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Improving academic skills and attention/memory skills in self-contained learning disabled students through a package of cognitive training procedures

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IMPROVING ACADEMIC SKILLS AND ATTENTION/MEMORY SKILLS IN SELF-CONTAINED LEARNING DISABLED STUDENTS THROUGH A PACKAGE OF COGNITIVE TRAINING PROCEDURES

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IMPROVING ACADEMIC SKILLS AND ATTENTION/MEMORY SKILLS IN SELF-CONTAINED LEARNING DISABLED STUDENTS THROUGH A PACKAGE OF COGNITIVE TRAINING PROCEDURES

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IMPROVING ACADEMIC

SKILLS AND ATTENTION/MEMORY

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CHAPTER I

INTRODUCTION

Justification for the Study

Frequently children in the public schools with severe learning disabilities are placed in a self-contained learning disabilities classroom for maximum academic assistance. A primary reason for placing children in self-contained learning disabilities programs is to improve their academic achievement and performance so that they can be mainsteamed back into a regular education program. Traditional special educational curriculums seem to have had only limited success in significantly improving the academic performance of self-contained learning disabled students. Many students remain in self-contained learning disabilities programs for long periods of time.

Torgesen (1977) asserts that many of the failures of learning disabled children may be due to defective meta-cognitive skills such as generalized attentional skills. Severely learning disabled students

may be unable to differentiate the essential from non-essential components in the learning situation.

Meichenbaum (1979) suggests that cognitive behavior modification procedures may also be applicable to the academic problems of children with severe learning problems.

No research investigations, however, have attempted to utilize Meichenbaum's procedures as part of the special education curriculum within the self-contained learning disabilities classroom in order to improve academic performance. This study employed Meichenbaum's self-instructional procedures to reinforce component attentional skills within the self-contained learning disabilities classroom.

Problem Statement

The purpose of this investigation is to attempt to improve the component attentional skills and academic performance of learning disabled students through the utilization of cognitive behavior modification procedures.

Theoretical Rationale

Cognitive behavior modification as outlined by Meichenbaum (1977) has become a popular therapeutic strategy for research and application with various populations of children and adults. Meichenbaum (1977) reports that cognitive behavior modification was an attempt "to bridge the gap between the clinical concerns of cognitive-semantic therapists (e.g., George Kelly, Jerome Frank, Albert Ellis, Aaron Beck, and Jerome L. Singer) and the technology of behavior therapy" (p. 11).

In a 1979 article, Meichenbaum reviews and discussed the current research concerning the application of cognitive behavior modification with school children. Meichenbaum (1979) traced the use of cognitive behavior modification with children to the work of the Soviet psychologists Luria (1959) and Vygotsky (1962). Luria (1959) proposed three stages by which the initiation and inhibition of voluntary motor behaviors come under verbal control. During the first stage, the speech of others, usually adults, controls and directs the child's behavior. The second stage is characterized by a child's overt speech becoming an effective mediator or regulator of his behavior. Finally the child's covert or inner speech comes to assume a

self-governing role. Meichenbaum and Goodman (1971) developed and successfully used a self-instructional treatment paradigm based on Luria's model to train impulsive children to talk to themselves as a means of developing self-control.

Meichenbaum (1979) contends that cognitive behavior modification procedures may also be applicable to academic problems. he states that "(a) students are told to perform a task, but rarely are shown how to break the task down into manageable units, (b) how to determine the hierarchy of skills required to do the task, or (c) how to translate these skills into self-statements and images that can be rehearsed" (p. 430). Meichenbaum (1983) also noted that research findings such as Torgesen (1977) have suggested that many of the failures of learning disabled children may be due to defective meta-cognitive skills such as attentional deficits. Very few research investigations, however, have employed cognitive behavior modification techniques with severely learning disabled children. In this study, a package of cognitive behavior procedures is utilized in an attempt to improve the attentional skills and academic achievement of severely learning disabled children.

Definition of Terms

Learning Disabled Students : Students previously identified as learning disabled according to Federal, State and Local regulations based upon Public Law 94-142.

Self-Contained Learning Disabilities Classroom : Classroom in the Virginia Beach Public Schools designated for severely learning disabled students with one state certified teacher and a teacher's aide for a maximum of ten students.

General Hypotheses

The general hypotheses explored in the study include:

(1) The academic achievement of elementary age self-contained learning disabled students will be significantly improved as a result of the cognitive training procedures.

(2) The attentional skills of elementary age self-contained learning disabled students will be significantly improved as a result of the cognitive training procedures.

(3) The visual and auditory memory skills of elementary age self-contained learning disabled students will be significantly improved as a result of the cognitive training procedures.

Sample and Data Gathering

The sample for this investigation (N=36) is students presently enrolled in the self-contained learning disabilities program from two Virginia Beach, Virginia, public elementary schools. Eight intact self-contained learning disabilities classes were selected for this study. Four classes served as treatment groups and four as controls. Date was gathered only on those students between the ages of 8-0 and 11-11 at the beginning of the treatment and with Full Scale I.Q. scores of 80 or greater on the Wechsler Intelligence Scale for Children-Revised.

Pre and post-treatment data was gathered using individually administered measures of academic achievement, visual and auditory memory skills and attentional skills. The Woodcock-Johnson Psycho-Educational Battery-Part II was utilized to obtain measures of reading, mathematics and written language achievement. Selected subtests of the Detroit Tests of Learning Aptitude were used to obtain measures of visual and auditory memory skills. The Matching Familiar Figures Test was utilized to obtain measures of impulsive-reflective attentional responding styles. All subjects

were tested during the three week period prior to the initiation of the three month treatment and during the three week period following the completion of the treatment procedure. Pre and post-testing procedures were counterbalanced between the groups.

Limitations

There are two major limitations in this investigation. The population used in this study involves intact classroom groups and random assignment of subjects was therefore impossible. Intact groups were chosen in order to investigate the effectiveness of cognitive training procedures utilized by the teacher within the classroom. Generalization to other learning disabled groups in other settings seems appropriate, however, since all of the subjects were placed in self-contained learning disabilities classrooms according to accepted Federal, State and Local guidelines based on Public Law 94-142.

A second limitation of this study involves the difficulty of controlling the effects of personality and "style" of the teachers delivering the treatment. This difficulty was partially controlled by the use of four different teachers in both the treatment and control situation. In addition, the teachers were also observed at least twice prior to the initiation of the treatment procedure and twice during the treatment procedure to insure that the teachers did display equivalent teaching styles both prior to and during the implementation of the treatment procedure.

Ethical Considerations

Informal parental consent in the form of written permission was obtained for each of the children included in this study. Anonymity of subjects was also assured. This study was submitted and approved by the Research Department of the Virginia Beach Public Schools and the Human Subjects Committee of the College of William and Mary.

CHAPTER II

REVIEW OF LITERATURE

Summary of Rationale

Cognitive Behavior Modification as formulated by Meichenbaum (1977) indicates that behavior change occurs through a "sequence of mediating processes involving the interaction of cognitive structures, inner speech, behavior and their resultant outcomes" (p. 218). According to Meichenbaum (1977), "the mediational process involves the recognition of maladaptive behavior (either internal or external and this recognition must come to elicit inner speech that is different in content from that engaged in prior to therapy" (p. 218). Meichenbaum also hypothesizes a three phase flexible sequence in which the cognitive structures, inner speech and behaviors with their resultant outcomes, interact in contributing to behavior change. Corey (1977) offers the following summary of the three phase process suggested by Meichenbaum:

> **Phase 1**: Self-Observation. The beginning step in the change process consists of clients' learning how to observe their own thoughts, feelings, physiological reactions, and interpersonal

behavior. For example, if depressed clients hope to make constructive changes, they must first realize that they are not a "victim" of negative thoughts and feelings. Rather, they actually contribute to their depression through the kinds of things they tell themselves. Although self-observation is seen as a necessary process if change is to occur, it is not a sufficient condition per se for change.

Phase 2: Starting a New Internal Dialogue. As a result of the early client/therapist contacts, clients learn to attend to their maladaptive behaviors, and they begin to notice opportunities for adaptive behavioral alternatives that will lead to behavioral/cognitive/affective changes. If clients hope to change, then what they say to themselves must initiate a new behavioral chain, one that is compatible with their maladaptive behaviors. Clients learn to change the internal dialogue that brought them into therapy. Their new internal dialogue comes to guide new behavior, which results in a form of cognitive restructuring.

Phase 3: Learning New Skills. The third phase of the modification process consists of teaching clients more effective coping skills, which are practiced in real-life situations. At the same time, clients continue to focus on telling themselves new sentences and observing and assessing the outcomes. The stability of what they learn is greatly influenced by what they say to themselves about their newly acquired behavior and its consequences. (p. 158)

Corey (1977) indicated that modern behavior therapy and Meichenbaum's cognitive behavior modification can be traced historically to Albert Ellis's rational-emotive therapy and Beck's cognitive therapy. Ellis (1962) assumes that human problems are the result of faulty thinking or irrational beliefs. In effect, people create their own emotional and behavioral disorders through their persistence in irrational thinking and self-destructive "self-talk." The assumption is that an individual's cognitive system can be changed directly and that this change will result in an altered and more appropriate set of behaviors. According to Corey (1977), Beck's cognitive therapy involves assisting clients to evaluate their behavior critically, by focusing on negative self-statements. Beck (1976) advocated teaching clients systematic skills of self-observation, so that they can see the relationship between thoughts and emotions. They develop certain hypotheses about their behavior and gradually learn to employ specific problem-solving and coping skills to other situations.

Meichenbaum included much of the work of Ellis and Beck in his theory of cognitive behavioral modification. Meichenbaum (1977) stated, however, that therapists must be concerned with all three basic processes: cognitive structures, inner speech, and behaviors

and their resultant outcomes in order to achieve optimal success in therapy. Meichenbaum indicated that focusing on only one will not prove effective.

In a 1979 article, Meichenbaum reviewed and discussed the current research concerning the application of cognitive behavior modification with school children. Meichenbaum (1979) traced the use of cognitive behavior modification with children to the work of the Soviet psychologists Luria (1959) and Vygotsky (1962). Luria (1959) proposed three stages by which the initiation and inhibition of voluntary motor behaviors come under control. During the first stage, the speech of others usually adults, controls and directs a child's behavior. The second stage is characterized by a child's overt speech becoming an effective mediator or regulator of his behavior. Finally the child's covert or inner speech comes to assume a self-governing role. Meichenbaum and Goodman (1971) developed and successfully used a treatment paradigm to train impulsive children to talk to themselves as a means of developing self-control based on Luria's model. Meichenbaum's technique involved the following procedural steps:

1. An adult model performed a task while talking to himself out loud (cognitive modeling);

2. The child performed the same task under the direction of the model's instructions (overt, external guidance);

3. The child performed the task while instructing himself aloud (overt self-guidance);

4. The child whispered the instruction to himself as he went through the task (faded, overt self-guidance) and finally

5. The child performed the task while guiding his performance via inaudible or private speech and nonverbal self-direction (covert self-instruction). (p. 427) This cognitive behavioral paradigm has now been used successfully to teach self-control skills to a wide variety of disruptive children.

Meichenbaum (1979) suggested that cognitive behavior modification procedures may also be applicable to academic problems. Meichenbaum (1979) stated that "(a) students are told to perform a task but rarely are shown how to break the task down into manageable units, (b) how to determine the hierarchy of skills required to do the task, or (c) how to translate these skills into self-statements and images that can be rehearsed" (p. 430). Meichenbaum also noted that research findings such as Torgesen (1977) hypothesized that many of the failures of learning disabled children may be due to defective meta-cognitive skills such as attentional deficits. Very little

research, however, has been undertaken employing cognitive behavior modification techniques with learning disabled children. The purpose of this study was to attempt to improve the cognitive processing skills and academic performance of learning disabled students through the application of the techniques of cognitive behavior modification.

Historical Theoretical Concepts

Cognitive behavior modification as outlined by Meichenbaum (1977) has become a very popular therapeutic strategy for research and application with various populations of children and adults.

