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Self-Talk and Handicapped Children's Academic Needs: Applications of Cognitive Behavior Modification

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This article addresses the practical validity of self-instruction training as an intervention for severely handicapped children. Three issues are addressed: (1) the development of verbal strategies that are adaptable to children with knowledge deficits, (2) the effects of generalization training, and (3) the role of self-talk (verbalization) in self-instruction. Four studies that address these issues are reviewed. The remedial implications of these studies are also discussed.

Perhaps the most popular approach of the cognitive training studies in improving the academic performance of children is the instructional model developed by Meichenbaum (e.g., Meichenbaum, 1982; Meichenbaum, 1977). The model teaches children to talk themselves through a series of problem-solving steps in order to direct task performance. The problem-solving steps are modeled by the teacher with systematic overt and covert rehearsal on the part of the child. The goal of these self-talk (verbalization) procedures is to change external behavior. That is, self-talk is aimed at altering cognitive processing by introducing new strategies that will improve behavior functioning. Although the approach has had some success with moderate learning-behavior difficulties (e.g., Barkley, Copeland, & Sivage, 1980; Bornstein & Quevillon, 1976; Bryant & Budd, 1982; Burgio, Whitman, & Johnson, 1980); its application to the severe handicapping conditions found in children has been questioned (e.g., Hobbs, Moguin, Tyroler, & Lahey, 1980). For example, the majority of studies using self-talk have focused on children whose learning problems are related to impulse control or orienting to task deficiencies (e.g., Nelson & Birkimer, 1978; Palinscar & A. Brown, 1981). Although these studies have been successful in modifying task behavior, the tasks have been of minimal academic relevance (see Hobbs et al., 1980 for a review).

Three issues must be addressed before self-talk procedures can be validated as an instructional approach for handicapped children with serious academic deficiencies. First, self-instruction training must provide strategies that are adaptable for children who lack the basic knowledge in a particular academic domain (e.g., Kendall & Williams, 1982; Lloyd, 1980). For children who possess the knowledge-base skills necessary for academic performance, general strategy training (e.g., slow down, look carefully at all choices) is appropriate (e.g., Meichenbaum & Goodman, 1971). However, some handicapped children lack specific skills to *identify, assess,* and

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produce the appropriate response. For example, in reading comprehension, some children are not able to identify what the specific task requires for correct performance. They cannot assess what knowledge is necessary to answer questions. That is, to answer a comprehension question, some children fail to read the passage, to look up unknown words, and to mark phrases or thoughts critically related to the purpose of the passage. Some children also lack skills in determining what response produces a correct answer to the problem. Whether that includes verbatim or paraphrased reproduction of a key sentence is based on their knowledge of specific demands of materials. In general, most academically deficient children need explicit instruction in how to gather knowledge to provide the correct response.

Along with the specific skill training needs, academically deficient children also lack general strategies that will enable them to become active learners (A. Brown, 1980; A. Brown, Campione, & Barclay, 1979). Children with severe academic deficiencies may not always know (a) how best to focus attention (Meichenbaum, 1982), (b) how to cope with errors (Meichenbaum & Goodman, 1971), (c) how to self-reinforce (Meichenbaum, 1977; Nelson & Birkimer, 1978), (d) how to self-interrogate or self-question (A. Brown, 1980), and (e) how to make predictions about outcomes (Palinscar & Brown, 1981). These general strategies appear critical for the successful orientation of children to academic tasks.

Second, self-instruction training has had limited success in its transference (generalization) of treatment effects (e.g., Bornstein & Quevillon, 1976; A. Brown, 1980; Friedling & O'Leary, 1979; Kendall & Finch, 1976). Several authors (e.g. Kendall & Wilcox, 1980) have suggested that generalization is more likely to occur when self-instructions include conceptual strategies rather than task-specific strategies. However, the inclusion of self-instruction training skills that are general enough to transfer to a variety of situations have produced mixed results (e.g., Roberts & Dick, 1982).

