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A SELF-INSTRUCTIONAL PACKAGE FOR INCREASING ATTENDING BEHAVIOR IN EDUCABLE MENTALLY RETARDED CHILDREN

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The purpose of this study was to develop a self-instructional package that would aid highly distractible retarded children in increasing their attending behavior in a training and two generalization (a one-to-one and a classroom) situations. Three untrained subjects were monitored for general comparison and social validation purposes. One of these control subjects was distractible and the other two (criterion comparison) were evaluated as not having attentional problems. A multiple baseline design was employed in which training was sequentially introduced across subjects. During training, the experimental subjects were taught through self-instruction to focus their attention and to cope with two tasks, math and printing. After learning the self-instructions the subjects were systematically and sequentially exposed to photo-slides of distracting situations, to audio-distractors composed of noisy lunchroom verbal peer interactions, and to in vivo distractors provided by kindergarten children playing with wooden blocks in the training setting. The entire training procedure was handled in a game-like context to maintain subject interest and to facilitate generalization. The results suggested that the training package produced direct and generalized changes in self-instructional behavior. In addition, a decrease in off-task behavior occurred during math, printing, and also during a phonics program in the one-to-one and classroom situations. However, reliable changes in academic task performance were not observed. Finally, no systematic changes on any of the dependent measures occurred for the three untrained subjects.

DESCRIPTORS: self-instruction, attending behavior, academic behavior, generalization, retarded children

Within educational settings, teachers recognize that students must sustain attention to school-related materials and activities if learning is to occur. Where attentional deficits exist, initial emphasis is often placed on the teacher for ameliorating this problem. Since the advent of behavior modification a variety of techniques have been developed to modify distractible, nonattentive behaviors in normal and retarded populations, including: positive reinforcement of incompatible behaviors (Alabiso, 1975; Patterson, 1965; Patterson, Jones, Whittier, & Wright, 1965; Whitman, Caponigri, & Mercurio, 1971), time out procedures (Johnson, Whitman, & Bartoon-Noble, 1978), and aversive stimulation (Forehand & Baumeister, 1970; Reardon & Bell, 1970).

Recently, a number of behavioral therapists have emphasized the need to switch the locus of control for an individual's behavior from external agents (e.g., the teacher) to the individual himself (cf. Kazdin, 1975). They argue that

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teaching individuals to control their own behavior is educationally more efficient in that it frees the teacher from many routine supervision responsibilities and because once learned it allows children to effect positive changes more readily in their own behavior across situations. One approach to teaching individuals to control their own behavior has involved self-instructional training. The self-instructional approach evolved from early investigations of the effects of verbal operants on motoric behavior (Bem, 1967; Lovaas, 1964; Luria, 1961; Vygotsky, 1962). The results of these studies suggest that verbal instructional procedures can facilitate the acquisition of new behaviors and increase appropriate responding in a variety of situations.

Since these seminal investigations, self-instructional procedures have been used successfully in modifying a wide range of behaviors (cf. Burron & Bucker, 1978; Meichenbaum, 1975), although researchers have confronted some difficulty in effecting change in academic task behavior (cf. Robin, Armel, & O'Leary, 1975). With the exception of a study by Guralnick (1976), research has typically employed adults and children who are of normal intelligence. Guralnick (1976) compared the effectiveness of feedback, modeling, and self-instruction techniques in developing problem-solving strategies for complex perceptual discriminations with a group of educable mentally retarded children. Results indicate that only the self-instructional approach significantly increases performance.

In the present study the utility of a self-instructional program with highly distractible retarded children was examined. The use of a self-instructional procedure with hyperactive and highly distractible children was suggested by Luria (1961). He stated that incorporating the child's own speech in a treatment program for hyperactivity would decrease the opportunity for disruption of goal-directed behavior and facilitate the organization of the children's own activities. Guralnick (1976) has similarly contended that self-instructions channel an individual's attention skills in selecting the relevant cues in a situation. In two earlier studies (Palkes, Stewart, & Freedman, 1972; Palkes, Stewart, & Kahana, 1968) the authors found that training hyperactive children to use self-directed verbal commands improved posttest performance on the Porteus Maze (a measure of impulsivity) when compared with control subjects who simply practiced the training exercises. However, until the present study no attempt to evaluate the effects of self-instructional training on distractible retarded children has been conducted.

The self-instructional package used in this study provided to the subjects: strategic inoculation and coping self-statements to assist them, respectively, in completing arithmetic and printing assignments, in ignoring distracting stimuli, and in dealing with task failure. In addition, because behavior modification programs have not always been successful in effecting generalized behavior changes across situations (Stokes & Baer, 1977), several procedures for facilitating generalization into a one-to-one and classroom setting were introduced. Specifically, during training a "storylike" instructional procedure (Bornstein & Quevillon, 1976) employing classroom imagery was used to assist the children in recognizing situations where self-instruction was appropriate; distracting stimuli similar to those likely to be encountered in the classroom were introduced; and finally, multiple exemplars (Stokes & Baer, 1977) of academic tasks encountered in the classroom were employed. In order to evaluate the direct and generalized effects of training, the subjects' use of self-instruction in the training situation, in a one-to-one and in a classroom situation, was assessed. In addition, changes in the subjects' off-task behavior in the latter two generalization situations were monitored. The final goal of this study was to examine whether correlated changes in academic behavior occurred. In order to evaluate this question, permanent-product data were collected during the math, printing, and phonics programs in the generalization settings.

