT), which has been used as a measure of impulsivity in children (Kagan, 1966). Meichenbaum and Goodman (1969) reported a positive relationship between a child's relative inability to control his or her motor behavior verbally by means of covert self-instructions and an impulsive conceptual tempo on the MFFT. These factors indicated that the children were in need of specialized training to improve their independent work skills.

Settings

The study took place at the Meyer Children's Rehabilitation Institute, an outpatient clinic for children at the University of Nebraska Medical Center. The PASS remedial program was conducted in a classroom furnished with small tables, chairs, and a wide selection of educational and play materials. Class was held four afternoons per week, 2½ hr per day, across a 9-mo

period. Each day children engaged in educational and recreational activities under the direction of an experienced teacher and an aide.

A 20-min independent work period was selected for experimental observation of the children in the classroom, because during this period the children individually completed pre-academic worksheets that required them to use problem-solving skills. All seven children in the classroom sat at a large round table; the three participants were seated adjacent to one another.

Experimental observations were also made of all self-instructional training sessions. These sessions took place during the first 10 min of a free play period, approximately 40 min prior to independent work time. Training sessions were conducted for individual children in a classroom adjacent to the regular classroom. The child and experimenter sat side by side at a rectangular table.

Tasks

During self-instructional training sessions, children completed worksheets focusing on three skills: finding the same, mazes, and size sequencing. Worksheets on finding the same provided rows of a sample stimulus and several slightly differing choice stimuli, from which the child marked the choice that matched the sample. On the maze worksheets, several simple square mazes were displayed with pictures (e.g., a dog and a doghouse) at the opening and the center, respectively. The child drew a path to connect the pictures without crossing any lines. Size sequencing worksheets provided rows of three to four objects in varying sizes; the child marked the pictures with crayons of different colors corresponding to the smallest object, next smallest, etc., using a color code displayed beside the worksheet which was explained to the child in advance. The worksheets were selected to be at the children's level but were tasks the children did not consistently perform correctly on their own.

During independent work period in the classroom, the teacher assigned five different worksheets per day. Four worksheets (oriented toward prereading, premath, and fine motor skills) were selected by the teacher and related to the lessons planned for other periods of the class day. The teacher informally judged the difficulty level of the worksheets in an effort to keep them generally comparable across days but with gradually increasing difficulty as the children acquired new skills. The fifth worksheet was chosen by the experimenter to assess the generalized effect of experimental self-instructional training on the accuracy of the children's classroom performance.

Five different types of experimenter-selected worksheets were assigned successively across days. Three of them were similar to the worksheets used in self-instructional training, and two of them were dissimilar to those trained. Similar-to-trained worksheets focused on finding the same, mazes, or size sequencing, as described above; dissimilar-to-trained worksheets dealt with sequencing to tell a story or finding what is missing from a picture. Story sequencing worksheets provided three to four scenes of actions, and the child used the color code (described above for size sequencing worksheets) to order the pictures in time. On the worksheets for finding what is missing, several familiar objects were pictured with a detail absent in each (such as a face with only one ear), and the child drew in the missing part. These five types of worksheets were selected for experimental assessment because they focused on skills similar to those measured in previous investigations of self-instruction (Meichenbaum & Goodman, 1971; Palkes et al., 1972).

Data Collection and Reliability Procedures

Independent work time. Measures of pertinent behaviors were obtained through three methods: (a) direct observation of child and teacher responses in the classroom, (b) scoring occurrences of verbal responses from audiotapes, and (c)

scoring work completion and accuracy of performance on the children's worksheets.

Direct observations were conducted daily in the classroom by having an observer watch one child for 10 sec, note occurrences of defined responses in a subsequent 5-sec interval, then rotate to the next child for 10 sec of observation and 5 sec of recording, and continue in the same pattern alternately across children. *On-task* behavior was recorded when a child engaged in motor task-related actions (e.g., marking, coloring, erasing) at any time during a 10-sec interval or when he or she was looking at the teacher or task materials for 5 consecutive sec during the teacher's explanation of the worksheets. *Disruptive behavior* was recorded whenever a child left his or her position at the table without permission, destroyed classroom materials, or was physically aggressive toward a peer or teacher. *Positive teacher attention* was scored when the teacher provided any verbal or physical attention to a specific child that approved of the child's behavior or acknowledged his or her accomplishment. *Instructional comments* were recorded when the teacher provided an instruction, invitation, or suggestion to the child regarding completion of the assigned task or compliance with general classroom rules.