Craighead (1982) indicated that Meichenbaum's approach involves self-instructional training in which clients are taught to produce internally generated self-statements and to talk to themselves in a self-guiding fashion. Craighead noted that Meichenbaum in developing his self-instructional training for children drew heavily from the writings of Luria (1959) and Vygotsky (1962). In Meichenbaum's procedure, "the experimenter modeled the overt behavior and the appropriate self-statements, and subsequently the child imitated the target behavior while first self-instructing aloud, then whispering, and finally covertly rehearsing the self-statements" (Craighead, 1982, p. 8).

Prior to Luria and Vygotsky, Shaffer (1947) asserted that therapy is a learning process through which a client becomes able to speak to himself in appropriate ways to control his behavior.

Abikoff (1979) suggested that Meichenbaum's cognitive training

"implements a task-analytic approach whereby the child is taught appropriate task-relevant cognitions, or 'cognitive strategies, which interrupt and inhibit maladaptive stimulus-response associations" (p.124). Abikoff also indicated that this cognitive training should provide the child with organized cognitions for monitoring overt behavior and thereby facilitate generalization and maintenance effects.

Meichenbaum (1977) reported that cognitive behavior modification was an attempt "to bridge the gap between the clinical concerns of cognitive-semantic therapists (e.g., George Kelly, Jerome Frank, Albert Ellis, Aaron Beck, and Jerome L. Singer) and the technology of behavior therapy" (p. 11). Meichenbaum also indicated that he was very concerned with whether behavior therapy procedures such as systematic desensitization, modeling and operant and aversive conditioning could be improved by expanding their focus to include the client's cognitions.

Meichenbaum (1977) concluded that "behavior therapy techniques, as originally conceptualized and implemented, have overemphasized the importance of environmental events (antecedents and consequences), and, therefore, underemphasized and often overlooked how a client perceives and evaluates those events" (p.108).

In general, Meichenbaum reported that the research indicated that "when the standard behavior therapy procedures were augmented with a self-instructional package, greater treatment efficacy, more generalization, and greater persistence of treatment effects were obtained" (Meichenbaum, 1977, p. 108).

Historically, Meichenbaum's cognitive behavior modification can be most clearly linked to the cognitive-semantic therapeutic approaches of Albert Ellis, George Kelly and Aaron Beck. Meichenbaum (1977) indicated that for the semantic therapist, mental illness is fundamentally a disorder of thinking-the patient consistently distorts reality in an idiosyncratic manner and/or reaches illogical conclusions concerning his ability to cope with his environment.

Meichenbaum believed that clients need to be taught strategies to analyze and generate appropriate self-statements, rather than just assuming they are capable of doing so, as Ellis apparently does.

Kelly (1955) developed his therapy based on the scientific method and considered it an experimental process. The therapist helps the client define hypotheses and to develop experiments using the therapy room as a laboratory. Patterson (1966) indicated, however, that Kelly's approach is phenomenological in nature and is not dianostically or externally oriented.

Ellis (1962) asserted that the client's irrational beliefs lead to self-defeating self-talk that exert an adverse effect on behavior. Ellis also believed that whether the client did or did not actually talk to himself prior to therapy is less important than that he is willing to view his behavior as if it were effected by self-statements and modifiable by them.

Lazarus (1972) also emphasized the role of cognitive factors in contributing to mental illness and focused on modifying the clients maladaptive self-verbalizations.

Mahoney (1974) identified five general areas of research including perceptual misattribution, semantic conditioning and generalization, symbolic self-stimulation, learning and awareness and vicarious learning processes which seriously challenge the adequacy of a totally nonmediational model. Mahoney developed a cognitive-behavioral approach which he describes as his personal science. Mahoney's paradigm, however, appears to be very general in nature and very difficult to operationally define for research purposes. Rimm and Masters (1979) concluded that little research supporting Mahoney's personal science has been generated and is available in the literature.

Beck (1976) indicated that his cognitive therapy involved assisting clients to critically evaluate their behavior by focusing on negative self-statements. Beck (1970) also suggests that a clients maladaptive cognitions may take a pictorial form instead of, or in addition to the verbal form. Semantic and behavioral techniques are used to teach clients to recognize, observe, and monitor their own thoughts and assumptions. Beck's approach, however, was geared mainly to working with depressed clients and is not readily generalizable to other clinical and non-clinical populations.

Critique

Rimm and Masters (1979) noted that "the treatments of Ellis, Beck and Meichenbaum are relatively straight forward in nature: by persuasion, disputation, cognitive modeling, and the like, efforts are directed at modifying self-statements or beliefs" (p. 413).

Albert Ellis's rational-emotive therapy emphasized the importance of changing the client's irrational belief system through the direct teaching of appropriate self-statements and homework assignments. Ellis, however, makes little attempt to determine if the client is capable of generating and analyzing appropriate self-statements in new and different problem situations.

Beck's cognitive therapy, as previously discussed, is difficult to generalize beyond his specific target population of depressed clients.

Abikoff (1979) reported that Meichenbaums' cognitive training seems to be most effective in modifying performance on paper and pencil measures of cognitive impulsivity. He indicates that "evidence for the generalizability of cognitive training to other areas of cognitive functioning is equivocal" (Abikoff, 1979, p. 132). Abikoff further noted, however, that promising positive findings for improved academic performance through Meichenbaum's cognitive training demand further investigation to clarify their implication for enhancing the academic functioning of problem as well as normal children. Kendal (1984) also contended that further research on the effects of cognitive-behavioral approaches with special populations of children is gravely needed.

Cognitive Self-Instructional Approaches

Cognitive behavior modification has been used successfully with children with various behavior problems in a number of settings. Meichenbaum and Goodman (1971) developed and utilized a self-instructional training procedure to train impulsive children to talk to themselves as a means of developing self-control. Significant increases in constructive self-talk and improved self-control as measured by test performance were noted in the experimental group as compared to the control group. The improved test performance continued to be evident in a one month followup.

It was noted, however, that observations of classroom activity, as well as teacher ratings, collected to investigate treatment effects on classroom behavior, failed to demonstrate significant effects.

These findings suggested that the limited focus of the treatment program may have contributed to it's lack of generalization to the classroom.

Kendall and Finch (1976) used self-instructional training with a nine year old boy who showed impulsive problems in the classroom and impulsive performance on the Matching Familiar Figures Test. The target behaviors were shifts in topics of conversation, games played with, and rules of play. After the treatment, the amount of therapist-recorded behavioral shifts was reduced to almost zero. The authors believed that the child's improved performance on the Matching Familiar Figures Test indicated a change from an impulsive to a reflective cognitive response style. At six month followup, the child was still using a reflective Matching Familiar Figures Test response style and continued to show no inappropriate shifts in behavior.

No systematic observation or followup within the classroom, however, was undertaken in this study. The case study approach also severely limited the generalizability of the experimental results.

Camp et al. (1977) used a cognitive training procedure to try and modify the aggressive behavior of a group of twenty-three second grade boys. Training exercises were taken from Camp's "self-instructional" program which emphasizes

the modeling of cognitive strategies and the development of covert self-instructional skills. The treatment groups test performance improved significantly as compared to the control group. Teacher ratings of aggressive classroom behavior, however, did not differentiate between the treatment and the control group.

The authors suggest that some nonspecific behavioral generalization to the classroom seemed to have occurred, since the treated children were rated as improved by their teachers, on significantly more prosocial behaviors than were the controls.

Bornstein and Quevillon (1976) employed a cognitive self-instructional treatment package with overactive preschool children in a headstart program to increase on-task behaviors. The treatment procedure was similar to that developed by Meichenbaum and Goodman (1971), but it also included a tangable reward of candy for the children and massed practice rather than spaced practice. Bornstein and Quevillon utilized a multiple-baseline design with an observer-expectancy control condition in order to increase the

credibility of a casual relationship. On-task behaviors reportedly increased significantly with the introduction of the self-instructional package and treatment gains were maintained 22.5 weeks after baseline was initiated. These on-task behavior gains were found to have generalized and were maintained within the classroom setting.

It was noted, however, that a very small sample size of three subjects was used and that the measurement involved only observations.

Nelson and Birkimer (1976) attempted to determine which components in a previously successful cognitive self-instructional program were necessary in modifying children's impulsivity. The training techniques were similar to those used by Meichenbaum and Goodman (1971). In this investigation, however, the subjects were divided into four groups including: "(a) self-instruction; (b) self- instruction and self-reinforcement; (c) attention control; and (d) assessment control" (Nelson and Birkimer, 1976, p. 183). Significant results as measured by test performance on the Matching Familiar Figures Test were found only in the

self-instruction and self-reinforcement condition. These findings are in conflict with the previous research of Meichenbaum and Goodman (1971) who obtained significant changes with a self-instructional approach. Nelson and Birkimer stated that their finding "provides a clear-cut support for the inclusion of self-reinforcement training component in cognitive self-instruction packages designed to modify children's impulsitivity" (p. 183).

Spivack and Shure (1974) developed a cognitive self-instructional approach called "social problem solving" designed to improve children's peer relationships. Spivack and Shure believed that children with behavior problems do not think of the possible consequences of their behavior nor do they conceptualize alternative options for action. Spivack and Shure (1974) trained teachers to carry out a series of thirty minute sessions on social problem solving with a group of preschool children. The treatment group showed significant gains on a self-report measure of their ability to generate alternatives and anticipate consequences. In addition, teachers who were blind to the group assignment rated them on a behavior rating

scale as better adjusted. Shure and Spivack (1978) obtained similar findings using kindergarten children.

Brown et al. (1985) studied the effects of three modes of treatment in relation to an untreated group on hyperactive boys. The treatments were administered over a three-month period and included cognitive training, stimulant drug therapy and the two treatments combined. Analyses of attentional deployment and cognitive style measures, tests of academic achievement, and behavioral ratings showed that only those children in the two medication treatment conditions showed improvement in attentional deployment and behavioral ratings. The cognitive therapy condition demonstrated changes on measurements of attentional deployment only.

In this investigation, however, the cognitive treatment was not provided by teachers within the classroom and all of the subjects were not classified as learning disabled. The measure of achievement employed was the Wide Range Achievement Test which provides very limited information on academic performance.

Critique

The research findings presented indicate that cognitive self-instructional procedures can be effective in modifying the behavior of children with various kinds of impulse control problems. As Abikoff (1979) suggests, however, cognitive training has been demonstrated to be most effective in modifying children's paper and pencil test performance. The generalizability of the treatment effects of cognitive self-instructional strategies to the classroom setting has not been clearly demonstrated. This could be attributable to the lack of involvement of the classroom teacher in the training procedure in many of the studies. In the investigations of Spivack and Shure (1974), in which the teachers were involved in the training procedure, generalization of behavior change to the classroom was noted. Meichenbaum (1983) and Tarver (1986) emphasize that cognitive-behavior modification training at the metacognitive level involving direct instruction should be used in future research to increase generalization.

The current research findings also suggest that the initial utilization of tangable reinforcement with young

children and pairing self-reinforcement with a cognitive self-instruction procedure may be instrumental in enhancing the treatment effects.

Component Attentional Skills Training

Learning disabled children have often been described as having very discrete and specific processing disorders which impede the learning process.

Torgesen (1977) suggested that the academic failures of learning disabled children may be due to inefficient performance, rather than due to an actual ability deficit. He further suggested that learning disabled children could benefit from being taught more effective learning strategies involving generalized attentional skills training. Very little research, however, has been undertaken involving training attentional skills to improve academic performance.

Egeland (1974) trained impulsive second grade children to improve their search strategies on a series of match-to-sample visual discrimination exercises. He focused on improving the academic performance of the children as well as modifying their cognitive response style. During training sessions a wide variety of tasks and materials were used, including match-to-sample exercises, recall of drawing designs from memory, and description of geometric

designs. Two treatment groups and a no treatment control group were utilized. The treatment groups showed significantly improved performance on the Matching Familiar Figures Test administered immediately after the training. The treatment group taught to improve search strategies maintained the improvement at a two month followup. The treatment groups also displayed improved performance on the vocabulary subtest of the Gates-MacGinitie Reading Test and the treatment group trained in improved search strategies showed increased comprehension skills.

This study seems to support Torgesen's hypothesis and suggests that training to improve search strategies and component attentional skills in impulsive children can be effective in improving academic performance on achievement tests. Unfortunately no attempt was made to generalize the treatment procedures to the children's classroom situation. Thus the generalizability and adaptability of the training to the classroom setting remains very much in question.