METHOD

Subjects

Five children, selected from a special education class in a parochial grade school, participated in the study. Judy, 9 yr old, with a full scale IQ of 70 on the Wechsler Intelligence Scale for Children (WISC), and Angie, 11 yr old and a WISC of 46, received self-instructional training. Due to illness, Harvey, 9 yr old and a WISC IQ of 45, although initially targeted for training, did not receive treatment, but did serve as a control subject. To evaluate the social significance of the treatment, Donny, 10 yr old and a WISC IQ of 71, and Kathy, 14 yr old and a WISC IQ of 46, were also monitored during the study. These children were viewed by the teacher as being the least distractible students in the class. All of the above children were diagnosed as mentally retarded with the origin of retardation unknown. Prior to treatment, a distractibility rating form, devised by the experimenters, was completed by the teacher, and a prebaseline behavioral assessment of the children's off-task behavior was conducted in the classroom. The experimental children were rated by the teacher as being the most distractible children in her class and were rated behaviorally as being off task more than 50% of the time; the two criterion comparison subjects were off task about 20% of the time. In order to assess whether the children were capable of learning how to self-instruct, a language test specifically constructed for the purpose of this study was administered to evaluate the children's ability to memorize and verbalize sentences of increasing complexity and to follow the instructions contained within these sentences. All children within three trials could repeat verbatim 90% of the words in the sentences and correctly carry out all the instructions.

Settings

The experiment took place in two settings: an experimental room where a training and a transfer (transfer I setting) assessment occurred, and a classroom (transfer II setting). The experimental room, located in the basement of the school building, was approximately 10′ × 18′ (30 m × 55 m). It contained one small table with two chairs placed around it. The classroom was 21′ × 24′ (64 m × 73 m). The teacher's desk was located in the front of the room, slightly to one side, with a table and two chairs placed in the front corner of the room for individual teacher-student instruction. Fourteen students' desks in four rows were facing the teacher's desk. The daily routine in the classroom included both individual and group educational activities during which math, printing, phonics, and other curricula were implemented. While a particular student was receiving individual instructions, the other children were expected to work independently until it was their turn for individual attention.

Tasks and Materials

Two tasks were used during training: an arithmetic task and a printing task. The arithmetic task consisted of 20, one- and two-digit addition and subtraction problems; usually an equal number of each. The printing task involved copying words obtained from the student's current reader. The number of words and arithmetic problems presented to the children always exceeded what they could complete in any one session. A third phonics task, not used during training or in the transfer I situation, was completed by the student in the classroom to evaluate task generalization. The phonics task consisted of a variable number of problems focusing on word sounds. For example, in one type of problem, the student was required to match drawings of various objects with the printed word representing the objects. All tasks used in the experiment were part of the classroom curriculum prior to the onset of the study.

During the distraction inoculation phases of treatment a Sony cassette recorder was used to play the prerecorded voice distractions and a Kodak Carousel slide projector was used to present 12 color slides of potentially distracting events which commonly occurred in the classroom (transfer II) setting.

Response Definitions and Rating System

Self-instructional verbalizations were rated to assess whether the training program succeeded in teaching children to self-instruct and whether the children self-instructed in the transfer situations. Off-task behavior was assessed in the transfer situations to see if there would be a change in the frequency of this response during self-instructional training. These target behaviors were defined as follows:

Self-instructional verbalization—Statements made by the child pertaining to the appropriate performance of a task. Specifically, a child was rated as self-instructing when he or she made one of the following statements: (1) asked a question [e.g., "What does Sr. ——— (the teacher) want me to do?"] (2) answered the question (e.g., "She wants me to draw this word."); (3) provided direction on how to to do the task (e.g., "First, I should look at both numbers," "I take away 4."); (4) reinforced himself or herself for completing the task (e.g., "I did a good job," "I'm doing real good so far."); (5) provided a cue to ignore distraction (e.g., "I hear people talking but I'm not going to let them bother me."); (6) specified how to cope with task-failure (e.g., "Oh, I was messy in printing that word. That's okay, I'll be even more careful on the next word.").

In-seat, off-task—The child is sitting in his or her chair with buttocks touching the seat of the chair but is not performing the assigned task properly. For example, the student might be looking about the classroom or talking to a classmate but would not be looking at the task material.

Ratings were taken for each experimental student three times a week on Monday, Wednesday, and Friday mornings in the training and two transfer settings. A fourth afternoon rating session, scheduled randomly, was also taken on one of these days each week. During each session behaviors were recorded during a 15-min training period, a 5-min transfer I period, and during a 15-min transfer II (classroom) period while the students performed the arithmetic, printing, and phonics (classroom only) tasks.

In the training and transfer I, but not in the transfer II (classroom) settings, the six types of self-instruction (e.g., "question," "answer") were subcoded in an event fashion. Specific self-instructional components were not recorded in the classroom because the noise level in the room made it difficult to obtain a reliable measure of these behaviors in this setting. In the transfer I and II settings the incidence of self-instruction, irrespective of type, was rated in an interval fashion. An interval recording system was also used to rate off-task behavior in the transfer I and transfer II settings. Off-task behavior was not recorded in the training setting. When rating self-instruction and off-task behavior with an interval system, these responses were scored in terms of their occurrence or non-occurrence within successive 10-sec intervals. Each specific behavior was recorded only once within an interval.

A cassette tape recorder was used to record self-instructions in the training setting. A videotape recorder was used to record off-task and self-instructional behaviors in the transfer I period and off-task behavior in the classroom setting. Thus, all ratings of the target responses were made from these tapes except for self-instructional behavior in the classroom which was rated as it occurred.

Performance measures—In addition to the preceding behavioral measures, measures of the subjects' performance quality on the arithmetic, printing, and phonics tasks were taken daily in the 15-min classroom situation. The overall number of problems completed on the arithmetic task and the number of letters printed on the printing task were tallied for each session. In addition, a percent correct measure was calculated for each task by counting the number of correct answers given or letters printed and dividing them by the total number of problems completed or letters printed. The writing task was evaluated by a method derived from Helwig, Johns, Norman, and Cooper (1976) which utilized transparent overlays to measure deviations of writing samples. A deviation of more than 2 mm from the standard was considered an incorrect response.

Children's distractibility rating form—In order to assess the teacher's perceptions of how distractible the children in this study were, a distractibility rating form composed of five questions was administered to her prior to the initiation of the study and again at the conclusion of training. The questions on this form probed the teacher's views concerning the children's ability to maintain attention to their work (e.g., "Does this child have trouble concentrating and keeping his mind on one thing?") and the extent of teacher prompting needed to assist the child in completing a task (e.g., "Does this child require prompting to finish his work?"). A 5-point scale indicating the extent to which the child displayed a particular problem was used by the teacher in answering the questions.