Finally, the role of self-talk needs to be clarified. By having a child self-talk, it has been assumed that through a child's rehearsing the strategy is being demonstrated. However, several studies have suggested that self-talk (a) directs attention to behavior (e.g., accuracy) but not necessarily to new learning (e.g., Malamuth, 1979), (b) is not easily adaptable to nonmotoric (e.g., reading) activities (e.g., Roberts & Dick, 1982), (c) may interfere with some phases of learning (e.g., Nelson & Birkimer, 1978), and (d) may lack ecological validity, since successful problem solvers do not necessarily talk aloud to themselves (e.g., Cole & Kazdin, 1980; Roberts & Tharp, 1980) Therefore, it may be questioned whether self-talk is a necessary process to insure the effectiveness of strategy training. The role of self-talk is further questioned, because some handicapped children rely on alternative language systems such as sign language to communicate rather than on a verbal language system.

The four studies reviewed assess the role of self-talk training with students who have severe handicapping conditions. These studies incorporate practical procedures that can be used to enhance the academic performance of handicapped students. To simplify the reporting, reliability measures and experimental design were not detailed. In general, all interobserver agreements were above 95% for the four studies. All experiment designs included a multiple baseline across tasks (e.g., Hersen &

Barlow, 1976), except for Study 2, which included a reversal (ABAB) design. All dependent measures were derived from classroom work sheets.

All children in the four studies were considered *educationally handicapped*, a term used in the state of Colorado to refer to both learning disabled and emotionally/behaviorally disordered children. Diagnosis of an educational handicap is made in accordance with the state definition and formal assessment procedures of the child's local school district. All children were independently diagnosed as emotionally disturbed by psychologists using *Diagnostic and Statistical Manual III* (*DSM III*) criteria for conduct disorder (*DSM III* = 312.00). Teacher ratings on the Quay-Peterson Behavior Problem Checklist (Quay & Peterson, 1967) for each of the children used in these studies yielded a mode of 5 (severe) for the conduct cluster. All seven children used in these studies had a history of special education, residential treatment, or both. In addition, all children displayed significant discrepancies between their standardized intelligence scores (M = 90) and their standardized achievement test scores (math, M = 15.5 percentile; reading, M = 12 percentile; spelling, M = 15 percentile). Since all of the children in these studies evidenced both emotion/behavioral disorders and significant academic deficiencies, it was felt that they were representative of handicapped students who need intensive educational intervention.

Study 1: A Test of Training and Generalization

In this study (Swanson & Scarpati, in press), we assumed that generating academic improvement as well as insuring a transfer of skills was related to the incorporation of specific and general skill training (see Kendall & Wilcox, 1980, for a review). We also assumed that in order to assess generalization, treatment effects must be representative of classroom mainstreaming procedures. Therefore, generalization was defined as a variation of treatment procedures that introduced a different task, setting, and person (see Kendall, 1981, for rationale).

Two students participated in this study. Remediation techniques focused on the improvement of reading and spelling performance. Both students received daily self-instruction training during individual, 45-minute tutoring sessions. The classroom token economy system was maintained during the course of the study. Points were given for correct academic performance and appropriate conduct (i.e., in seat, attending behavior, etc.). Tokens were exchanged for such things as free time, privileges, and money.

The daily instructional treatment followed the verbal modeling procedure outlined by Meichenbaum and Goodman (1971). When applying the behavioral rehearsal process, the training proceeded according to the following five sequential steps:

1. Subject quietly observed the teacher (model) performing a task as the teacher talked aloud to himself or herself.
2. Subject performed the same task while the teacher instructed.
3. Subject performed the task again while instructing himself or herself aloud.
4. Subject then performed the task while whispering softly with no teacher prompting.
5. Subject was instructed to perform the task quietly.