Audiotapes of the work period were made to record occurrences of self-instructional verbalizations. Remote microphones were attached to the clothing of two children per day so that each child was recorded at least twice per week. An observer listened to the audiotape recording after each session and recorded verbatim each instance of self-instructional verbalization, along with the numbers showing on the digital counter of the tape recorder at the time of the verbalization. *Self-instructional verbalizations* consisted of whispering or saying one of the steps taught in the self-instructional training.

The teacher judged work completion at the end of each 20-min period by noting whether or not each child had finished the entire assignment for the day. *Work completion* was recorded

when a child completed correctly the four worksheets assigned by the teacher, completed (whether correctly or not) the experimenter-assigned worksheet, and wrote his or her name on the back of each paper by the end of the work period. Different criteria were used for teacher- and experimenter-assigned worksheets because the teacher-assigned worksheets were part of the children's curriculum and were used for educational purposes, whereas the experimenter-assigned worksheets were used to provide a measure of the generalized effects of self-instructional training in the absence of teacher assistance on the worksheets. *Accuracy* of the children's performance on the experimenter-assigned worksheets was assessed by dividing the number of correct responses by the total number possible on the worksheet. For three of the five types of worksheets, a determination of correct vs. incorrect responses was straightforward; however, measurement of accuracy for worksheets on mazes and finding what is missing from a picture required some judgment by observers using scoring rules appropriate to the particular tasks. On the maze worksheets, accuracy involved a determination of whether or not a child's line touched or crossed over a printed line and whether the child selected the correct path at each point where more than one path was available. Accuracy on worksheets for finding what is missing entailed judging whether the part(s) drawn in by the child resembled the correct missing part and whether it was drawn in the correct location.

The reliability of experimental recordings was assessed at least four times per condition for each child and performance measure. Interobserver agreement on the direct observation measures was evaluated by comparing, interval by interval, the independent records of two observers who simultaneously recorded the behaviors. To be scored as an agreement, both observers had to record the occurrence of the same behavior in the same interval. Reliability on self-instructional verbalizations was assessed by

having a second observer independently listen to the audiotapes twice weekly. In order to be scored as an agreement, a verbalization could differ by no more than two words and the number on the tape counter by no more than five. Reliability measures on work completion and accuracy were obtained once weekly by having a second observer independently record the same responses. A percent agreement was calculated for each response category by computing the number of agreements over the number of agreements plus disagreements and multiplying by 100.

Self-instructional training sessions. Data relating to training sessions were collected on behavioral checklists. (A complete copy of the behavioral checklists is available upon request from the second author.) One checklist was used to monitor the extent to which the experimenter and child followed the prescribed self-instructional steps, and another checklist was used to assure that the experimenter carried out the same training procedure with each child. Records were made of key teacher and/or child behaviors on each phase of the self-instructional training, except that child use of the self-instructional steps during the final phase (when the child was instructed to say the steps covertly) could not be measured. A reliability observer was present to complete the checklist at least twice each week. Interobserver agreement was assessed item by item on each checklist, and an overall measure of agreement was calculated using the formula described above.

Pre- and Posttraining Assessment

At the outset and again at the completion of the study, the MFFT (Kagan, 1966) was administered to six of the seven children in the classroom. (One nontarget child was excluded because his level of intellectual functioning was judged to be too low to administer the test.) On each of 11 trials, the child was shown a single picture of a familiar object (the standard) and four similar variants, only one of which was

identical to the standard, and asked to find the one that was the same. If the child responded incorrectly, he or she was told to look again. The total number of errors until a correct response and the duration of time from first observing a picture to a correct response were recorded for each trial.