Reliability Assessment

For reliability purposes, at least twice in each condition a second observer rated the students' behaviors from randomly selected videotapes of the transfer situations and cassette recordings of the training sessions. Similarly, for the same purpose, a second observer was brought into the transfer II (classroom) setting to assess self-instructional behavior. In calculating reliability coefficients for off-task behavioral and global self-instructional ratings in the transfer I and transfer II settings, individual rating records were compared on an interval-by-interval basis for each child. The reliability coefficients were calculated by dividing the number of agreements of occurrence of the behaviors between the two observers by the total number of observations. For off-task behavior, interobserver agreement ranged from 53 to 100% with a mean of 83%. Interobserver agreement for global self-instruction ranged from 73 to 100% with a mean of 87%. All of the low reliability coefficients (<80%) obtained, occurred when the frequency of off-task and global self-instruction was extremely low (<4 occurrences). This occurred three times. The reliability of the event recording system used in measuring the occurrence of specific component self-instructions was assessed through the following formula: % agreement = smaller number of occurrence/larger number of occurrence × 100. The percentage agreement across all reliability checks ranged from 81 to 100% with a mean of 90%. That is, in no instance did observer agreement, when a specific self-instructional component was rated, fall below 80%.

In order to assess the reliability of the rating system used in evaluating the children's performance on the academic tasks, each child's task performance was rated at least twice during each phase by dividing the number of agreements of occurrence by the total number of agreements and disagreements. Specific reliability coefficients for the accuracy measure ranged across children and tasks, from 97 to 100% with a mean of 99%. Interobserver agreement for the rate measure was 100% at all times.

Design

A multiple baseline design across children was employed. Training procedures were sequentially introduced to the two experimental children in the training setting. No intervention occurred in the transfer I or classroom setting. The behavior of the control and criterion comparison children, who did not receive training, was monitored throughout the study in the classroom.

Procedure

Baseline. For the two experimental children and one control child, behavioral ratings were taken in the training, transfer I, and classroom situations. The two criterion comparison children were observed only in the classroom setting. No experimental manipulations were initiated in the training setting. Children were brought individually into the experimental room and were exposed for 15 min to either the math or printing materials which were presented on an alternate basis in successive sessions. The experimenter, sitting by the children, instructed them to do their work just as they would in the classroom and presented social reinforcement noncontingently as the children were completing their tasks. In the transfer I situation which occurred immediately after training for 5-min duration, the experimenter presented the children with the task not presented that day in the training situation (e.g., if the math task was presented in training, printing was presented). In this transfer situation, the experimenter then positioned himself about 10 feet (30 m) in front and to the side of the child. Except for the task difference, session duration, and experimenter location, the procedures followed in the training and transfer I settings were identical during this condition. In the classroom situation the teacher consecutively administered, within the same session, three tasks: math, printing, and a third "generalization" task (phonics) to the experimental and criterion reference children. The children were allowed to work on each task for 5 min after which the material was collected by the teacher and the next task was presented. The same task was presented to all children concurrently with the order of the different tasks randomized across sessions. The procedures described above for the transfer I and transfer II (classroom) situations remained constant throughout all phases of the study.

Training. During this phase the child was told that he or she and the experimenter were going to play a game that would help with schoolwork and that an important rule of the game was that he or she should, while in the training setting, pretend it was the classroom. The child was then given self-instructional training. These self-instructions were specific to each task with each set of instructions containing the steps listed in the response definition section (steps 1-5).

Initially the experimenter performed the task (math or printing) while verbalizing the self-instructions. He then said to the student, "Now it's your turn. First you add the numbers (print the letters) while I say the words." Then the child was asked to verbalize the self-instructions while performing the tasks. During this phase the experimenter whispered the self-instructions along with the child. Finally, the child self-instructed while the experimenter remained silent. Although Meichenbaum (1977) suggested a final phase in which the child gradually whispers the instructions and then says them to himself or herself, this phase was deliberately not implemented so that the child's use of self-instruction would, hopefully, be observable in the transfer situations. The self-instructional responses were systematically shaped by the experimenter with the use of contingent social reinforcement.

During the modeling sequence of training the experimenter would sometimes purposely make an error on his task and then verbalize the failure-coping self-statement. In order to supply an opportunity for the children to verbalize the failure-coping self-statement during their performance of the task, each task included a portion that was considered more difficult and that usually resulted in at least one error by the child. At the end of each treatment session, the experimenter told the child that if he or she played this game by himself or herself and said the same things in the classroom, he or she would be able to perform schoolwork better.

After the child had successfully verbalized the complete chain of self-instructions for three consecutive sessions without prompting from the experimenter, a "distraction-inoculation" procedure was initiated. During this phase visual, audio, and in vivo distractors were introduced sequentially into the training setting while the children were engaged in their tasks and self-instructing appropriately. The visual distractors were composed of 12 photo-slides flashed on a screen, each depicting a distracting situation which the children were likely to confront in the classroom (e.g., a child tugging on the arm of another child who is trying to complete a task). The audio distractors were supplied via a tape recording of the children's peers interacting loudly in a lunchroom setting. Finally, to supply in vivo distraction, kindergarten children were introduced into the training setting and instructed to play with wooden blocks and other noise-inducing objects.

During the initial presentations of the various distractors, the experimenter modeled the distraction-ignoring self-statement by saying: "If I were in the classroom doing my work and saying the words and something like this happened (i.e., the visual, audio, or in vivo distraction), I would say something like this: 'I'm not gonna look, I'm gonna keep doing my work.' " As each distracting stimulus was introduced the child was asked to identify it (e.g., "People are making noise."), and then asked to verbalize the distraction-ignoring self-statement. When the subject could verbalize this appropriate self-statement along with the previously learned self-statements for a given set of distractors (visual or audio) unprompted for three consecutive sessions, the next type of distractors was introduced. The children were continued in the in vivo distraction phase until training was terminated.

Maintenance

Due to time limitations caused by the end of the academic year, only limited data were collected in this condition and only for one child. The first child was gradually (over a 4-wk period) given fewer training sessions, at a rate of one less per week, until the last week of the study at which time training was phased out completely.