Douglas et al. (1979) developed a remedial program that focuses on teaching the child more effective problems-solving strategies and control of disruptive behavior though self-instructional modeling, and role-playing techniques. Their aim

was to develop a package of problem solving and cognitive self-instructional strategies which would improve the behavior and academic test performance of hyperactive boys. Teachers and parents were involved as observers in the training process in order to maximize generalization. As compared to the controls, the treatment group showed significantly improved test performance on the Matching Familiar Figures Test, the Bender Gestalt Test and the Durrell Reading Test. No treatment effect was obtained on a teacher's behavior rating scale, even though the treatment program included a behavior skills component.

It is interesting to note that in this investigation both problem solving strategies and cognitive self-instructional training were used. Although the treatment effects did not appear to generalize behaviorally to the classroom, significant improvement in tested reading performance was obtained. It seems likely that more active participation of the teachers in the training process may have increased the potential for behavioral generalization to the classroom.

Brown and Alford (1984) used a package of cognitive self-control procedures to attempt to remediate the attentional deficits and improve the academic performance of twelve year old

learning disabled students. The treatment involved training improved search strategies through the visual discrimination exercises of Egeland (1974) and cognitive self-instructional training similar to that developed by Meichenbaum and Goodman (1971). The treatment group as compared to the no treatment control group displayed significantly improved performance on measures of reading, attention, and inhibitory control. The improvement was maintained at a three month retest followup.

It was again noted, however, that the classroom teachers were not in any way involved in the training procedure. It was further noted that the academic tests administered did not involve a reading comprehension or written language subtest.

Locker (1985) investigated the effects of a haptic training program on impulse and attention control in communication learning disabled students. Significant improvements in scanning and processing times, attention deployment strategies, and response accuracy on the haptic and visual discrimination tasks sampled at posttesting and at followup as well as increases in reflectivity were reported by the researchers.

No standardized measure of academic achievement, however, was administered to determine if academic performance was enhanced by the treatment program.

Montague et al. (1986) attempted to improve verbal math problem solving performance of learning disabled adolescents through cognitive strategy training. The cognitive strategy was designed to enable students to read, understand, carry out, and check verbal math problems that are encountered in the general math curriculum at the secondary level. The results indicated that the students demonstrated improved performance on two-step math problems with maintenance and generalization of the strategy being evident.

The small sample size of six and multiple baseline design, however, used in this study appears to severely limit the validity of the results.

Critique

The research presented indicates that training in component attentional skills can be successful in improving the academic test performance and attentional skills of normal and learning disabled children. Much more research, however, is needed involving larger sample sizes and different age groups of both normal and learning disabled children before the extent of generalization of attentional

skills training can be fully assessed. It was also noted that in none of the research presented did the training take place in the classroom setting administered by the teacher.

In the current investigation, teachers were actively involved in the training process with all of the children within their classrooms. Attentional component training activities similar to those used by Egeland (1974) were used in the training process.

Population

Impulsive children and children with academic problems have frequently been described as having a generalized deficit in their attentional processing skills. These attentional deficits have been described and investigated in various ways in the literature.

Kagan (1965) utilized a complex series of visual discrimination tasks with first grade children in order to differentiate those with either impulsive or reflective responding styles. The students were also given measures of reading skills at the end of first grade and second grade. Kagan reported that the impulsive children with fast response times and high error scores on the visual-matching tests, as compared to the reflective children with long decision times and low error scores made significantly more errors in reading on both evaluations.

It was noted, however, that the specific reading test used was not mentioned and that no measure of actual classroom performance was undertaken.

Siegelman (1969) attempted to classify fourth grade children as cognitively reflective or impulsive responders by means of the Matching Familiar Figures Test. As predicted, she found that

reflective children had significantly higher mean scores on all absolute measures of frequency and duration of looking behavior. When relative deployment of attention was calculated, reflective children were found to devote proportionately less time as well as less frequent looks to the standard, to the most observed alternative, and to the chosen alternative. Siegelman suggested that the impulsives displayed a more biased and peaked distribution of attention.

Zelniker et al. (1972) attempted to analyze and modify the search strategies of impulsive and reflective children on the Matching Familiar Figures Test. They found that requiring the children to perform a Differentiating Familiar Figures Test after the Matching Familiar Figures Test improved the scanning strategy of both the impulsive and reflective children. It was also found, however, that impulsive responding children had poorer ability to sustain attention on a reaction-time test than did the reflective children.

The research presented on impulsive and reflective responding children appears to indicate that impulsive children have difficulty sustaining attention and differentiating essential information for learning from non-essential information.

Torgesen (1977) suggested that learning disabled students may have faulty learning strategies such as those previously noted in impulsive responding children. He suggested "that when a child fails a memory task, or seems deficient in some aspect of attention or perception, it may be interpreted as a failure to employ active and successful strategies" (Torgesen, 1977, p. 30). Torgesen felt that memory processes were not being measured per se, but it was measuring the subjects ability to adapt to the demands of the task by employing effective strategies to deal with it. He further suggested that learning disabled students could be considered inactive learners and unable to actively structure themselves into appropriate learning strategies.

Parker et al. (1975) compared thirty children labelled as learning disabled to thirty normal children with regard to their free recall performance as a function of organization of material and level of difficulty. It was found that for normal children both material organization and level of difficulty influenced the amount of recall; while for learning disabled children, only level of material difficulty influenced recall. Parker feels that these findings lend support to the hypothesis that learning disabled children are unable to take mnemonic advantage of externally organized material.

These findings appear to be consistent with the previously cited research on reflective and impulsive children and the hypothesis of Torgesen with regard to learning disabled children. These children have severe difficulties attending to and recalling essential information required in the learning process.

Tarver et al. (1976) investigated the development of verbal rehearsal strategies and selective attention in learning disabled children. A developmental analysis of the treatment groups indicated that central recall revealed constant age-related increases in overall central recall and primary recall. The children in the control groups recalled more central, but not more incidental information than the learning disabled children which suggested that the learning disabled children are deficient in selective attention. The findings also indicated that the selective attention of learning disabled children improves with age.

The researchers suggested that the performance of learning disabled children may be improved by teaching and reinforcing appropriate learning strategies.

Torgesen and Hauch (1980) attempted to determine which of a number of theoretically relevant variables including attention, motivation, mnemonic strategies or subprocessing skills could

account for the poor performance of some learning disabled children on tests of short-term auditory memory like the Digit Span subtest of the Wechsler Intelligence Scale for Children-Revised. The subjects were eight learning disabled children who performed in the retarded range on the Digit Span subtest, eight learning disabled children who performed normally on the test and eight average children from regular classrooms. The authors found that the major portion of the recall differences among the groups appeared to be due to the inability of the low memory group of learning disabled children to establish efficient mnemonic codes for highly familiar stimuli.

These findings again suggested that teaching appropriate learning strategies such as mnemonic and rehearsal techniques could be beneficial to learning disabled children with attention deficits.

Swanson (1984) demonstrated that learning disabled and non-learning disabled readers can be differentiated by the extent to which their free recall of words is affected by the attention demand characteristics or cognitive effort of the items presented. The results suggested that learning disabled and nondisabled readers do differ in processing capacity and that cognitive effort may be relevant factor in the word encoding process. The author also suggested that nonlearning disabled readers activate features of

words automatically and show a strong tendency to conduct further processing and encoding effort in order to improve the probability of future retrieval.

Swanson (1985) explored the hypothesis that learning disabled students poor math performance was related to their inability to make strategy transformations. The results indicated that nondisabled children were superior in performance to disabled on transformations that required reordering or the abandoning of previously learned strategies.

These findings seem to indicate that learning disabled students need to learn strategies to cue themselves to attend to the essential information required for learning within an academic setting.

Critique

The research presented appears to demonstrate clearly that children described as having impulsive responding styles show very similar characteristics to learning disabled children described as having generalized attentional deficits. The findings indicated that learning disabled children as compared to nondisabled children have great difficulty utilizing effective rehearsal and mnemonic strategies in the memorization and recall of new information. Learning disabled children also have great difficulty developing

effective problem solving skills to aid in differentiating essential information required for learning from non-essential data.

Several authors have suggested that teaching learning disabled children to actively utilize appropriate attentional skills and mnemonic cues may be effective in improving their attentional deficits and academic performance. The purpose of this study was to employ the cognitive self-instructional training strategies developed by Meichenbaum and Goodman (1971) to teach learning disabled children to talk to themselves with regard to using appropriate mnemonic and attentional problem solving skills within the classroom to enhance academic performance.

Summary

Although the research reviewed in this section is far from all inclusive, it does indicate the need for the present study. The studies reviewed regarding the effectiveness of cognitive self-instructional procedures with children clearly suggested that it can be very effective in modifying the behavior of children with various kinds of impulsive control problems. Cognitive training procedures, however, have been most successful in modifying children's performance on paper and pencil tests such as the Matching Familiar Figures Test. Some evidence of generalization of effects to the classroom setting can be found in the research of Spivack and Shure (1974), in which teachers were involved in the training procedure.

A number of research investigations have been successful in improving academic test performance of normal and learning disabled students through the training of component attentional skills. In none of these investigations, however, were teachers actively involved in the treatment training process.

The research previously reviewed clearly seems to demonstrate that children having impulsive responding styles show characteristics very similar to learning disabled children described

as having generalized attentional disorders. Learning disabled children seem to have great difficulty developing effective rehearsal and mnemonic strategies for the assimilation and recall of new information. Learning disabled students also appear to have difficulty differentiating essential from non-essential information required for learning.

This investigation utilized the cognitive self-instructional procedures developed by Meichenbaum and Goodman (1971) to reinforce component attention and memory skills in self-contained learning disabled students in order to improve their level of academic achievement.

CHAPTER III

METHODOLOGY

Population

The population utilized for this investigation were students previously identified and placed in the self-contained learning disabilities program in a large metropolitan Virginia School District. Eight elementary self-contained learning disabled classrooms with a total of thirty-six children eight to eleven years of age were selected for this study. Four classrooms received the treatment procedure and four continued to receive their normal classroom instruction. The students were placed in a learning disabilities self-contained classroom after a thorough diagnostic evaluation by a qualified school psychologist. All of the subjects in both groups came from middle to uppermiddle class home environments. Excluded from the study were students whose overall I.Q. scores on the Wechsler Intelligence Scale for Children-Revised were less than 80.

The training group consisted of five females and thirteen males with a mean age of 10.15 years and a mean I.Q. on the Wechsler Intelligence Scale for Children-Revised of 93.2.

The control group consisted of six females and twelve males with a mean age of 10.14 years and a mean I.Q. on the Wechsler Intelligence Scale for Children-Revised of 95.2.

Procedures

The treatment utilized the cognitive self-instructional training strategies developed by Meichenbaum and Goodman (1971) to teach learning disabled children to talk to themselves with regard to using appropriate mnemonic and attentional problem solving skills similar to those used by Egeland (1974) and Brown and Alford (1984). Meichenbaum's procedure with children involves the following procedural steps:

1. An adult model performed a task while talking to himself out loud (cognitive modeling);

2. The child performed the same task under the direction of the model's instructions (overt, external guidance);

3. The child performed the talk while instructing himself aloud (overt self-guidance);

4. The child whispered the instructions to himself as he went through the task (faded, overt self-guidance);

5. The child performed the task while guiding his performance via inaudible or private speech or nonverbal self-direction (covert self- instructional).

The training procedure involved two one hour sessions per week for ten weeks within the self-contained learning disabilities classroom administered by the teacher and her aid. The teachers involved in the training procedure participated in a two session training module administered by the researcher. In the first session, the treatment procedure was modeled and demonstrated for the teachers and possible difficulties with regard to classroom implementation were discussed. In the second session, the teachers were required to model the training procedure and a critique and suggestions were presented. All of the teachers both those involved in providing the treatment and those used as controls were observed in class for a minimum of two hours prior to the initiation of the treatment and for two hours during the implementation of the treatment procedure. These observations were utilized to ensure that the teachers selected for this investigation did not differ significantly in their overall teaching styles prior to the treatment procedure or during the presentation of the treatment in the classroom.