Experimental Design and Procedures

A multiple-baseline design across subjects was used to evaluate the effects of each experimental training condition on the children's classroom behavior.

Baseline. At the beginning of independent work, the teacher described how to complete the worksheets assigned for the day and displayed samples with approximately 20-25% of each worksheet completed. Thereafter, the children were instructed to work independently but received intermittent assistance and praise regarding their work. During all conditions of the study, the teacher or aide was cued at 3-min intervals to provide 10 to 20 sec of instructional attention to each child in order to keep the amount of attention constant. Children were required to complete all assigned worksheets before being allowed to go to recess.

Self-instructional training. Classroom procedures during independent work remained identical to baseline; however, children sequentially received nine sessions of self-instructional training outside the classroom. The training was similar to that described by Meichenbaum and Goodman (1971) and proceeded as follows: (a) the experimenter modeled the task while verbalizing the self-instructional steps aloud; (b) the child performed the task while the experimenter instructed aloud; (c) the child performed the task while self-instructing aloud and the experimenter whispered the steps; (d) the child performed the task instructing in a whisper while the experimenter made lip movements but no sound; (e) the child performed the task making lip movements without sound; and (f) the child was asked to say the words to himself or herself

while performing the task. Across the nine training sessions, this sequence of phases was repeated with each child on three types of worksheets (finding the same, mazes, and size sequencing). Nine sessions were used, because this allowed the child 3 days to proceed through all six phases on each of the three worksheets.

The self-instructional verbalizations taught were of five types: (a) stop and look; (b) questions about the task (e.g., "What does the teacher want me to do?"); (c) answers to questions about the task (e.g., "That's right, I'm supposed to find the same"); (d) self-instruction to guide through the task (e.g., "This one looks just like that one so I'll put an X on it"); and (e) self-acknowledgement of work accomplished (e.g., "I did a good job on this one").

During training sessions, children were praised for using all the steps of the self-instructional procedure and for finding the correct answer. If a child missed a step, the experimenter again modeled the correct verbalizations and the child was instructed to repeat that phase of the training. When a child marked an incorrect answer, he or she was shown what would have been correct and told that it was alright to make mistakes.

At the end of each training session, the child was told that saying the things he or she had been practicing would help in the classroom when doing worksheets; however, no overt instructions, prompts, or feedback were given regarding use of the self-instructional procedure in the independent work period.

Two of the children (Cindy and Josh) were subsequently provided 5 additional days of self-instructional training in an effort to increase the generalized effects of training to the classroom. This training was designed to (a) give them additional exposure to the self-instructional procedures; (b) incorporate into the self-instructional training an emphasis on beginning work immediately, not watching the other children, and moving down the page when finished with one line or onto the next worksheet when one

was completed; and (c) introduce a positive incentive procedure into the self-instructional training sessions. The incentive system consisted of setting a kitchen timer for 10 min at the beginning of each session and providing the child one brightly colored sticker per worksheet when he or she completed all worksheets before the timer rang. The stickers were affixed to an index card the child could take home. Prompts and praise were provided within the training sessions for using the self-instructional steps, as in the previous training phase. Again, following each session, the children were reminded that the procedures they were learning would be helpful in the classroom, but they were given no specific instructions or feedback regarding their use of the self-instructional procedure in the classroom.

Classroom intervention. To help the children complete their worksheets and use self-instructional steps in the independent work period, the incentive system used in the training sessions was introduced directly into the classroom along with minimal prompts and praise for use of self-instructional steps. After the teacher had explained how to complete the worksheets at the outset of independent work time each day, a timer was set for 15 min. Each child was told he or she would receive stickers on a card for completing all the worksheets before the timer rang. The children were also specifically instructed at the beginning of the period to use the self-instructional steps that the experimenter had taught. When a child finished the work, the teacher asked if the work had been finished before the timer rang. If the child had finished within the 15-min period, he or she was praised for working hard and was allowed to choose a sticker for each worksheet to place on an index card the child could take home. If the child had not finished, he or she was reminded that no stickers could be given for that day's worksheets and was encouraged to try again the next day. In addition, if the teacher heard the child using the self-instructional steps during the period, he or she was praised for using the steps at the end of the period.