RESULTS

Self-Instructional Behavior

Training setting. Table 1 shows the mean unprompted frequencies of the various self-instructional components during the training conditions. Although no self-instructions occurred prior to training, after training both experimental children learned to verbalize each of the self-instructional components without prompting. The low mean frequencies of occurrence of the coping self-instruction in the math and printing

Table 1

Mean frequency of various types of self-instruction by the experimental children across tasks (math and printing) during the training condition in the training and transfer I settings.[a]

Children	*Question*	*Answer*	*Task*	*Coping*	*Distraction*	*Self-reinforcement*
TRAINING						
Math						
Judy	12.7	1.0	59.3	1.0	8.7	14.5
Angie	15.6	1.3	65.3	0.0	11.3	13.2
Printing						
Judy	1.6	1.2	161.4	4.1	14.3	14.6
Angie	2.5	1.4	199.1	0.3	11.4	14.0
TRANSFER I						
Math						
Judy	8.4	0.9	32.1	0.3	0.0	9.4
Angie	5.4	0.7	33.2	0.0	0.2	4.4
Printing						
Judy	1.1	1.0	118.6	0.8	0.1	9.9
Angie	0.9	0.5	83.6	0.0	0.1	4.7

[a]Self-instruction did not occur during the baseline condition.

tasks and the question self-instruction in the printing task were a function of the nature of the rating system and differential task demands. Although not presented in Table 1, the data also show that both children began producing some unprompted self-instructions as early as the first training session.

Transfer I setting. Figure 1 shows the percentage of intervals in which general self-instructional behavior (collapsing across the various types of self-instructions) occurred across tasks and conditions for the experimental children and for the untrained child in the transfer I setting. The two children who received training showed a high frequency of self-instruction on both tasks in this generalization situation whereas neither of these children prior to training nor the third child who never received training showed any self-instructional behavior. Both of the trained children displayed a higher frequency of self-instruction on the printing task. Table 1 shows the mean frequencies of the various self-instructional components that were emitted in the transfer I setting by the two experimental children on the math and printing tasks. With the exception of the coping and distraction self-instructions, the other self-instructional components occurred on the average of at least once and usually much more frequently each session. The lower frequency of distraction-ignoring self-instructions can be attributed to the lower number of distractors available in the transfer I situation.

Transfer II (classroom) setting. Figure 2 shows the frequency of self-instruction by the experimental children and the untrained children during the math, printing, and phonics tasks in the classroom setting. Although both experimental children showed self-instructional behavior in this generalization setting, they were quite variable. As Figure 2 shows, Angie displayed a higher rate of self-instruction than Judy. Both children self-instructed more frequently during the printing than the math task. With the exception of one of Angie's sessions, neither child showed self-instruction during the phonics task. The third child who was not trained did not self-instruct nor did the criterion reference children whose data are not presented.

Off-Task

Transfer I and II (classroom) settings. Figures 3 and 4 show the frequency of off-task behavior displayed by the two experimental children and the untrained child in the transfer I and transfer II (classroom) setting. Data for the criterion comparison children are also presented in the classroom situation. Figure 3 shows that off-task behavior was generally low across conditions for all three children in the transfer I setting, although the data suggest that Angie was less off task after she received self-instructional training. The low rate of off-task behaviors in this situation is probably related to the fact that there were no external distractors in the room.

In contrast, Figure 4 shows that off-task behavior was generally higher in the transfer II (classroom) setting than in the transfer I setting. The two experimental children displayed a gradual but marked decrease in off-task behavior after training. Generally, this effect occurred across all tasks. Due to the nature and complexity of data presented in Figure 4, for these two children a time-series statistical analysis (Glass, Willson, & Gottman, 1974) was performed as an adjunct to visual analysis.[1] For Angie, the time-series analysis showed a significant change in both trend, $t(41) = 5.37$, $p < 0.0005$, one-tailed, and level, $t(41) = 1.72$, $p < 0.05$, one-tailed, of her off-task behavior during the math task, a significant change in trend, $t(41) = 1.97$, $p < 0.05$, one-tailed, during the printing task, and a significant change in trend, $t(41) = 7.07$, $p < 0.0005$, one-tailed, during the phonics task. For Judy there was a significant post-intervention change in the level of her off-task behavior during the printing, $t(40) = 1.61$, $p <$

[1]The authors performed the time-series analyses with the TMS computer program developed by Cathleen Bower, William Padia, and Gene Glass at the Laboratory of Educational Research, University of Colorado, October 1974.