Throughout the training sessions and with all of the training exercises, the five step self-instructional procedures of Meichenbaum and Goodman (1971) were systematically applied. The students were

also encouraged to make self-reinforcing statements when they completed a task. Using these procedures, the children were trained to analyze the problems presented systematically and to scan and take notice of the particular details of each problem.

The following component attentional skill exercises were employed in this investigation.

1. Match-to-sample tasks using geometric designs beginning with two alternative and going to three alternative choices. The designs became progressively more complex during the sessions. The sample and choice alternatives were always available to the students while they marked their answers.

2. Match-to-sample tasks using single letters and numbers circumscribed by geometric designs fading to number and letters alone and becoming successively more complex.

Some of the alternatives had a letter or number missing and the students were asked to fill in the missing letter or number.

3. Match-to-sample tasks using simple reading and math problems. The math problems were initially presented in completed form but as the problems became more complex, no answers were provided and the students were asked to work out each problem.

4. Match-to-sample memory tasks using simple geometric designs, letters and numbers, progressing to simple math problems and words. The sample was presented to the students for ten seconds and removed and the students were asked to find the correct alternative. As the mathematics problems become more complex, the students were asked to compute an answer to the problem which they wrote down.

5. Memory tasks using simple geometric designs, numbers and letters and progressing to simple sentences and math problems. The sample was presented for ten seconds and removed and the students were asked to reproduce the sample on paper.

Informed parental permission was obtained for all of the students who participated in this investigation. Since the treatment results were significant, the control group students will be given the opportunity to participate in a future cognitive training treatment group.

Instrumentation

The reading, mathematics, and written language skills clusters of the Woodcock-Johnson Psycho-Educational Battery were used as pre and post measures for all subjects. The reading cluster consists of three subtests including letter-word identification, word attack, and passage comprehension. The mathematics cluster consists of calculation and applied math problems, while the written language cluster consists of a dictation subtest and a proofing subtest. Woodcock (1978) reported consistently high correlation coefficients regarding concurrent validity of the achievement cluster with other highly regarded achievement tests. The correlation coefficients were consistently above .60 for both normal and learning disabled children. Test-retest reliabilities on the achievement clusters of the Woodcock were consistently in the .80 to .95 range. These findings indicated that the Woodcock-Johnson achievement cluster was a valid and reliable instrument for use in this research study.

Selected subtests of the Detroit Tests of Learning Aptitude were administered to all of the subjects selected for this study prior to and subsequent to the implementation of the treatment. The

following Detroit subtests were administered: visual attention span for objects; visual attention span for letters and auditory attention span for related syllables. These subtests involve visual and auditory attention and memory skills. Baker and Leland (1967) reported validity intercorrelations among sixteen of the subtests appropriate for eight to twelve year olds ranging between .20 and .40 which indicated the relative independence of the subtests. A test-retest ability coefficient of .96 for students retested at five months was reported in the manual. Brown and Alford (1984) found significant improvement in the performance of learning disabled students on selected subtests of the Detroit after cognitive training. These findings appear to indicate that the Detroit test offers reliable information for research involving pre and post-test measurement.

The 1984 Detroit Tests of Learning Aptitude-Revised was not used in this investigation because it does not contain subtests which are identical to the auditory and visual memory subtests of the original Detroit.

The final measurement instrument utilized in this study was the Matching Familiar Figures Test as described by Jerome Kagan (1965). In the Matching Familiar Figures Test, subjects are shown a picture (the standard) and six similar stimuli, only one of which is

identical to the standard. The subject is instructed to select the picture that is identical to the standard. The standard and the variations are always available to the subject. The variables measured are the total number of errors and the average response time to the first selection on twelve items. Kagan hypothesized that children with impulsive rather than reflective response styles, based on their performance on the Matching Familiar Figures Test, use inefficient visual search and scanning behaviors which interfere with and inhibit their learning processes. Kagan (1965) identified the cognitive response styles of first grade children using the Matching Familiar Figures Test. These students were retested in the second grade using the Matching Familiar Figures Test and a reading achievement test. Kagan found that the students with reflective responding styles scored significantly higher in reading achievement in the second grade than those students with impulsive responding styles.

Egeland (1974) utilized component attentional skills training to enhance the academic skills of second graders, identified as impulsive using the Matching Familiar Figures Test. After the training, the treatment groups demonstrated significant decreases in errors on the Matching Familiar Figures Test and significantly

increased reading comprehension skills on the Gates-MacGinitie Reading Test as compared to the control group.

Douglas et al. (1976) obtained similar results to Egeland's using the Matching Familiar Figures Test and the Durrell Reading Test. After the three-month training period, the treated children performed significantly better on the Matching Familiar Figures Test and Durrell Reading Test as compared to the control group.

Brown and Alford (1984) employed a package of cognitive self-control procedures to remediate attentional deficits and improve academic performance in twelve year old learning disabled students. The students in the treatment group showed improved scores on the Matching Familiar Figures Test and the Reading section of the Wide Range Achievement Test.

Oas (1985) reported that the clinical validity of the Matching Familiar Figures Test has been demonstrated clearly for children up to twelve years of age.

The research reviewed demonstrates a very clear relationship between significantly improved scores on the Matching Familiar Figures Test and significantly improved scores on the achievement tests as a result of cognitive training procedures. These research findings indicated that the Matching Familiar Figures Test used as a

measure of cognitive response styles in conjunction with achievement tests was valid for use in this investigation.

Design

The untreated control group design with pre-test and post-test depicted below was utilized in this investigation.

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This design was used since the treatment was conducted by classroom teachers within the self-contained learning disabled class and random assignment of subjects was not possible. Cook and Campbell (1979) concluded that this design usually controls for all but four threats to internal validity. The uncontrolled validity threats involve selection-motivation, instrumentation, differential statistical regression and local history. A pretest comparison of the treatment and control groups with regard to mean age and I.Q. differences was employed to investigate the potential effects of selection-motivational differences. The selection process using federal, state and local guidelines for self-contained learning disabled placement and the variety of instruments used in the

assessment process should effectively control for the validity threats of instrumentation and differential statistical regression. The effects of local history should not create difficulties for this investigation since both groups involved in this study were receiving similar instruction within the environment of a self-contained learning disabilities classroom.

Specific Null Hypothesis

HO1: There is no significant difference in the measurement of achievement level of students between the treatment and control groups.

HO2: There is no significant difference in the measurement of attention skill level of students between the treatment and control groups.

HO3: There is no significant difference in the measurement of memory skill level of students between the treatment and control groups.

Statistical Analysis

Data was analyzed using a 2X2 analysis of variance.

All hypothesis were tested using the F ratio (ANOVA). Each null hypothesis was rejected at the .05 level of significance. Since the analysis yielded significant F values for main effects, a Sceffe comparison of each mean was used as a post hoc analysis.

Summary of Methodology

The population consisted of thirty-six children previously identified by federal, state and local guidelines and placed in the self-contained learning disabilities program in a large metropolitan Virginia School District. Eight elementary self-contained learning disabilities classrooms with students eight to eleven years of age were selected for this study. Four classrooms received the treatment administered by the teachers two hours per week for ten weeks; while the four control classrooms continued to receive their regular classroom instruction. All thirty-six subjects were pretested and posttested using the following assessment battery: (a) Attention/ memory tests from the Detroit Tests of Learning Aptitude (Baker and Leland, 1967). Four subtests were used: one measuring visual attention span for letters; the second measuring visual attention span for objects; the third measuring auditory attention span for sentences and the fourth measuring auditory attention span for words; (b) The Woodcock-Johnson Psycho-Educational Battery (Woodcock, 1977) achievement clusters for reading, mathematics and written language; (c) The Matching Familiar Figures Test of Reflection-Impulsivity (Kagan, 1966). Data was analyzed using an analysis of variance, and

when needed, post hoc comparisons were used to test the significant of each hypothesis at the .05 level. Informed parental consent was obtained for each of the children included in this investigation. This study was submitted and approved by the Research Department of the Virginia Beach Public Schools and the Human Subjects Committee of the College of William and Mary.

CHAPTER IV

ANALYSIS OF RESULTS

There were nine variables on which test scores were obtained for the eighteen children in the control group and the eighteen children in the treatment group.

To ensure equality between the groups, the pretest means for each variable were compared using a two-tailed t test analysis. No significant differences were found and Table 4.1 presents the t scores obtained. It was concluded that the experimental and control groups were not statistically different prior to the treatment intervention.

The results of the investigation are presented by hypotheses. A 2X2 analysis of variance were performed on each of the nine dependent variables with appropriate post hoc analysis used as necessary. The .05 level of confidence was the criterion point for acceptance or rejection of the hypotheses.

Hypothesis One

It was hypothesized that the academic achievement of elementary age self-contained learning disabled students would be significantly improved as a result of the cognitive training procedures and measured by the reading, mathematics, and written language clusters of the Woodcock-Johnson Psycho-Educational Battery Part II.

The data in table 4.2 indicates that the reading and mathematics skills of the treatment groups significantly improved as compared to the control group on the Woodcock-Johnson Psycho-Educational Battery. Significance was reached at the .05 and .01 level for both the reading and mathematics subtests of the Woodcock-Johnson. The results in table 4.2 for the written language subtest of the Woodcock-Johnson, however, did not indicate a significant difference between the experimental and the control group. Although the results on written language were not significant, a probability of .10 was obtained which approaches significance.

Hypothesis Two

It was hypothesized that the attentional skills of elementary age self-contained learning disabled students would be significantly improved as a result of the cognitive training procedures and measured by the Matching Familiar Figures Test.

An analysis of the data in table 4.3 indicates that the treatment groups latency scores on the Matching Familiar Figures Test improved significantly at the .05 and .01 level suggesting that the students in the experimental groups attentional style became more reflective as compared to the control group. The error scores of the groups were not found significantly different. The cognitive training did not appear to improve the accuracy of the treatment groups responses significantly on the Matching Familiar Figures Test. It was noted, however, that the students in general across the groups made relatively few errors on the pretest which left little room for improvement on the posttest.

Hypothesis Three

It was hypothesized that the auditory and visual memory skills of elementary age self-contained learning disabled students would be significantly improved as a result of the cognitive training procedures and measured by the Detroit Tests of Learning Aptitude.

A significant improvement at the .05 level of the auditory attention and memory skills for related and unrelated words on the Detroit for the treatment group as compared to the control group was obtained as indicated by the results in table 4.4. Nonsignificant data was obtained with regard to the differences between the groups in visual memory skills for objects and for letters on the Detroit. It was noted, however, that the treatment group did improve markedly as compared to the control group with regard to visual memory for objects which was significant at the .06 level.

TABLE 4.1 Results of t Test Analysis Comparing Pretest Mean Scores of the Treatment Group and the Control Group of the Nine Dependent Variables

	EXPERIMENTAL GROUP PRETEST		CONTROL GROUP PRETEST		
	Mean	SD	Mean	SD	t
Woodcock-Johnson					
Reading	464.16	19.36	456.61	23.02	-1.07 (NS)
Mathematics	467.83	33.91	471.22	27.56	.33 (NS)
Written Language	473.33	18.37	468.94	22.91	- .63 (NS)
Detroit Tests of Auditory Attention					
Unrelated Words	61.39	20.73	72.89	24.30	1.53 (NS)
Related Words	76.94	26.26	84.33	27.62	.82 (NS)
Visual Attention					
Objects	104.17	29.11	112.07	37.09	.71 (NS)
Letters	100.50	15.61	104.18	24.97	.53 (NS)
Matching Familiar Figures Test					
Latency	9.17	5.72	8.05	3.58	- .70 (NS)
Error	2.13	.48	2.24	.68	.55 (NS)

Table 4.2 Pretest and Posttest Comparisons of the Woodcock-Johnson Psycho-Educational Battery Reading, Mathematics and Written Language scores included in Analysis of Variance

	TRAINED GROUP				CONTROL GROUP					
	PRETEST		POSTTEST		PRETEST		POSTTEST			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	P
Woodcock-Johnson										
Reading	464.16	19.36	481.00	18.49	456.61	23.02	466.11	22.67	9.32	.004
Mathematics	467.83	33.91	489.79	34.53	471.22	27.56	478.06	31.02	8.42	.007
Written Language	473.33	18.37	485.00	16.37	468.94	22.91	477.00	21.37	2.72	.109 (NS)

TABLE 4.3 Pretest and Posttest Comparisons of the Latency and Error scores in the Matching Familiar Figures Test included in Analysis of Variance

	TRAINED GROUP				CONTROL GROUP					
	PRETEST		POSTTEST		PRETEST		POSTTEST			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	P
Matching Familiar Figures Test										
Latency	9.17	5.72	12.03	5.07	8.05	3.58	7.53	4.33	8.67	.006
Error	2.13	.48	1.84	.50	2.24	.68	2.06	.55	1.36	NS

TABLE 4.4 Pretest and Posttest Comparisons of Auditory and Visual Memory and Attention Subtests of the Detroit Tests of Learning Aptitude included in Analysis of Variance

	TRAINED GROUP				CONTROL GROUP						
	PRETEST		POSTTEST		PRETEST		POSTTEST				
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	P	
Detroit Tests of Learning Aptitude											
Auditory Attention											
Unrelated Words	61.39	20.73	90.33	29.84	72.89	24.30	77.22	21.07	7.08	.012	
Related Words	76.94	26.26	94.33	31.45	84.33	27.62	92.33	31.41	4.56	.040	
Visual Attention											
Objects	104.17	29.11	133.72	33.62	112.07	37.09	126.61	36.39	3.84	.059	(NS)
Letters	100.50	15.61	109.94	12.97	104.18	24.97	106.06	21.54	1.12	.297	(NS)

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes the present investigation, states the findings, discusses the hypotheses and conclusions and offers recommendations for future research.