RESULTS

Interobserver agreement levels in each experimental condition were 75% or above for all behaviors. The mean occurrence reliabilities across the study were as follows: on-task behavior, 97%; disruptive behavior, 75%; positive teacher attention, 93%; teacher instructional comments, 84%; self-instructional verbalizations, 90%; work completion, 96%; accuracy on similar-to-trained worksheets, 83%; accuracy on dissimilar-to-trained worksheets, 86%; and checklists used in training sessions, 98%.

Data from behavioral checklists indicated that all the children learned to use the self-instructional steps during the training sessions. Records of child use of self-instruction from phase (c) (when a child self-instructed aloud while the experimenter whispered) through phase (e) (when the child made lip movements of self-instructional steps) showed that Edward correctly used the components taught 94% of the time, Cindy 92%, and Josh 97%. The children were not expected to self-instruct in phases (a) or (b), and were told to do so covertly in phase (f). During the subsequent training sessions for Cindy and Josh, the children self-instructed correctly 93% and 97% of the time, respectively. The experimenter correctly followed the steps prescribed in the training procedure 97% of the time.

Because of the large number of sessions in this study, classroom data were summarized after completion of the study into session blocks. Most blocks are composed of data from two classroom sessions; however, some blocks contain data from only one session, either because a child was absent on one day or because there was an uneven number of days in the experimental condition.

Figure 1 presents the findings on the primary variable of interest: accuracy on experimenter-selected worksheets completed in the classroom. Following self-instructional training, all three children showed clear increases in accuracy on worksheets that were similar to those used dur-

ing self-instructional training. The baseline variability for Cindy was due to an increase in accuracy on size sequencing worksheets across baseline sessions. Except in this instance, all children's performance on individual similar-to-trained worksheets showed a systematic increase following training. Both Edward and Cindy increased their accuracy on dissimilar worksheets as well, but the effect of training on Edward is not as clear since there was only one baseline data point on this behavior. For all children, the greatest changes on dissimilar worksheets were seen for finding what is missing, with less improvement for story sequencing following self-instructional training. The children maintained their high rates of accuracy on similar-to-trained worksheets during the classroom intervention.

Figures 2 and 3 present supplementary data on additional aspects of generalization. Results related to these measures were less clear; however, they suggested that some additional changes may also have occurred as a function of self-instructional training or later classroom intervention. Figure 2 displays the children's rates of work completion on all tasks assigned in the independent work period, as well as their use of self-instructional verbalizations in the classroom. Josh is the only child who showed some improvement in work completion following self-instructional training; however, all children appeared to show clear increases in this behavior following the classroom intervention. Edward's audible self-instructional verbalizations increased notably following training, but his usage of them gradually decreased over time. Cindy and Josh were observed to use the verbalizations on occasion but not at a consistent rate. An examination of the content of self-instructional comments made in the classroom showed that self-instructions to guide through the task (e.g., "put a circle around it," "this one gets blue") were by far the most common type made by all children, ranging between 72 and 85% of an individual's total self-instructional comments. All the children used self-acknowledgement on occasion, and Edward self-instructed regarding