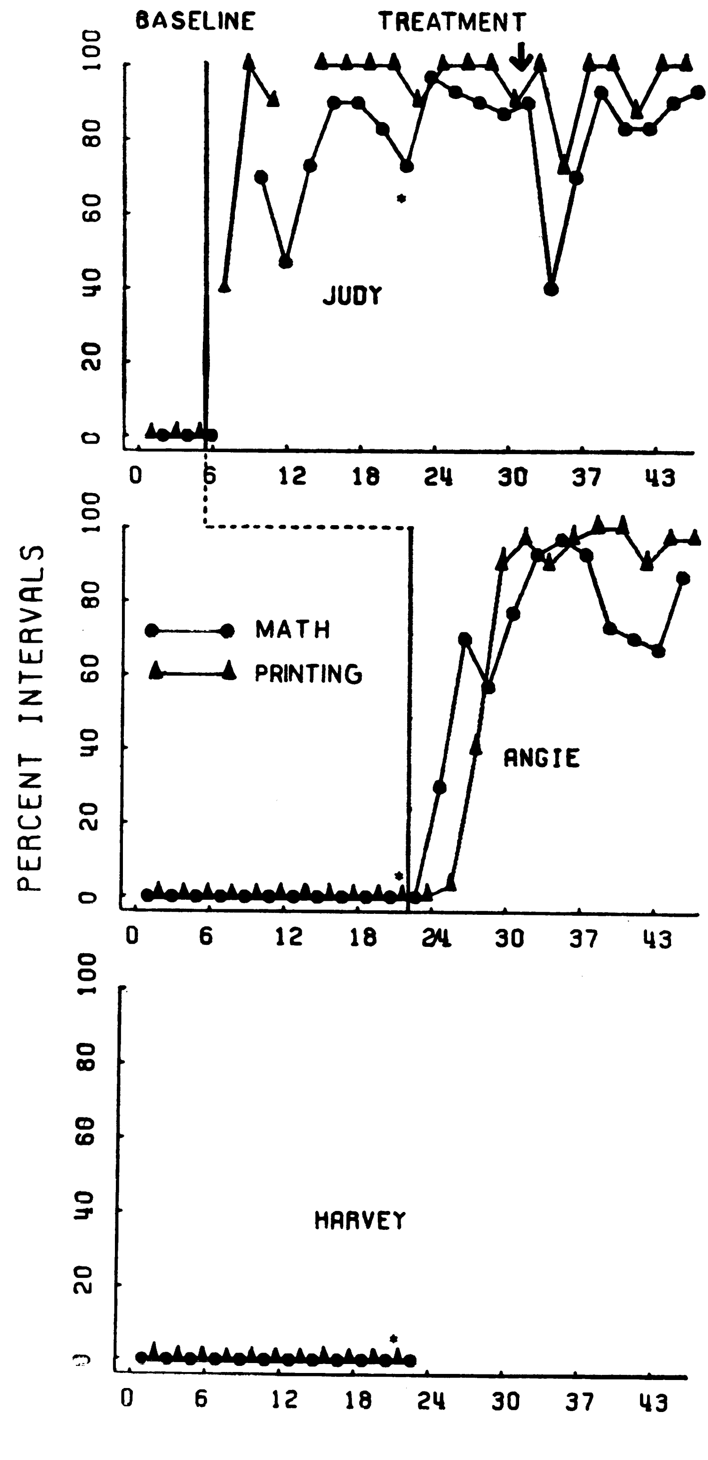

Fig. 1. Percentage of intervals of self-instruction over sessions by the experimental children on the math and printing tasks in the transfer I setting. (An asterisk designates a 2-week school holiday when observations were not made. The arrow signifies the point at which training was faded out for Judy.)

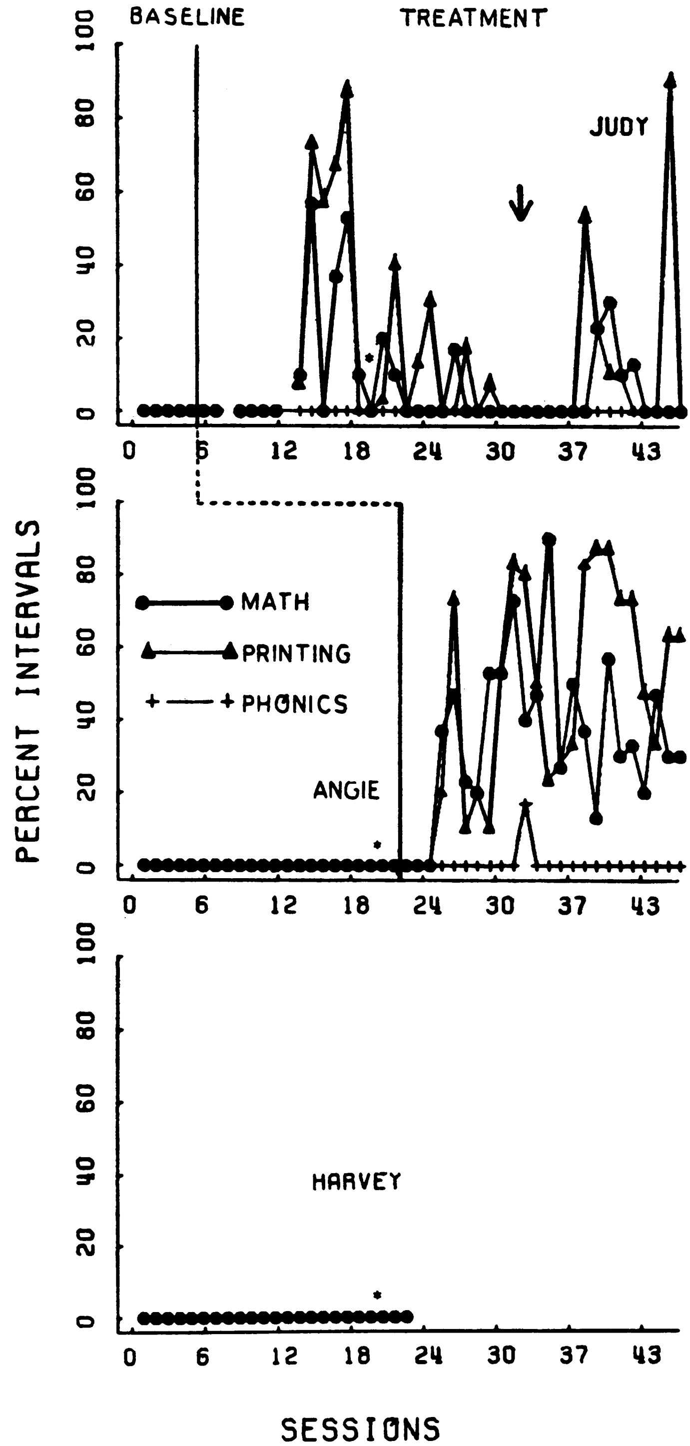

Fig. 2. Percentage of intervals of self-instruction over sessions by the experimental children on the math, printing, and phonics tasks in the transfer II (classroom) setting. (An asterisk designates a 2-week school holiday when observations were not made. The arrow signifies the point at which training was faded out for Judy.)