The teacher verbally modeled task-specific and general-strategy statements. The general-strategy statement served to slow down the problem-solving process for the following purposes: (a) to assist in error monitoring ("Yesterday I didn't—and I missed the answer"), (b) to self-interrogate ("I need to ask myself . . ."), (c) to make predictions ("If I do that I'll be able to . . ."), and (d) to set the stage for self-reinforcement when the correct procedure occurred. The error-monitoring component of instruction included a coping statement from previous sessions (e.g., "I should have asked myself the title of the story, then I would have been able to answer the question"). The specific task self-instruction statement focused on identifying what the student could do (task-specific requirements) to ascertain the appropriate knowledge (e.g., ask the teacher, look up the word in the dictionary, study the word

Table 1
Sample Self-Instructional Statements

Statement type	Student verbalization
Reading	
Self-interrogation	"How do I understand this passage before I read it?"
Identify task demands	"First, I need to look at the title, then skim the passage for new words and circle them. Second, I need to underline the people's names and words that show action."
Assess knowledge needed	"I need to ask myself the questions who, when, what, where, and how before I read."
Make predictions	"Now, from my lesson yesterday, if I forget these steps, I won't remember what the passage is about."
Error monitoring	"Yesterday, I didn't underline words so I could not answer the question about what happened."
Self-reinforcement	"All three of these tasks are easy if I just take my time and do them."
Assess knowledge needed	"If I don't know a word I circle, I can ask my teacher before I begin reading."
Identify task demands	"I like the way this helps me answer my assigned reading comprehension questions that I need to write out on this paper later."
Identify product required	
Spelling	
Self-interrogation	"Let's see what it is I have to do today."
Identify task demands	"Later I will need to spell these words slowly by underlining word families."
Assess knowledge needed	"I need to remember this for the spelling test."

list aloud) to produce the appropriate response (write the answer in the blank). When either student confused the instruction, the teacher modeled the correct statements. Sample statements used throughout the five sequential steps for reading and spelling are shown in Table 1.

Before answering reading comprehension questions and taking spelling tests, the students proceeded through the five sequential steps . To further insure that self-instruction training occurred during performance, nonverbal referents were established by the teacher. These nonverbal referents were the overt behaviors called for in the self-instruction (i.e., underlining the title, circling new words, answering the questions who, what. . . , looking at the work, and writing words on the paper). The teacher directed each student to produce one nonverbal referent that matched each self-instruction statement.

Table 1 continued

Sample Self-Instructional Statements

Statement type	Student verbalization
Error monitoring	"This has the vowel-consonant-silent /e/. On my spelling test yesterday, I missed a word formed like this."
Self-interrogation	"I need to ask myself how is the best way to do this."
Assess knowledge needed	"If I remember my word families, I won't have to guess on spelling words I'm not sure of."
Self-reinforcement	"That's easy, even if I don't remember each of the letters of the word to spell, . . .
Prediction and error monitoring	I can remember the word family."
Product	"I need to write my words on this piece of paper."
Math [62 + 58 = ?]	
Self-interrogation	"What do I have to do?"
Determine procedure needed	"First, I start on this side of the problem" [student points to right side] and add on the beads [abacus]. Then I carry the one and put it on the top of the next row and I put zero under the two and eight."
Self-reinforcement	"I'm doing a good job."
Determine procedure needed	"Now I add the next row of numbers on the abacus."
Product	"I write two in the tens column and one in the hundreds column."
Self-reinforcement	"That's good. I can do this when I take my time."

Table 2
Mean Subject Performance on Self-Instructional Training

	Mean performance during treatment phases (%)						Mean performance during generalization phases (%)		
	Baseline	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Setting phase	Person phase	Task phase
Study 1									
Subject 1									
Reading	45					75	50	90	70
Spelling	50					96	100	100	100
Subject 2									
Reading	65					81	90	70	90
Spelling	75					95	100	80	100
Study 2									
Subject 1									
Math	60					90	100		
Study 3									
Subject 1									
Math	45	75	63	58	70		90		
Spelling	45	75	75	35	55		50		
Subject 2									
Math	38	95	90	65	90		70		
Spelling	25	95	95	70	90		95		
Subject 3									
Math	35	45	55	70	75		70		
Spelling	40	45	80	65	90		55		
Study 4									
Subject 1									
Reading	13					70	90	45	90
Spelling	48					91	85	73	78

Note. Treatment Phases 1 to 5 were used in Studies 1, 2, and 4. Treatment Phases 1 to 4 were used in Study 3.