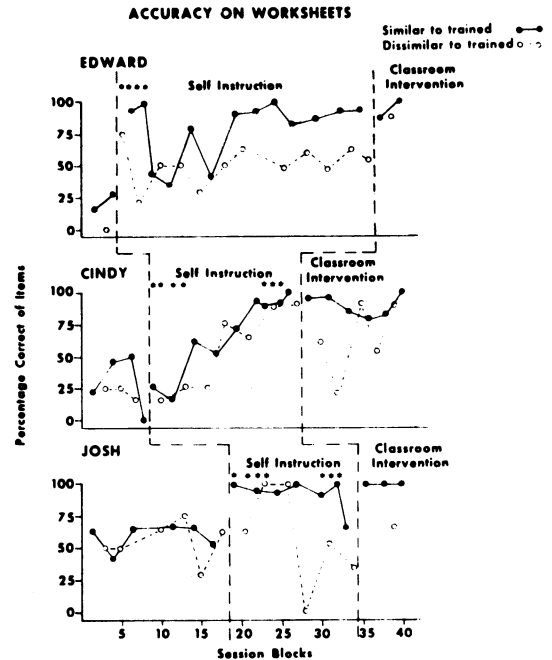


Fig. 1. Percent correct of total possible items on experimenter-provided worksheets completed in the classroom per 2-day session block for each subject. Accuracy on worksheets similar to those used in self-instructional training is indicated by solid dots; accuracy on worksheets dissimilar to trained is represented by open dots. Asterisks above session blocks correspond to sessions preceded in the day by self-instructional training.

what he was supposed to do on the task, but none of the children used "stop and look" comments.

Figure 3 presents levels of on-task behavior in the classroom during the independent work period. The results suggest that both Edward and Josh displayed overall increases in on-task performance following training, although there were day-to-day variations. Mean on-task rates before and after training for Edward were 47% and 65%, and for Josh 48% and 64%, respectively. However, Cindy's on-task rate showed little improvement as a result of self-instructional training, averaging 40% before training and 42% following training. After the introduction of the classroom intervention, mean on-task levels of the children were 75% for Edward, 60% for Cindy, and 68% for Josh. These levels