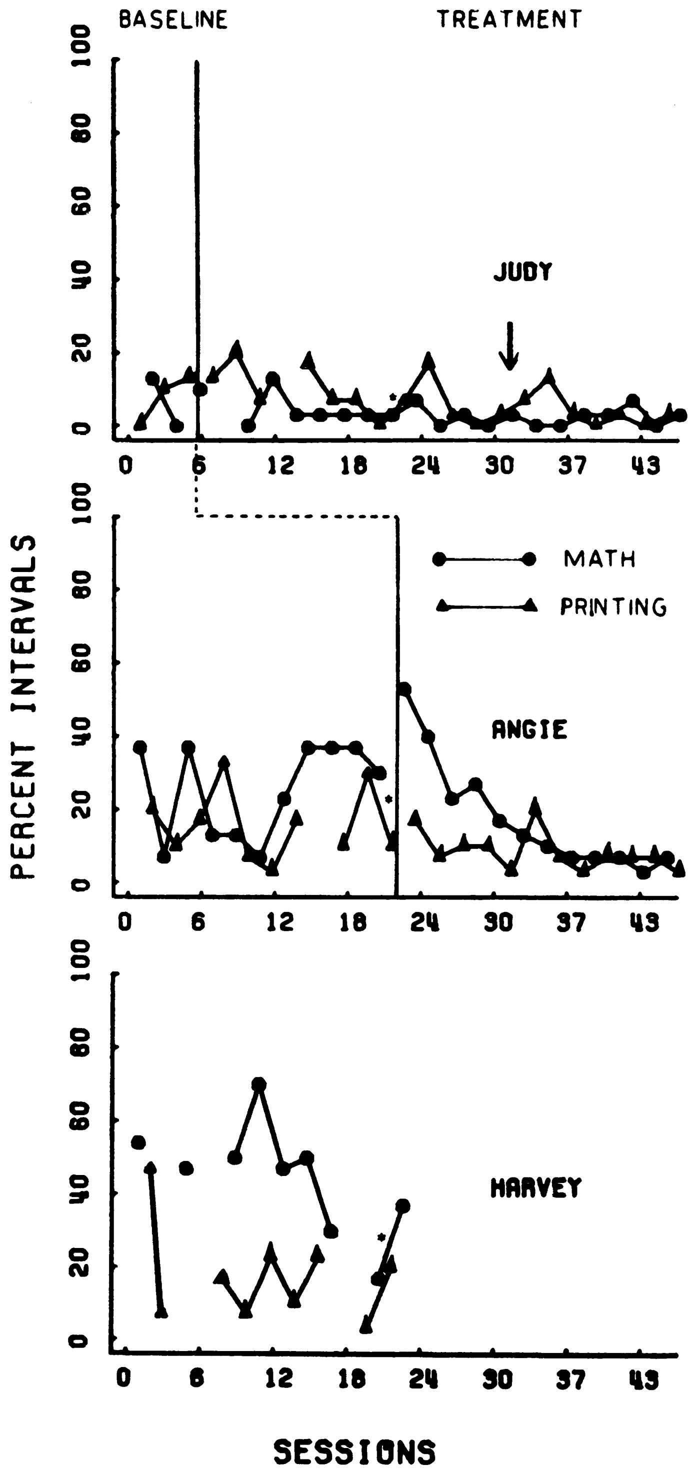

Fig. 3. Percentage of intervals of off-task behavior over sessions by the experimental children on the math and printing tasks in the transfer I setting. (An asterisk designates a 2-week school holiday when observations were not made. The arrow signifies the point at which training was faded out for Judy.)

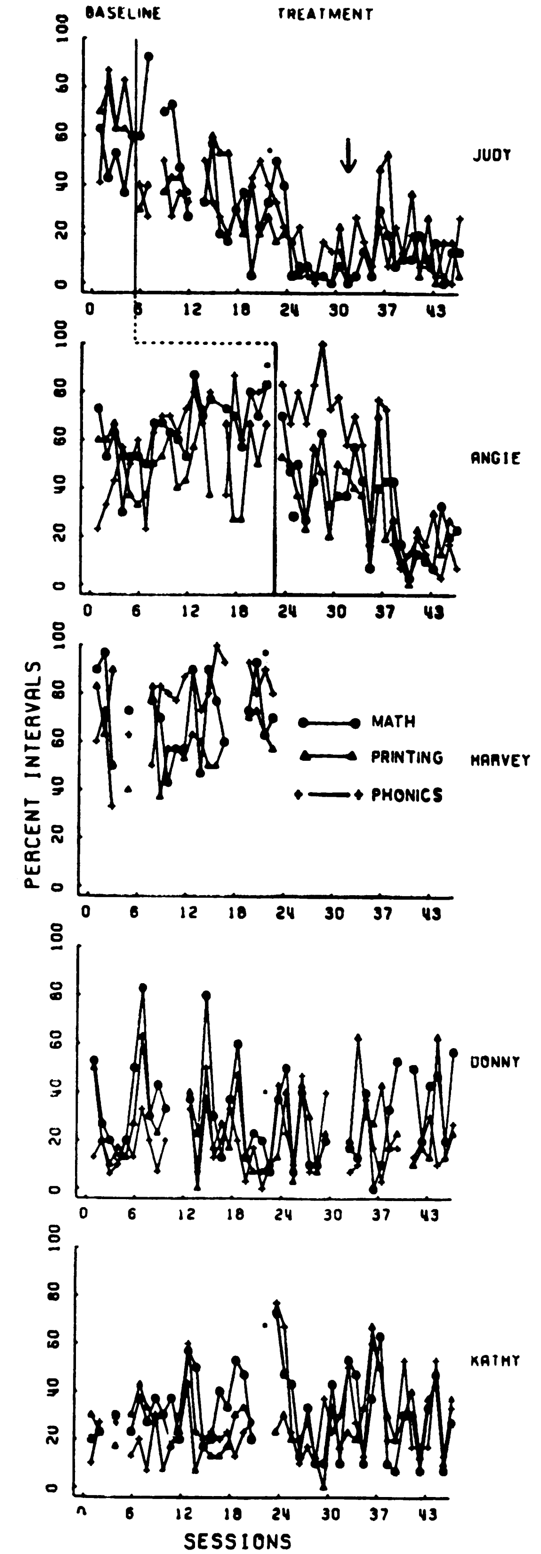

Fig. 4. Percentage of intervals of off-task behavior over sessions by the experimental and criterion comparison children on the math, printing, and phonics tasks in the transfer II (classroom) setting. (An asterisk designates a 2-week school holiday when observations were not made. The arrow signifies the point at which training was faded out for Judy.)