A test for generalization of trained self-instruction effects was done in three separate phases. In the setting phase, the students attempted learning activities with the same teacher in a setting not used during the baseline and self-instructional training. This setting phase included environmental changes such as a different classroom with unfamiliar desks and seating arrangements. The person phase utilized a teacher who was new to the academic tasks tested but with whom the subject was familiar from other classroom activities. These sessions occurred in the same classroom that was used for the setting phase. During the task phase, students were asked to use self-instruction training with new learning activities that were of similar grade equivalency to the instructional materials used during the training phase.

In general, the results of the study (see Table 2) suggest that self-instruction training favorably influences reading and spelling performance. Furthermore, self-instruction influenced academic performance when variations occurred in the setting, person, and task phases. However, the effects of generalization during the setting phase for Subject 1 must be questioned. It appears that the setting phase represents an instructional component to be mastered before successful mainstreaming can occur. These limitations were addressed in the next study.

Study 2: Can Self-Talk Generalize Across Settings?

One possible reason for poor generalization during the setting phase, as noted in Study 1, was the extensive amount of variability (e.g., room color, different desks, seating arrangements, proximity to larger regular classrooms). This study (Swanson & Scarpati, in press) evaluates the effectiveness of self-instruction procedures on a different academic task (math) and assesses the generalization of this performance in a setting that introduces variability gradually.

One student was used to measure the effects of both variables. All phases of the intervention were carried out in the student's classroom. The student was instructed individually during baseline and self-instruction training in a secluded corner of the classroom. Each session lasted for 30 minutes five times per week. Generalization of the training was assessed when the student returned to a regular seat in the classroom. The procedures for self-instruction were the same as for the first study (see Table 1).

The student returned to his regular seat to test for generalization effects. All of the other students were told that the subject needed to think aloud on some problems and not to pay any attention to his verbalizations. The three students seated adjacent to the subject were reinforced intermittently via a point system for ignoring his verbal behavior. Two modifications were made in the self-instruction procedures. First, teacher modeling and prompting were omitted from the self-instruction procedure. Second, the teacher only intermittently cued the subject's self-instruction statements.

In general, our results (see Table 2) suggest that arithmetic behavior can be effectively improved by self-instruction procedures. Of critical importance, however, was the effectiveness of self-instruction procedures when the subject was placed in another location within the classroom setting. This finding, coupled with the findings of Study 1, suggests that when setting variability is controlled, generalization of training effects will occur.

Study 3: What Effect Does Sequential Presentation Have on the Academic Performance of Handicapped Children?

The next study (Swanson, in press) basically provides a replication of the earlier studies. However, the study assesses the performance of subjects at various stages of self-instruction in order to identify critical elements of self-instruction training. Since the components of self-instruction training are time-consuming and thus difficult to implement effectively within the time constraints imposed by the classroom setting, this study attempted to determine the most efficient training sequence. Three students participated in this study. Academic performance in the areas of math and spelling were target behaviors.

Four treatment phases were implemented. In the first phase, three steps of Meichenbaum and Goodman's (1971) procedure were used:

1. Subject quietly observed the teacher (model) performing a task as the teacher talked aloud to himself or herself.
2. Subject performed the same task while the teacher instructed.
3. Subject performed the task again while instructing himself or herself aloud.

In the second phase, Steps 1 and 2 were eliminated. Instead, the subjects were instructed to do the task and verbalize aloud. The teacher consistently prompted the subject if self-statements did not include both task-specific and general task components (see Table 1), and if nonverbal behavior did not match self-instruction statements.