Summary

The problem of this study was to determine the effects of a program of cognitive behavioral procedures on the achievement skills, auditory and visual memory skills and attentional styles of elementary self-contained learning disabled students. The investigation was conducted for the following purposes:

1. To determine if participation in a program of cognitive behavioral procedures would effect the achievement skill test scores of elementary self-contained learning disabled students.

2. To determine if participate in a program of cognitive behavioral procedures would effect attentional style test scores of elementary self-contained learning disabled students.

3. To determine if participation in a program of cognitive behavioral procedures would effect the auditory and visual memory test scores of elementary self-contained learning disabled students.

In order to facilitate this process the following hypotheses were tested:

Hypothesis One. The academic achievement of elementary age self-contained learning disabled students will be significantly improved as a result of the cognitive training procedures.

Hypothesis Two. The attentional skills of elementary age self-contained learning disabled students will be significantly improved as a result of the cognitive training procedures.

Hypothesis Three. The visual and auditory memory skills of elementary age self-contained learning disabled students will be significantly improved as a result of the cognitive training procedures.

The subjects for this study were thirty-six elementary age self-contained learning disabled students ages 8-0 through 11-11 attending two elementary schools in a large metropolitan Virginia school district. The students had all been identified as severely learning disabled by a qualified school psychologist according to state and federal guidelines based on Public Law 94-142.

Three instruments were administered as pretests and posttests. The reading, mathematics, and written language clusters of the Woodcock-Johnson Psycho-Educational Battery were employed to measure academic achievement skills. Attentional learning style was assessed using the Matching Familiar Figures Test and auditory and visual memory skills were measured using the Detroit Tests of Learning Aptitude. The order of administration of the tests was counterbalanced between the groups.

Eight self-contained learning disabled classes, four experimental and four control, at two elementary schools were utilized in this study.

Treatment consisted of twenty 60 minute sessions held bi-weekly for a period of ten weeks. The treatment consisted of a package of cognitive training procedures utilizing the self-instructional approach of Meichenbaum and Goodman (1971) to

reinforce component attentional skills. The training took place within the student's self-contained learning disabilities classroom and was administered by the self-contained learning disabilities teacher and teacher's aide.

An analysis of variance was used to test the hypotheses for the nine dependent measures. The .05 level of significance was the criterion point for rejection of the null hypotheses. The two groups pretest scores were compared using a two tailed t test analysis to ensure equality between the groups prior to the treatment procedures.

Statement of Findings

From the analysis of the statistical data presented in this study, the following findings were established:

1. There was a significant improvement at the .05 and .01 level in the reading and mathematics scores of elementary self-contained learning disabilities students who participated in a program of cognitive training procedures compared to the control group as measured by the Woodcock-Johnson Psycho-Educational Battery.

2. There was no significant improvement at the .05 level in the written language scores of elementary self-contained learning disabled students who participated in a program of cognitive training procedures compared to the control group as measured by the Woodcock-Johnson Psycho-Educational Battery.

3. There was a significant improvement at the .05 and .01 levels in the reflective attentional style scores of elementary self-contained learning disabled students who participated in a program of cognitive training procedures compared to the control group as measured by the latency score on the Matching Familiar Figures Test.

4. There was no significant improvement at the .05 level in the accuracy scores of elementary age self-contained learning disabled students who participated in a program of cognitive training procedures compared to the control group as measured by the error score on the Matching Familiar Figures Test.

5. There was a significant improvement at the .05 level in the auditory memory scores of elementary self-contained learning disabled students who participated in a program of cognitive training procedures compared to the control group as measured by the Detroit Tests of Learning Aptitude.

6. There was no significant improvement at the .05 level in the visual memory scores of elementary self-contained learning disabled students who participated in a program of cognitive training procedures compared to the control group as measured by the Detroit Tests of Learning Aptitude.

Conclusions

Based on the findings of this research, the following conclusions from the study are suggested:

1. Elementary self-contained learning disabled students who participate in a program of cognitive training procedures do appear to show a significantly greater improvement in reading and mathematics skill development than those who do not receive cognitive training as measured by the Woodcock-Johnson Psycho-Educational Battery.

2. Elementary self-contained learning disabled students who participated in a program of cognitive training procedures do not appear to show a significantly greater improvement in written language skill development than those who do not receive cognitive training as measured by the Woodcock-Johnson Psycho-Educational Battery.

3. Elementary self-contained learning disabled students who participated in a program of cognitive training procedures do appear to show significantly improved reflective attentional style skill development than those who do not receive cognitive training as measured by the latency score on the Matching Familiar Figures Test.

4. Elementary self-contained learning disabled students who participated in a program of cognitive training procedures do not appear to show significantly improved accuracy skills compared to those who do not receive cognitive training as measured by the error score on the Matching Familiar Figures Test.

5. Elementary self-contained learning disabled students who participated in a program of cognitive training procedures do appear to show significantly improved auditory memory skill development than those who do not receive cognitive training as measured by the Detroit Tests of Learning Aptitude.

6. Elementary self-contained learning disabled students who participated in a program of cognitive training procedures do not appear to show significantly improved visual memory skill development than those who do not receive cognitive training as measured by the Detroit Tests of Learning Aptitude.

Discussion

The present research findings appear to indicate that cognitive training can be effective in remediating the attentional difficulties and more importantly the academic deficits of elementary age self-contained learning disabled students.

The finding that the children in the experimental group improved significantly on the reading and mathematics clusters of the Woodcock-Johnson Psycho-Educational Battery is particularly encouraging and suggests evidence of generalization. The results of the written language cluster of the Woodcock-Johnson were not significant but they did approach significance at the .10 level. The fact that the cognitive training took place within the classroom and was administered by the teacher seems to have had a positive effect upon generalization. The results suggest that the treatment was successful in teaching the children to attend selectively to essential stimuli required for learning. These findings are in agreement with the data presented by Egeland (1974) and Douglas et al. (1979) who trained normal impulsive children in effective scanning strategies and found improved reading test scores on the Gates-MacGinitie Test and the Durrell Reading Test. Brown and Alford (1984) successfully

used cognitive training to improve the attentional skills and reading test scores of self-contained learning disabled students on the Wide Range Achievement Test. It was noted, however, that no significant improvement in mathematics test scores was reported in any of the previous investigations. The significant improvement in mathematics test scores found in the present study lends further support for using cognitive training procedures within the classroom situation administered by the teacher.

The results of the two auditory attention and memory subtests of the Detroit Tests of Learning Aptitude suggest that the training had a significant effect on the auditory memory and attention of the learning disabled students involved in the study. The use of the self-instructional procedures of Meichenbaum and Goodman (1971), therefore appears to have had positive effects on the auditory skills of the treatment group. Nonsignificant results were obtained on the visual attention and memory subtests of the Detroit Tests of Learning Aptitude. The visual attention and memory for objects subtests, however, approached significance at the .059 level which indicates some improvement in the students visual skills. It was noted that the training primarily involved match-to-sample problems and did not specifically emphasize the visual memory of letters.

A very significant improvement in the trained group with regard to reflective attention style was suggested by the latency scores on the Matching Familiar Figures Test. An analysis of the error scores on the Matching Familiar Figures Test, however, did not indicate an improvement in the overall accuracy of the experimental group. These findings are consistent with a number of investigations attempting to alter cognitive styles in which only the latency scores significantly improved such as Denny (1972), Douglas et al. (1979) and Egeland (1974). Brown and Alford (1984) did find a significant improvement in both latency and error scores on the Matching Familiar Figures Test as a result of their cognitive training.

In the present investigation, it was noted that the students tended to make a minimal amount of errors on the Matching Familiar Figures pretest which made a significant improvement in these scores difficult to achieve.

The results of the investigation appear to suggest that Meichenbaum's self-instructional procedures in conjunction with component attentional skills training can be effectively applied by self-contained learning disabilities teachers within their special education classrooms. The techniques and methods used in this study were effective in improving reading and mathematics achievement

scores on the Woodcock-Johnson Psycho-Educational Battery, auditory attention and memory skill scores on the Detroit Tests of Learning Aptitude and measures of reflective responding style on the Matching Familiar Figures Test.

Recommendations

The following recommendations for future study are based on the findings and conclusions of this study, the review of related literature and information gained as a result of conducting this investigation:

1. Future cognitive training programs may wish to include memory and match-to-sample problems involving increasingly complex sentences to improve generalization to written language skills.

2. Future research with elementary age learning disabled children may wish to employ the recently developed adolescent form of the Matching Familiar Figures Test to increase differentiation in error scores.

3. It may be beneficial for teachers involved in future cognitive treatment procedures to actively encourage the students to generalize the skills training to regular classroom activities.

4. Future research with larger samples and different age groups of self-contained learning disabled, resource learning disabled and regular education students with learning problems is recommended.

5. A delayed posttest condition should be included in future research to determine if the treatment effects persist over time.

6. Behavior measures both standardized and anecdotal should be used in future studies to measure the effects of the treatment on observed classroom behavior.

7. It may be beneficial to increase the number of sessions and decrease the time of each session in the classroom to ensure maximum pupil motivation and interest.

8. Future studies may also wish to include an attention-control group to assess possible nonspecific effects of the treatment program.

APPENDIX

SELECTED GROUP SESSIONS AND ACTIVITIES

SESSION I: STOP-THINK-ACT

We are going to be doing some activities twice a week for several weeks which will encourage you to take your time and work very carefully and not make unnecessary mistakes. We will call it "Stop-Think-Act." Today we will be looking at and matching different shapes and designs, and I will be showing you how to think out loud as we do it. We will always try to take our time and not make any mistakes but if we do make mistakes we will stop and correct them. In the beginning the tasks will seem very easy but they will become much more difficult.

I would like you to put your pencils down and just watch and listen to what I am going to do at the board. (Have page 1 drawn on the board.) Everyone please look at and listen to what I am doing up here at the board. Look at the designs up here on the board. "Stop and

Think!" What am I supposed to do? What are the directions? I am supposed to find the shape over here (pointing to the two designs to the right of the two lines) which is just the same as this one (pointing to the one to the left of the two lines) and put an X on it. What should I do first? "Stop and Think!" What is this first one? It's a shape with three sides and a point at the top--it's a triangle. Now I need to look at the other two shapes and see which one is just the same as this first one. I need to be sure to look at all my possible choices before I mark an X on my choice. (Pointing to the first alternative say) Does this shape have three sides? Yes it does. It does not look just like this one (pointing to the original) but I will not mark it with an X until I have checked all the possible choices. (Pointing to the second choice) Does this one have three sides? No, it has four. It is not just like this one (pointing to the original at the left). Now, I am sure that this one (pointing to the correct choice) is right and I will mark it with an X. That was fun and I did a really good job.