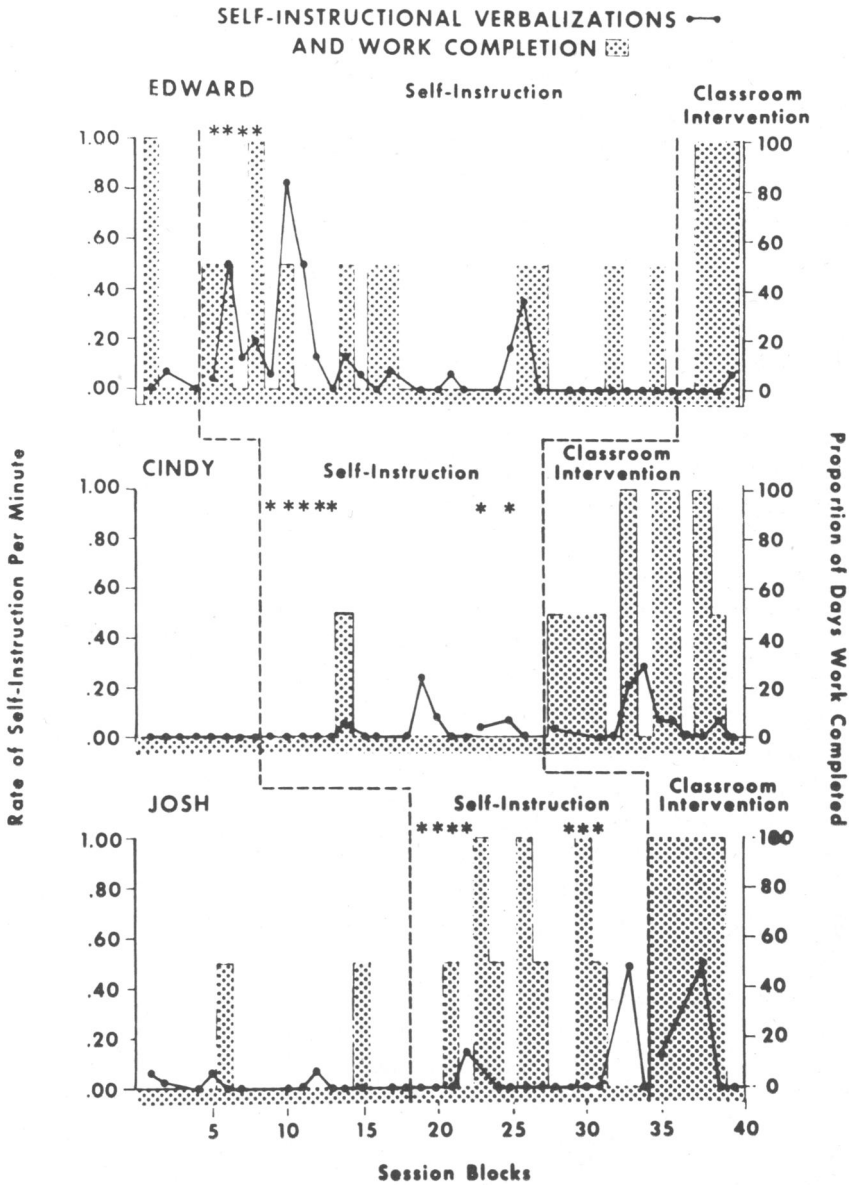


Fig. 2. Rate per minute of self-instructional verbalizations (solid dots) in the classroom and proportion of sessions in which all assigned work was completed (bars) per 2-day session block for the three children. Asterisks above session blocks correspond to sessions preceded in the day by self-instructional training.

were comparable to those of the other children in the classroom.

The children's rates of disruptive behavior remained virtually at zero throughout all experimental conditions. Only two occasions of disruptive behavior for each child were recorded during independent work time across the study.

Records of positive and instructional teacher attention to each child during the independent work time indicated that teacher input remained constant across baseline and treatment conditions. Positive teacher attention ranged from mean daily levels of 3 to 9% per child per condition, and instructional comments from 5 to

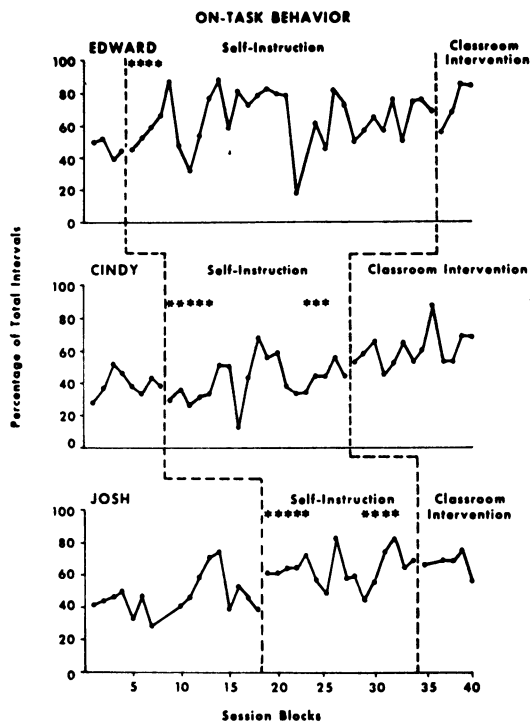


Fig. 3. Percentage of intervals of on-task behavior for each child in the classroom per 2-day session block. Asterisks above session blocks correspond to sessions preceded in the day by self-instructional training.

12%, respectively, with no systematic variation over time.

On the MFFT, all three children increased their mean response latencies and two of the children decreased substantially their total number of errors following treatment. Edward's pre- and posttraining latencies were 3.1 sec and 5.1 sec; Cindy, 3.1 sec and 4.9 sec; and Josh, 2.3 sec and 3.3 sec, respectively. Edward's pre- and posttraining error levels were 11 and 3, Cindy, 9 and 8; and Josh, 9 and 1; respectively. The nontarget peers showed no increase in response latencies (and, in fact, a slight overall decrease from a mean of 4.6 to 3.4 sec) and modest reductions in total error rates (from a mean of 4.7 to 2.7 errors). Thus, by the completion of the study, two of the three target children responded comparably to the nontarget peers on the MFFT.

DISCUSSION

The present findings indicate that preschool children are capable of learning and using a self-instructional procedure in a one-to-one training setting, and that they demonstrate some carry-over of the training to academic classroom activities. For all three children, self-instructional training resulted in increased levels of accuracy on worksheets in the classroom that were similar to those used in training. Results related to several supplementary measures were less clear; however, they suggested that rates of on-task behavior may also have improved, and that a mild classroom intervention strengthened on-task rates and effected consistent work completion for all three children.