0.05, one-tailed, and phonics, $t(40) = 3.50$, $p < 0.005$, one-tailed, tasks. The change in level during the math task approached significance, $t(40) = 1.55$, $p < 0.10$, one-tailed. In general, these statistical analyses support the conclusions of the visual analyses. Changes in off-task behavior were not observed for either control child (Harvey) or the criterion comparison children (Donny or Kathy) who did not receive self-instructional training. Figure 4 also shows that at the end of training, Judy and Angie were comparable to each other in their level of off-task behavior and that both were less off task than the criterion reference children over all tasks (arithmetic, printing, and phonics).

Maintenance. Although training was faded out for Judy beginning on session 31, the data indicate that both self-instructional and off-task behavior were maintained at the levels achieved during the latter stages of the training condition (See Fig. 1-4).

Task Performance

Table 2 presents the mean rate of math, printing, and phonics performance and the mean percentage accuracy with which this work was completed by the experimental and criterion comparison children during the baseline and training conditions in the transfer II (classroom) setting. No systematic changes in the rate or accuracy of performance on the printing or phonics tasks were noted. The data indicate that the experimental children, Angie and Judy, both increased their accuracy of math performance in the classroom, whereas no change in accuracy was seen during the study for the criterion reference children.

Teacher Ratings

The teacher's ratings of the experimental students and the criterion reference students on the

Table 2

Mean rate and accuracy of performance during math, printing, and phonics tasks for experimental and criterion comparison children during baseline and training conditions in the transfer II (classroom) setting.[a, b]

	Accuracy		Rate	
Children	*Baseline*	*Training*	*Baseline*	*Training*
Math				
Judy	71.6(41.5)	89.0(14.4)	4.0(2.1)	13.1(6.2)
Angie	42.6(22.4)	56.3(16.9)	7.3(3.1)	6.6(1.5)
Donny	91.4(10.1)	87.3(13.8)	10.2(5.3)	13.1(4.6)
Kathy	47.7(28.4)	35.2(25.2)	4.8(1.4)	4.0(1.6)
Printing				
Judy	92.6(3.4)	93.6(6.6)	43.8(12.4)	43.5(13.2)
Angie	66.5(16.3)	67.8(11.3)	34.5(9.9)	26.4(5.7)
Donny	91.6(5.6)	91.5(10.1)	74.0(35.2)	51.1(13.3)
Kathy	87.7(6.8)	86.0(8.5)	33.9(5.7)	30.6(4.9)
Phonics[c]				
Judy	82.4(18.7)	83.5(18.7)		
Angie	53.3(33.7)	69.7(14.8)		
Donny	88.9(18.8)	82.6(27.6)		
Kathy	67.6(29.4)	80.0(24.5)		

[a]The standard deviations appear in parentheses.

[b]Means and standard deviations for criterion comparison children (Donny and Kathy) during baseline and training conditions were computed on the task data for the first and last 23 sessions, respectively.

[c]Rate data are not reported for the phonics task due to the variable number of phonics problems given in any one session.

Children's Distractibility Rating Form administered before and after training were compared. The scale scores ranged from 0 to 4, with 4 indicating high activity and 0 indicating a low level of activity. Both experimental children who received training were rated as being less "hyperactive" after training than before training. Judy's and Angie's prebaseline activity ratings were at a 3 level, whereas their ratings after training were, respectively, 1.2 and 2.2. Both criterion reference children (Donny and Kathy) were rated as being slightly more active at the end of the study (1.6 and 1.4) than before the study began (1.0 and 0.6) and were similar at this point in their activity level to the experimental children. At the end of the study the individual seen by the teacher as least "hyperactive" was Judy, an experimental child.

DISCUSSION

From both an experimental and clinical perspective the results of this study suggest that the self-instructional training program employed can be used to decrease the off-task behavior of distractible retarded children in a classroom setting. In contrast to most previous research that has used this approach, the present study not only trained children to self-instruct but systematically monitored the extent to which the children learned these self-instructions during training and subsequently exhibited them in a nontraining situation. The results indicated that the experimental children learned to self-instruct in the training situation and to use these self-instructions extensively for the math and printing tasks in the transfer I situation where only an observer and the child were present. In both the training and the transfer I situation it was evident not only that both experimental children were self-instructing frequently but also that they were using all of the self-instructional components they had been taught.

The results also indicate that both children self-instructed, albeit to a lesser extent, in the classroom situation. However, it may be that more self-instructions occurred than were rated in this latter setting. Both children, in the early stages of treatment, spontaneously reported that they said the words (self-instructions) to themselves while they were doing their work in the classroom. Moreover, while the observer was recording self-instructions in the classroom setting, the children were often noticed mouthing, inaudibly, what appeared to be self-instructions. However, due to the absence of clear and definite identification, these apparent self-instructions were not recorded formally. Perhaps in future research a wireless microphone could detect these low volume verbalizations. In general, however, the fact that less self-instruction occurred in the classroom is consistent with past research. Meichenbaum (1977) has suggested that the classroom setting may indeed have an inhibitory effect on overt self-instruction. One can easily understand how children may be reluctant to self-instruct overtly in the presence of their peers for fear of drawing adverse attention to themselves.

The self-instructional program used in this study differed in several significant respects from those employed in past studies. First, it was more complex in that it taught the children self-instructions for two very different tasks as well as procedures to cope with error and distraction, included within a game-like context. Second, the distraction inoculation procedure was quite unique in that it not only taught the children what they should say when distraction occurred, but also, systematically, through the presentations of a variety of visual, audio, and in vivo stimuli, showed the children the occasions when such statements would be appropriate. Third, because in pilot research with retarded children, modeling and prompting were not found sufficient to produce good self-instructional behavior, the experimenter shaped, with praise as a reinforcer, the chain of the various self-instructional components to be used by the children.