Repeat the procedure with the square talking out loud in front of the class. (Give the students page 2) Note the square has 4 sides and 4 points--2 at the top and 2 at the bottom. Next, have the

children perform the same tasks following the teacher's step by step verbal instructions.

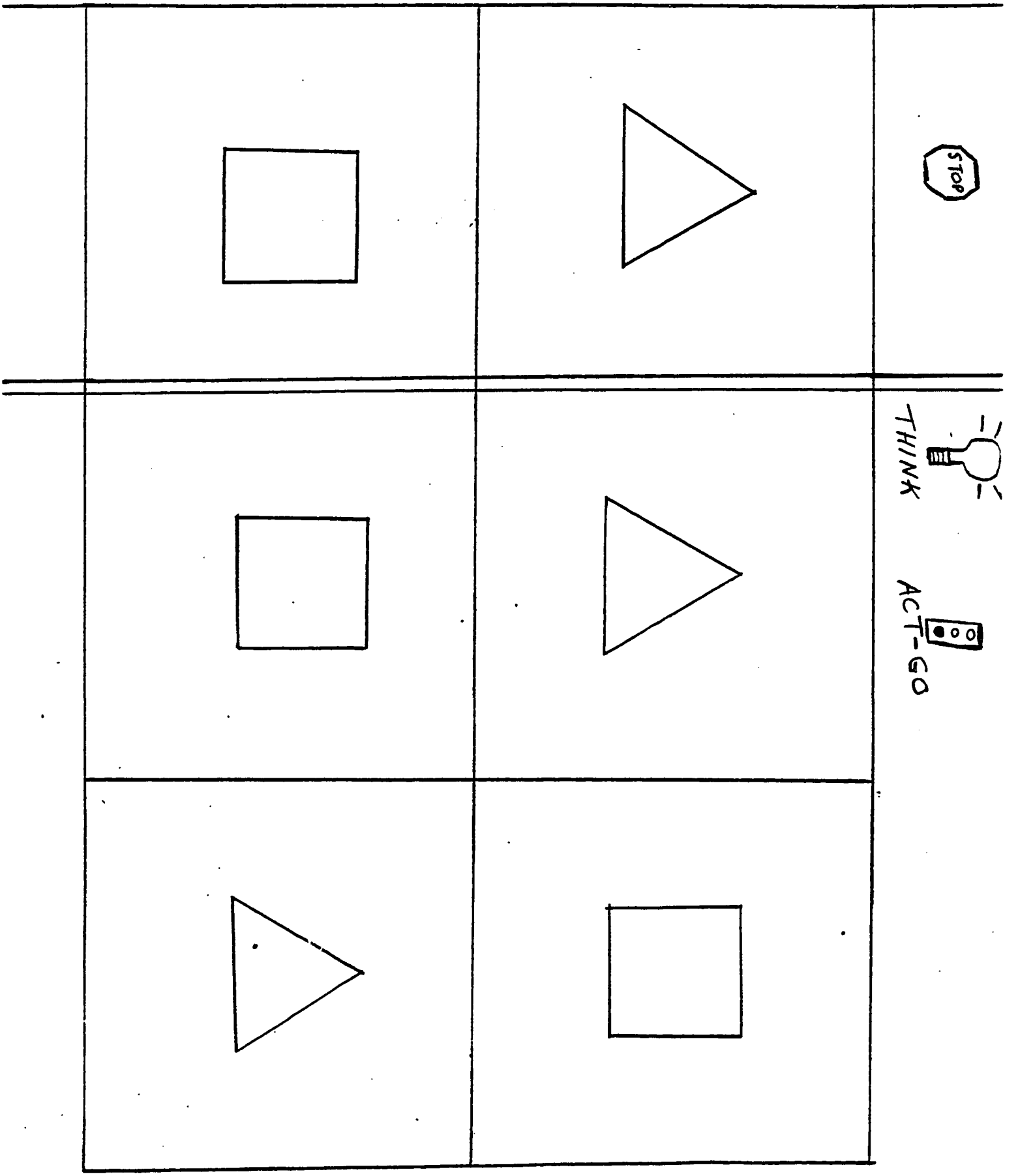
(Give the students page 2)

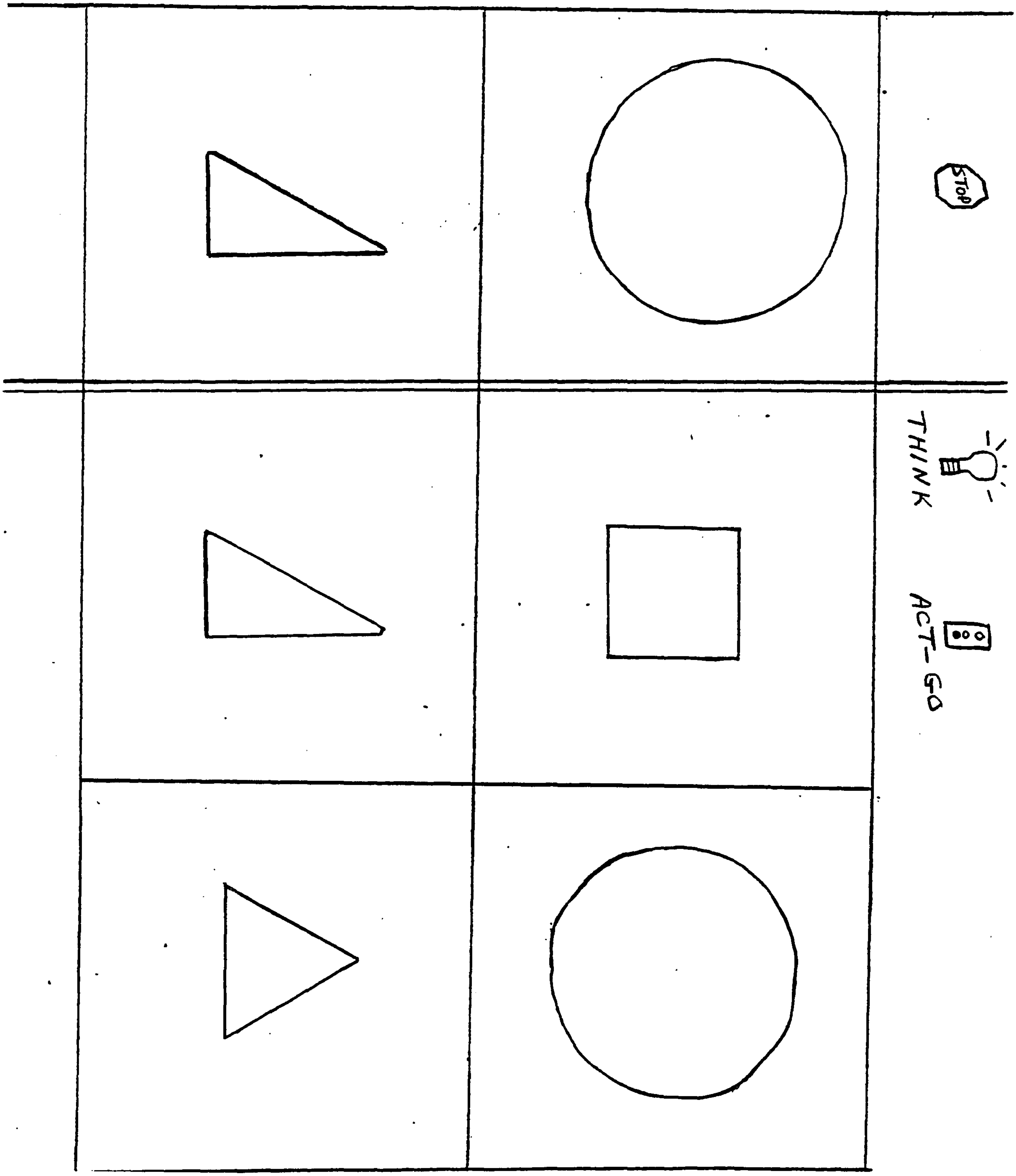
Model these tasks out loud for the students (as done for page 1, but not at the board) while the teacher holds page 2 in front of the class. Point out that the first one is a circle or one continuous line and that the second shape is a tall, thin triangle. Give verbal self-reinforcement for a job well done.

Next have the students complete page 2 under the direct verbal instruction of the teacher.

(Give the students page 3)

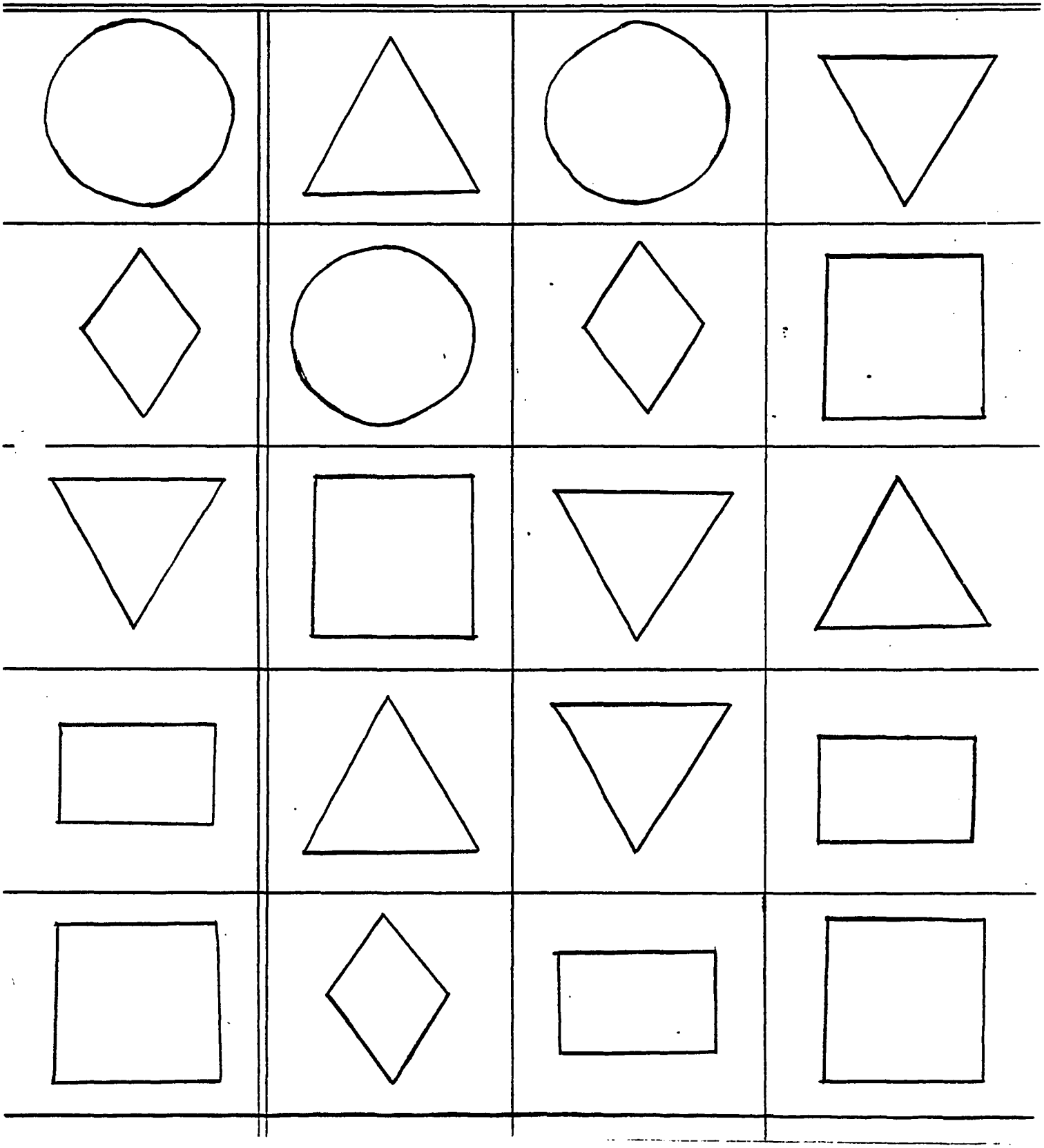
Model only the first shape, the circle, out loud in front of the class. Now, have the students complete page 3 beginning with the circle under the direct verbal instruction of the teacher. Emphasize the important features of the designs such as a diamond having 4 sides and 4 points with one point at the top and one at the bottom. Compare these features one-by-one with each of the alternatives and eliminate the shapes that are not the same as the sample shape until the correct choice is made. Always look at all of the alternatives before marking the correct answer. Make positive verbal statements to the students regarding their performance.