The changes in accuracy on classroom worksheets were greater and more systematic than those reported in previous self-instructional studies (Burgio et al., 1980; Friedling & O'Leary, 1979). This positive effect on classroom performance may well have been related to the naturalistic format of the training sessions. By using worksheets analogous to those assigned in class as the primary tasks for training, the children were exposed to instructions, modeling, practice in self-instruction, and teacher feedback on these tasks. All three children showed greater and/or more consistent improvements in accuracy on classroom worksheets that were similar to those used in training than on those that were dissimilar. The performance differences may have been due to improved skill on the similar tasks following exposure to them in training (irrespective of the self-instructional component of training) or to the effects of self-instruction itself. However, the baseline stability of accuracy levels across several session blocks observed for Josh, coupled with the immediate increases in accuracy following self-instructional training for both Edward and Josh, argue against an explanation of the changes due simply to practice effects. Although the present study does not provide a component analysis of the func-

tional variables of training, the findings point to the value of everyday classroom tasks as training materials in order to enhance generalization of self-instructional training effects (cf. Meichenbaum & Asarnow, 1979). The results also provide a caution that training may need to incorporate multiple and diverse tasks in order to effect widespread improvements of accuracy across academic activities in the classroom.

The fact that two of the three children in the study appeared to show moderate increases in on-task behavior in the classroom following training lends support to the findings of Burgio et al. (1980), who reported similar results. By keeping teacher attention equivalent across all conditions, the present research ruled out teacher attention as an explanation for the changes in on-task behavior. The lack of improvement for one child in this study, however, fits with the findings of Friedling and O'Leary (1979), who observed no significant improvements in on-task levels. In the present study, the one child who did not increase in on-task performance was also the child who showed no reduction in errors on the MFFT following training. Thus, it is likely that individual child variables not measured in this study play a role in the value of self-instructional training for particular children.

The importance of individual child variables on the outcome of self-instructional training is suggested also by the contrast between the modest on-task changes seen in this study (and others noted above) with the dramatic on-task increases reported by Bornstein and Quevillon (1976). The subjects in their study were described as highly disruptive, whereas children in most self-instructional studies have been selected on the basis of inattentiveness and/or poor academic performance rather than overt disruptive behavior. In the present research, all target children displayed extremely low levels of disruptive behavior throughout the study. This difference in subject characteristics, coupled with the lack of control for teacher attention to the children in their study, suggest that Bornstein and Quevillon's findings may not be representa-

tive of the generalized effects of self-instruction on children with poor academic performance.

Self-instructional training appeared to have little impact on the frequency with which the children correctly completed their worksheets in the allotted time frame in the classroom. Throughout baseline and self-instructional phases, the children evinced low rates of efficient work completion, despite the fact that the children were always required to stay in the classroom after the independent work period was over and finish their worksheets before being allowed to join their classroom peers at recess. Even a supplementary phase of self-instructional training, which included a mild incentive procedure in the training session for working consistently and finishing before a timer rang, had no noticeable effect on children's work completion rates in the classroom. However, this simple intervention, when applied directly in the classroom along with minimal prompts and praise for self-instruction, produced systematic increases in work completion for all three children. Which aspects of the classroom intervention were functional, and whether or not the previous self-instruction training enhanced the effectiveness of the intervention, are unclear and suggest topics for future research.

In conclusion, the present study demonstrated that self-instructional training provided impulsive preschool children with a useful strategy for approaching worksheets that generalized to other similar worksheets in the classroom. Whether the children actually verbalized the self-instructional steps covertly in the classroom, or rather transferred a skill that was now implicit from training, is unknown, but the positive effect of self-instructional training on classroom performance was confirmed. This finding is especially impressive considering the young age of the children. On the other hand, the findings suggest that self-instructional training outside the classroom may be insufficient to accomplish all the goals a teacher has for improving children's independent work skills. In these cases, the addition of a mild intervention directly in

the classroom can result in more comprehensive improvement than self-instructional training alone.

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