In the third phase, the subjects were instructed to whisper their self-instructions to themselves. They were provided with cue cards that listed questions to help them remember their self-instruction components. The teacher, as in the first and second treatment phases, sat next to the subjects to insure compliance and to assure that corresponding academic behavior occurred.

In the fourth phase, the subjects were instructed at each session "to think about what they had been instructed in the past." They were told to do their thinking to themselves. The teacher remained seated with each child for 2 minutes while he or she began the math or spelling assignment.

To check for generalization, the subjects were presented with word problems that required the same math skills as the previously presented number problems. The spelling task followed the same instructional procedures. The spelling-generalization check used words from the subjects' reading comprehension assignment for that day. The results of the study (see Table 2) suggest that the implementation of all five steps on a daily basis is not necessary to insure the self-instruction effects. In addition, transfer of math performance to a related task was achieved for all subjects. Spelling performance also generalized, although performance was not as accurate as during the earlier treatment conditions.

Study 4: What Are the Effects of Self-Instruction When Modalities of Communication Other than Oral Speech Are Used?

This study (Swanson, in press) is different from the previous ones in that the self-instruction strategies were taught through the simultaneous use of sign language and speech (total communication) with a child identified as emotionally disturbed,

hearing impaired (71 db loss/left ear; 90 db loss/right ear) and seriously deficient in reading and spelling skills.

Individual tutoring in reading and spelling self-instruction took place 45 minutes per day in a quiet portion of the classroom. Consistent with the classroom routine, a token economy system was used to reinforce academic performance and appropriate conduct. During the self-instruction experimental condition (see Table 2, Study 4, Phase 5), the token economy was continued as well as the individual instruction. The daily instructional intervention followed the verbal modeling procedure (Meichenbaum & Goodman, 1971) outlined in Study 1. The teacher utilized a total communication approach to model task-specific and general strategy statements. The subject was required to self-instruct using the same total communication system. When an instruction was omitted by the subject, the teacher modeled the correct statement using sign language. The signing was coordinated with the task activity so that the act of holding a pencil, for instance, was prompted by a signed self-instruction. An example of the self-statement for reading comprehension and spelling can be found in Table 1.

The results of this study (see Table 2) indicate that the use of a total communication self-instruction package for a hearing-impaired student yields similar success to the self-instruction intervention used with hearing subjects. Academic performance in the areas of reading comprehension and spelling improved after the self-instruction intervention was implemented. The results of the generalization component of the study indicate that setting generalization and task generalization were more successful than person generalization. This suggests that transfer in the subject's performance may be accomplished in different classrooms and with different tasks as long as the same teacher continues to implement treatment.

Implications for Special Education

The major purpose in reviewing these four studies was to determine the effectiveness of applying self-instruction training to children with serious handicapping conditions. Recent criticisms of these procedures (e.g., Hobbs, Moguin, Tyroler, & Lahey, 1980); Ledwidge, 1978) have been directed to its clinical and educational utility. The present results indicate that self-instruction training can positively influence academic and communication performance. The present treatment, which included elements of cognitive modeling and self-talk, was effective in modifying the academic performance of educationally handicapped children within a self-contained special education setting and token economy. In addition to their behavioral disturbance, most children were two standard deviations below average academic functioning for their grade and age placement. These findings lend evidence to the clinical utility of self-instruction training. We will briefly review four educational implications of our studies.

1. *A self-instruction package that includes general and specific skill components influences the academic functioning of handicapped children.*

The majority of related studies utilize self-instruction strategies that incorporate general coping skills (slowing down response patterns). However, these procedures are more appropriate for impulsive children and less so for children who lack a

knowledge base or task-specific skills. To deal with this problem, the present studies integrated both general and task-specific components that teach the child to control attending skills while acquiring specific knowledge for the task at hand.