THINK

ACT - GO



SESSION V: STOP-THINK-ACT

(Give the students page 16)

Model item number 1, page 16, out loud in front of the class. After finding the alternative which matches the sample and marking it with an X, go back and fill in the missing numbers to make the other choices correct. Have the students complete item 1 under the teacher's direct verbal supervision. Pick individual Students to complete the remaining items on page 16 out loud in class.

(Give the students page 17)

On page 17, each of the possible choices must be changed in some way to make it match the sample (Note that none of the alternatives matches the sample as is). Model item 1, page 17, out loud for the class noting the error or omission in each one and changing it to match the original. Have the students complete page 17 under the verbal direction of the teacher.

(Give the students page 18)

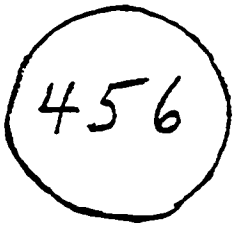
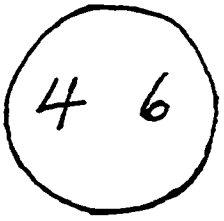
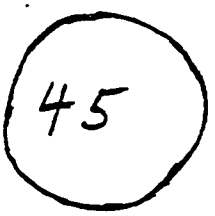
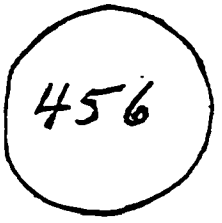
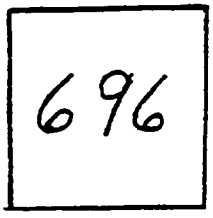
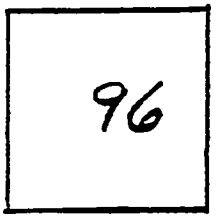
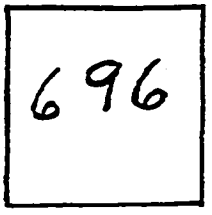
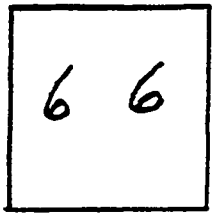
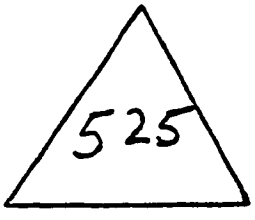
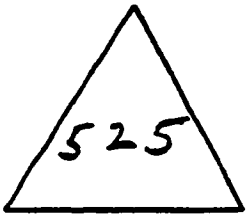
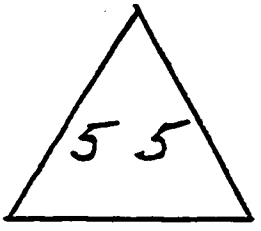
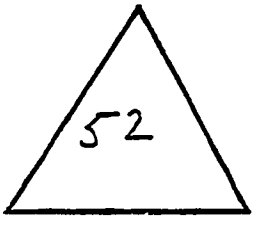
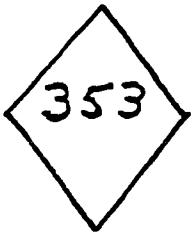
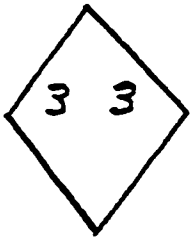
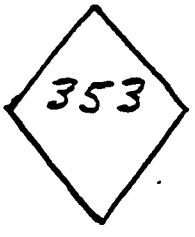
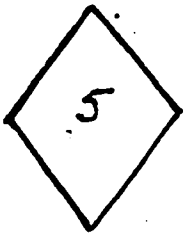
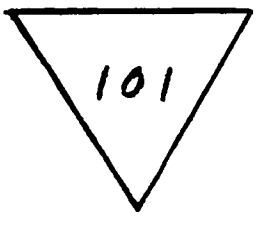
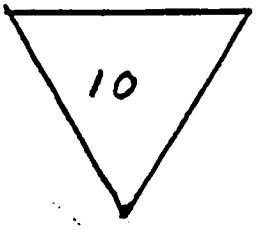
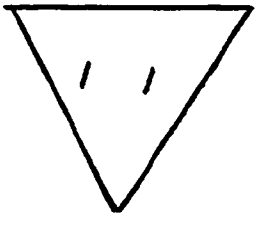
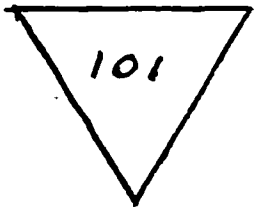
On page 18, a number must be added to each of the alternatives to make it match the sample. Have the students complete item 1, page 18, under the teacher's direct supervision. Pick individual

students to complete the items on page 18 out loud for the class. The other students should be working along as they listen. Remember to encourage appropriate student verbalizes and positive self-statements. Help the students as necessary.

(Give the students page 19)

On page 19, the students must add a number or a sign to each of the possible choices to make it match the sample. Time permitting, have individual students complete page 19 out loud in class. encourage the students to talk more quietly in a kind of stage whisper as they complete these items.

16

17

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18

2 3 4	2 4	2 3	3 4
9 6 6	9 6	9 6	6 6
1 0 2	0	1 0	0 2
1 2 3 4	1 3 4	1 2	1 2 3
5 2 8 6	2 8 6	5 8 6	5 2 6
7 5 5 7	7 5 7	7 5 5	7 5 7

19

23 55+ 78	23 5 + 78	23 55 78	2 55+ 78
13 24+ 37	13 24 37	13 2 + 37	13 24+ 3
51 27+ 78	5 27+ 78	51 27 78	51 27+ 8
68 11− 57	68 11− 5	68 11− 7	68 1 − 57
25 25− 00	25 25 00	25 25− 0	25 2 − 00
31 12+ 43	3 12+ 15	31 1 + 11	31 12 43

SESSION X: STOP-THINK-ACT

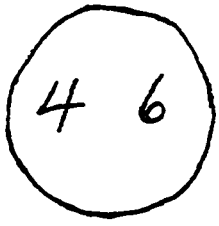
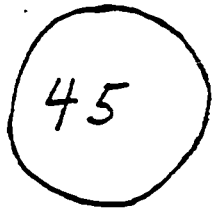
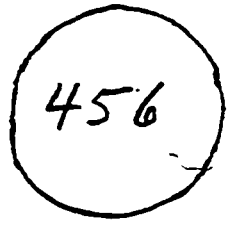
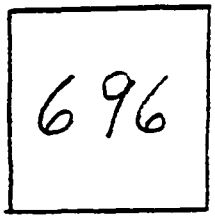
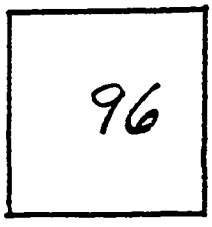
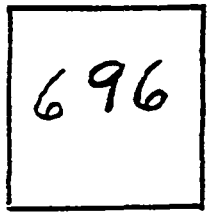
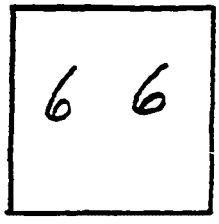
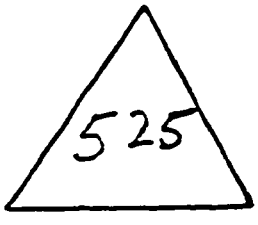
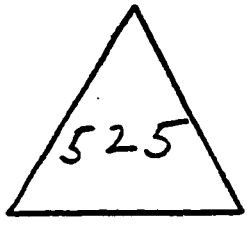
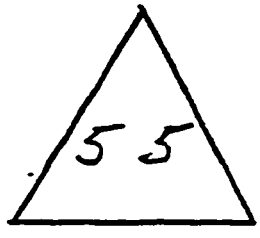
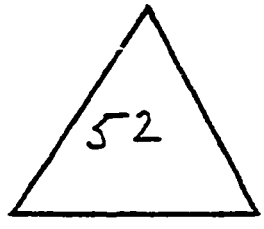
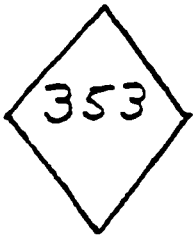
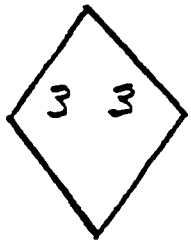
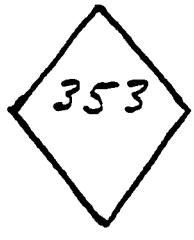
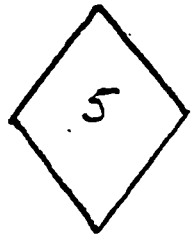
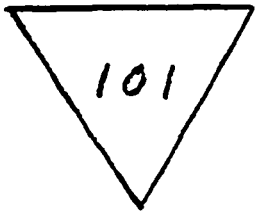
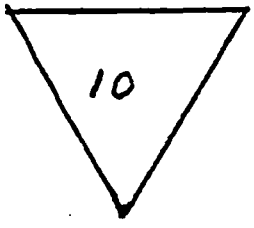
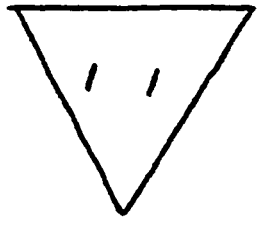
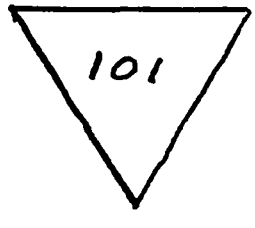
(Give the students page 36)

Put items 1 and 2, page 36, on the board and pick individual students to come up to the board and complete these items out loud for the class. Note that each alternative which is incorrect can have a number added to make it match the sample. Have the students complete all of the items on page 36 and 37 talking quietly to themselves at their desks.

(Give the students pages 38 and 39)

Have the students complete pages 38 and 39 working silently at their desks. After the students have completed these pages, pick individual students to describe how they completed items 1 and 2, page 38, out loud for the class.

36

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$\begin{array}{r} 5 \\ +2 \\ \hline 7 \end{array}$	$\begin{array}{r} 5 \\ +2 \\ \hline 9 \end{array}$	$\begin{array}{r} 5 \\ -2 \\ \hline 7 \end{array}$	$\begin{array}{r} 5 \\ +2 \\ \hline 5 \end{array}$
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$\begin{array}{r} 4 \\ +1 \\ \hline 5 \end{array}$	$\begin{array}{r} 4 \\ 1 \\ \hline 5 \end{array}$	$\begin{array}{r} 4 \\ \times 1 \\ \hline 5 \end{array}$	$\begin{array}{r} +1 \\ \hline 5 \end{array}$
$\begin{array}{r} 2 \\ -2 \\ \hline 0 \end{array}$	$\begin{array}{r} 5 \\ -2 \\ \hline 0 \end{array}$	$\begin{array}{r} 2 \\ +2 \\ \hline 0 \end{array}$	$\begin{array}{r} 2 \\ 2 \\ \hline 0 \end{array}$
$\begin{array}{r} 1 \\ +1 \\ \hline 2 \end{array}$	$\begin{array}{r} 7 \\ +1 \\ \hline 2 \end{array}$	$\begin{array}{r} 1 \\ -1 \\ \hline 2 \end{array}$	$\begin{array}{r} 1 \\ -1 \\ \hline 0 \end{array}$
$\begin{array}{r} 8 \\ +2 \\ \hline 10 \end{array}$	$\begin{array}{r} 8 \\ -2 \\ \hline 10 \end{array}$	$\begin{array}{r} 8 \\ +2 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 2 \\ \hline 10 \end{array}$