Although it took several sessions for the children to learn to self-instruct without prompting, both children appeared to be enjoying the training sessions and both reported that they enjoyed playing the "game." One child even reported that she played the "game" at home while doing her homework. These anecdotal data support the contention that by presenting the self-instructional training as a "game that will help you do your work better," children's attention will be better maintained during training (Meichenbaum, 1977; Bash & Camp, Note 1). This procedure may be especially important with a retarded population that has marked attentional problems (House & Zeaman, 1963).

As indicated in Figure 4, there were marked decreases in the off-task behavior of the two experimental children in the classroom setting. Moreover, there is an obvious, although imperfect, correlation between the self-instructional behavior of these children and their off-task behavior during both the math and printing tasks (See Figures 2 and 4). Conversely, the untrained child and the criterion comparison children who did not receive training did not show changes in either their self-instructional or off-task behavior. The direct monitoring of both of these subject behaviors allows stronger inferences to be made regarding whether the changes in off-task behavior were actually a function of the self-instructional program (Kazdin, 1978). Although similar reductions in off-task behavior have been found by Meichenbaum and Goodman (1971), Bornstein and Quevillon (1976), and others, they did not monitor self-instruction directly.

The results of this study suggest that the self-instructional training package employed effected generalized changes in self-instructional and off-task behavior across situations, most importantly in the classroom, and across tasks. Prior to this study only Bornstein and Quevillon (1976), using a self-instructional program, obtained generalization of behavioral effects into a new setting, but with a nonretarded population. One aspect of the results might, however, argue against the conclusion that the self-instructional behavior and the generalized effects were really functionally related. That is, although decreases in off-task behavior during the phonics program in the classroom setting were observed for both experimental students, they showed virtually no overt self-instructional behavior when performing this task. This may indicate that self-instruction was not the mechanism producing changes in off-task behavior and that some other treatment-correlated agent was responsible. However, one could argue that because, in contrast to math and printing, the children were never prompted to self-instruct overtly during phonics nor reinforced for such behavior, they covertly self-instructed. In this regard it was noted that lip movements, not recorded as self-instruction, were occurring during phonics as well as in the math and printing situations. Therefore, the major difference in the child's self-instructional performance on the phonics task may have been that the children were self-instructing almost exclusively at a covert rather than an overt level.

In contrast to most previous self-instructional studies this study examined the effects of the program on the academic performance of the children, specifically on the rate and accuracy of their performance in the math and printing tasks, and the accuracy of performance in the phonics task. Consistent with the findings of Robin et al. (1975) the present study showed no improvement in printing performance due to training. In the phonics task although one experimental child showed some improvement in accuracy of performance, a similar improvement was displayed by a criterion comparison child who never received training, thus weakening any inference that training was responsible for this performance change. Contrary, however, to the findings of Wein and Nelson (Note 2), there was some improvement in accuracy for both subjects on the math task. Unfortunately the degree of change was not large enough for any definitive statements regarding the effect of training on this task.

Several reasons for the absence of performance change across tasks are suggested. It may be that before the effects of self-instructions can be detected on academic measures, the children's performance will have to be observed over a longer period of time. It is also possible that while attending/on-task behavior is a necessary prerequisite for changing academic performance, the presence of this response pattern is not sufficient to ensure that performance changes will occur. In cases where students are both off task and lack specific academic skills, it might be beneficial to design self-instructional programs incorporating components that not only help the individual deal with distractions but also cope quite specifically with the academic task demands. Although the self-instructions used during math were considered to be sufficiently specific to guide the children's behavior, the printing self-instructions were, in comparison, much more general. In this regard it may be important to reiterate that the most pronounced performance change displayed by the experimental students were in math.

In general, results from past studies point out that the relationship between attentional behavior and performance changes in the classroom is unclear. Although some studies suggest that academic performance can be improved by increasing attending behavior (O'Leary, Becker, Evans, & Saudargas, 1969; Surratt, Ulrich, & Hawkins, 1969), other studies indicate that such correlated effects do not always occur (Ferritor, Buckholdt, Hamblin, & Smith, 1972). Perhaps the key to understanding the discrepant results from these studies lies in the examination of the population studied. If the children do not possess certain requisite academic skills, for example, if they don't know how to add or subtract, it is unlikely that increasing attention will increase work rate or accuracy. Whereas if children do possess such skills, but are frequently off task, increasing attention alone may be sufficient to improve academic performance. In this study the children were quite deficient in their math, printing, and phonics skills which could explain the general absence of performance changes.

In the present study an attempt was made to assess the clinical significance or social validity of the changes in the experimental children. One common way of making this assessment is to ask "significant individuals" who are affected in important ways by the child's behavior to assess whether the child is different after training. The problem with this type of assessment is that it often does not have established reliability and validity (O'Leary & Turkewitz, 1978). In the present research several methods of assessing the clinical significance of the decrease in the experimental children's off-task behavior were included. The teacher's perceptions of the children's behavior, before and after training, were solicited. In addition, the experimental children's behavior throughout the study was compared with that of two criterion comparison children who were seen as good students (frequently on task) by the teacher. Both the teacher's ratings and the interchild comparisons suggested that after training the experimental children approximated and in some cases were off-task less than the criterion children in the classroom. The child who was most distractible in the classroom during baseline appeared after training more task oriented than the criterion comparison children.

In summary, the results of this study indicate that the self-instructional training package produced direct changes in self-instructional behavior in the training situation and that generalized change occurred in the self-instructional behavior of the experimental children in the transfer I and II (classroom) situations, and in their off-task behavior during three task situations in the classroom. It was established that retarded children can be taught self-instructions even though they are language deficient and commonly thought unable to gain control over their own behavior. Furthermore, this study suggests that self-instruction might be used to reduce hyperactivity, a common problem among retarded children. The results of this study are generally encouraging, but they do suggest that when a self-instructional approach is to be used to effect changes in academic performance, the instructions employed may well need to be modified. In this regard and more generally, it is imperative that the self-instructional technology not be viewed as a completed product, to be used but not refined. Although this approach should be compared ultimately with more direct behavior change procedures, the authors would argue that the self-instructional approach is still in its beginning stages of development, and that comparisons of self-instruction with other techniques, such as token systems (cf. Friedling & O'Leary, 1979), is premature.

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