2. *Cognitive behavioral programs can be efficiently spread across teaching sessions.*

In Study 3, the cognitive-behavioral program was efficiently spread across sessions. However, when treatment conditions required children to whisper (Phase 3 of Table 2) self-instruction, a decrease in academic performance occurred. The reason why this decrease occurred for some subjects is uncertain. One explanation is that children may have attended more to the activity of whispering rather than to the content of the instructional statements. Another explanation is that teachers had difficulty monitoring whispering activities. Some children were embarrassed by the act of mumbling to themselves and went through their self-statements rapidly. Furthermore, as shown in Table 2, the results of Phase 4 suggest that internal speech serves as a means of generating control over behavior (Vygotsky, 1962). Children in the present study were instructed to think quietly of all the components of self-instruction and to practice them in their heads before beginning their academics. This covert self-instruction maintained academic task performance.

3. *In most cases, the treatment effects generalized across setting, person, and task variables.*

All four studies evaluated the generalization of treatment effects. While our experimental design for evaluating generalization effects is defensible (see Kendall, 1981, pp. 314–316), some caution must be placed on interpreting results. This is because no baseline data were collected for the generalization conditions. The results do suggest, however, that the effects of self-instruction can be maintained when treatments are altered. These altered treatments or phases were judged to be a meaningful assessment of the targeted children's present school needs. In general, subjects were able to generalize reading comprehension, math, and spelling performance to related materials and new settings. This finding is important, since the learning behavior of children may be categorized as being "bound" by specific materials and a specific setting when specific verbal self-instruction strategies are used (e.g., Fox & Kendall, 1983). However, the treatment effects must be qualified, since the generalization of academic performance to a new person was less effective relative to performance in earlier treatment phases. The person generalization phase was included because it accurately represents mainstreaming procedures.

4. *Language plays a critical role in the effectiveness of self-instruction training.*

The last study, which included elements of cognitive modeling and self-talk (via signing), was effective in modifying academic (reading comprehension, spelling) performance of profoundly hearing-impaired children. Of course, we can only infer that the child's signing mediated the self-instruction components. That the child's behavior did not regress to baseline conditions supports this inference. More important, the present study suggests that child language (i.e., signing), not the mere act of verbalization, is an effective means for generating control over behavior. In other

words, the majority of self-instruction studies have included children relatively sophisticated in verbalization skills (e.g., Kendall & Finch, 1976). From these studies we are uncertain if the act of verbalizing mediates important task-related information or merely serves as auditory feedback for task-related variables. By utilizing subjects of various communication styles, it may be effectively argued that inner language (e.g., Vygotsky, 1962) plays a critical role in the effectiveness of self-instruction training. Regardless of our clear support for this interpretation, the overall results of this study suggest that clinical utility of self-instructional training is promising.

Conclusion and Cautions

A training program that includes self-instruction components for general and task-specific learning results in satisfactory maintenance for the children described in these studies. No doubt, from the size of samples used in these four studies, generalizations are questionable. In addition, two notes of caution in the above implications are necessary. First, the effects of global skills versus specific skills were not directly assessed. It may be possible that with the elimination of some components from the self-instruction package, the same academic outcomes could be yielded. Second, it may be argued that the self-instruction procedures used in the four experiments did not modify academic and language behavior directly (Ledwidge, 1978). Therefore, we infer that the imposed statements that modified the cognition of the children indirectly modified their academic behavior. This conclusion is consistent with the majority of cognitive behavior modification studies that attempt to change a child's thought patterns chiefly through the modification of speech (e.g., Vygotsky, 1962). Successful training programs that include metacognitive supplements to strategy training support our conclusion (e.g., Palinscar & Brown, 1981). The clinical utility of cognitive behavior modification procedures may rest in programs that include self-instruction practice in appropriate, task-specific strategies (skill training) as well as self-regulatory training that keeps the child an active learner. Of course, the utilization of self-instruction procedures will depend critically on the efficiency (timewise) of their application compared with more direct and highly observable behavioral interventions (see Hobbs et al., 1980). Since self-instruction training has utility for children with severe academic deficiencies and can facilitate generalization, its application to special education students becomes more feasible.

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