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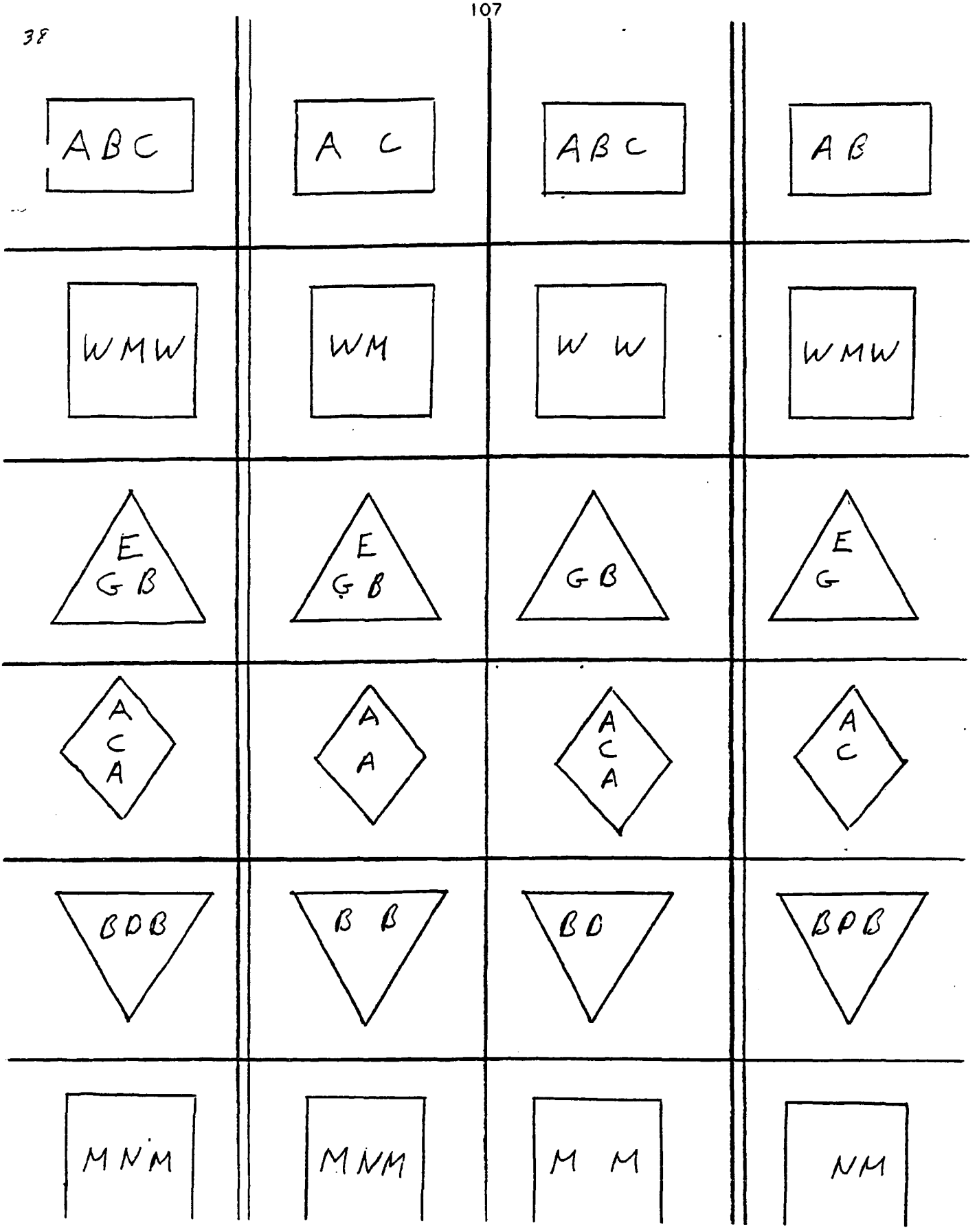
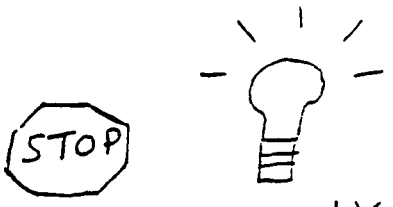


39



THINK ACT-GO

b b d	b d	b b	b d
E M C	E M	E C	M C
A W M B	A M B	A W M	A W B
P d E F	P E F	d E	P d E
L N M O	L M O	L N M	L N O

SESSION XV: STOP-THINK-ACT

In the remaining sessions of this program, we will attempt to encourage the students to generalize the attentional skills stressed in the previous activities to actual math and reading problems.

(Give the students pages 63 and 64)

On page 63, the students will be asked to find the math problem which exactly matches the sample from memory. The sample problem is shown to the students for 10 seconds with the teacher describing the problem aloud and the students are then asked to find the matching problem from memory. After the students have marked their choice, have them work out the answer to that problem and write it down. Finally, select one student to come to the board and write down the problem which he/she chose and demonstrate working it aloud for the class. The teacher should now show the class the original sample and be sure that everyone has chosen the correct problem and successfully completed the answer. Emphasize the importance of finding the problem with the numbers in the same order as the sample and having the correct sign in order to find the correct answer to the problem.

On page 64, the students will be asked to find a word that exactly matches a sample word from memory. The sample word is shown to students for 10 seconds with the teacher verbally describing the letters and word for the students (e.g., this is C-A-T which will make the word CAT). After the students have marked their choice, one student should be selected to come to the board and write the alternative he/she chose saying it aloud for the class. The teacher should now show the class the original sample and be sure that all of the students have checked their work.

(Give the students plain white paper)

The students will now be asked to reproduce math problems and words from memory. The sample problem/word should be presented to the students for 10 seconds with the teacher verbally describing it for the students. After the students have written down the math problem, have them work out the answer at their desks. Finally, a student should be selected to come to the board and write down the problem or word for the class as he/she describes it aloud. The teacher should then show the students the original sample and have the students check their work.

$\begin{array}{r} 2 \\ +3 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ -3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ -2 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ +2 \\ \hline \end{array}$
$\begin{array}{r} 5 \\ -2 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ +2 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ -5 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ 5 \\ \hline \end{array}$
$\begin{array}{r} 23 \\ +32 \\ \hline \end{array}$	$\begin{array}{r} 23 \\ +23 \\ \hline \end{array}$	$\begin{array}{r} 23 \\ -32 \\ \hline \end{array}$	$\begin{array}{r} 32 \\ -23 \\ \hline \end{array}$
$\begin{array}{r} 31 \\ -24 \\ \hline \end{array}$	$\begin{array}{r} 31 \\ +24 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ -24 \\ \hline \end{array}$	$\begin{array}{r} 31 \\ -42 \\ \hline \end{array}$
$\begin{array}{r} 15 \\ +1 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ -1 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ +10 \\ \hline \end{array}$	$\begin{array}{r} 51 \\ -1 \\ \hline \end{array}$
$\begin{array}{r} 36 \\ -12 \\ \hline \end{array}$	$\begin{array}{r} 63 \\ -12 \\ \hline \end{array}$	$\begin{array}{r} 36 \\ +12 \\ \hline \end{array}$	$\begin{array}{r} 36 \\ +21 \\ \hline \end{array}$

634

$$\begin{array}{r} 3 \\ +\,2 \\ \hline \end{array}$$

636

$$\begin{array}{r} 5 \\ +\,2 \\ \hline \end{array}$$

$$\begin{array}{r} 23 \\ +\,32 \\ \hline \end{array}$$

$$\begin{array}{r} 31 \\ +\,24 \\ \hline \end{array}$$

63E

$$\begin{array}{r} 15 \\ -\ 1 \\ \hline \end{array}$$

63F

$$\begin{array}{r} 36 \\ +12 \\ \hline \end{array}$$

64

TAC	ATC	CAT	CTA
ASW	SAW	WAS	SWA
TAB	ATB	BTA	BAT
TAE	EAT	TEA	ATE
NEM	MEN	MNE	MEW
TEW	ETW	WET	TWE

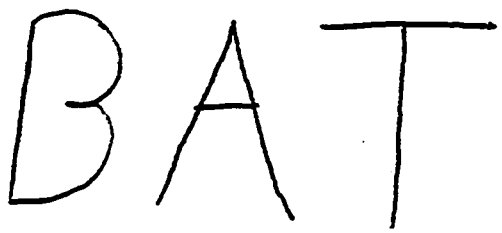
64A

CAT

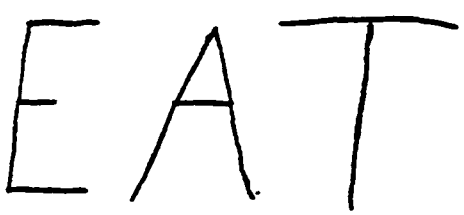
64B

WAS

G.4c



G.4.d



MEN

WET

65 A

$$\begin{array}{r} 9 \\ -\,6 \\ \hline \end{array}$$

65 B

$$\begin{array}{r} 3 \\ +\,2 \\ \hline \end{array}$$

66 A

$$\begin{array}{r} 4 \\ +\ 2 \\ \hline \end{array}$$

66 B

$$\begin{array}{r} 6 \\ +\ 3 \\ \hline \end{array}$$

67 A

67 B

SESSION XX: STOP-THINK-ACT

Remind the students that this will be the final day for these activities and thank them for their participation. Again, encourage the students to STOP and THINK before they ACT and complete these activities.

(Give the students pages 88 and 89)

On these pages, the students will be asked to find a word or math problem from a verbal description only. Select a student to choose and verbally describe a word or math problem to the class and have the students complete the math problem at their desks. Have a student come to the board and complete the problem or write down the word for the class. Give the students an opportunity to check their work.

(Give the students plain white paper)

The students will be asked to reproduce a sentence or math problem from memory. Select individual students to show the sample to the class for 10 seconds and describe it verbally. Have the students compute the answers to the math problems and select a student to write down the completed problem or sentence for the

class at the board. Finally, show the students the original sample and have them check their work.

88

325 -112	235 +112	112 +235	235 -112
256 -123	526 -123	256 +123	526 +213
565 +314	655 -314	655 -134	565 +134
417 -213	417 +213	147 +213	147 -113
663 +321	663 +231	663 -231	231 +663
964 -153	694 -153	694 +513	694 -513

P9

FINE	MINE	DINE	LINE
LATE	MATE	CAPE	TAPE
FORT	SORT	PORT	PORK
DRIP	SLIP	CLIP	FLIP
CLAP	SNAP	FLAP	SLAP
SEEN	BEEN	MEAN	TEEN

90A

$$\begin{array}{r} 352 \\ +235 \\ \hline \end{array}$$

90B

I LIKE YOU.

91 A

THIS IS FUN.

---

91 B

$$\begin{array}{r} 643 \\ -331 \\ \hline \end{array}$$

92A

$$\begin{array}{r} 785 \\ -473 \\ \hline \end{array}$$

92B

THE END.

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Abstract

IMPROVING ACADEMIC SKILLS AND
ATTENTION/MEMORY SKILLS OF
SELF-CONTAINED LEARNING DISABLED STUDENTS THROUGH A
PACKAGE OF COGNITIVE TRAINING PROCEDURES

Kevin Charles Wiesner, Ed.D.
The College of William and Mary in Virginia
August 1986

Chairman: Dr. Charles Matthews

The purpose of this study was to determine if participation in a cognitive training program administered by teachers within their classrooms would significantly improve the academic achievement, attentional responding styles and auditory and visual attention and memory skills of elementary self-contained learning disabled students.

Subjects were thirty-six elementary age self-contained learning disabled students 8-0 to 11-11 years of age and with total I.Q. scores on the Wechsler Intelligence Scale for Children-Revised of 80 or greater from the Virginia Beach City Public Schools in Virginia Beach, Virginia.

Three instruments were used to measure the dependent variables in this study: the reading, mathematics, and written language clusters of the Woodcock-Johnson Psycho-Educational Battery; the auditory and visual attention and memory subtests of the Detroit Tests of Learning Aptitude; and the Matching Familiar Figures Test to measure impulsive vs. reflective responding styles.

The research design was the Pretest-Posttest Control Groups Design. The data was analyzed using a 2X2 analysis of variance with the hypotheses being tested at the .05 level of confidence.

The findings indicated that participation in a program of cognitive training procedures administered by self-contained learning disabilities teachers in their classrooms did significantly improve the reading and math achievement test scores, the auditory memory and attention test scores and the reflective attending style test scores of the students involved in the training. No significant improvement was noted in the students written language test scores on the Woodcock or in the visual attention and memory test scores on the Detroit.

Future research is suggested with larger samples of both self-contained and resource learning disabled students.