

Applying Cognitive-Behavioral Interventions in Greek Mainstream School Settings: The Case of Learning Difficulties

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This study presents a psycho-educational intervention using cognitive-behavioral techniques to modify and improve thinking strategies as well as facilitate behavioral adjustment and generalization of strategy use in children with learning disabilities attending mainstream schools. One hundred and twenty Greek pupils in 2nd, 3rd, and 4th grade were treated under four different conditions: psycho-educational intervention, self-instruction training, attention control, and no treatment. Results indicated that the psycho-educational intervention program was clearly superior to the other conditions, producing meaningful and lasting effects on participants' cognitive skills and strategies and a significantly heightened sense of academic self-esteem. Improved task performance was also evident in a 7-month follow-up assessment. Children's academic achievement (writing, reading and mathematics performance as rated by their teachers) also improved satisfactorily compared to that of controls.

Keywords: Learning Disabilities, Cognitive-Behavioral Techniques, Self-Instruction Training, Cognitive Structuring, Locus of Control, Self-Esteem

Over the last three decades, behaviorism has had a major and positive impact on our understanding of children's behavior and subsequently strategies for improving behavior. Recent developments in behavior therapy have moved beyond the study of observable behavior and encouraged the inclusion of the child's cognitive mediation processes (Kazdin, 1978). This addition, away from, but at the same time encompassing, operant and classical conditioning-based models of behavior, has led to the acknowledgment of the active role of the individual in perceiving, interpreting, and understanding the world. This creates a dynamic and reciprocal interaction among the child's behavior, cognitive processes (including beliefs, rules, and expectations), and the environment. Each of these factors—behavioral, interpersonal, and environmental—requires our attention if we are to understand and support children with disabilities (Bandura, 1985).

Since Bandura's (1969) early work on children's observational learning and Meichenbaum's (1977) description of self-instruction training, mediation approaches to children's behavior have flourished. What is more, children with learning disabilities (LD) who have been taught to use cognitive-behavioral techniques to guide their behavior have been shown to improve their school adjustment (Efklides, 2001; Egeland, 1974; Meichenbaum & Goodman, 1971; Montague, 1997; Wong, 1994).

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Learning Disabilities and Current Cognitive Approaches

Children with LD by definition demonstrate academic difficulties. The National Joint Committee on Learning Disabilities (NJCLD, 1994) defines *learning disabilities* as a general term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities. Although learning disabilities may occur concomitantly with other handicapping conditions (sensory impairment, mental retardation, serious emotional disturbance), they are not the result of those conditions or influences.

Research on learning difficulties within the framework of cognitive and instructional psychology has contributed much to enlightening the various underlying causes (Swanson, 1991). For example, some authors suggest that academic deficits include a deficient knowledge base as well as deficient cognitive and metacognitive strategies (in particular in self-regulation and self-control) (Borkowski, Estrada, Milstead, & Hale, 1989; Wong, 1991). Also, the role of metacognitive functions in learning disabilities appears to be important (Denkla & Reader, 1993; Torgesen, 1994).

Metacognition is defined as knowledge of cognition (Flavell, 1979) as well as skills that permit effective regulation and monitoring of one's own behavior (Georgiadis & Efklides, 2000). As a result, it is both static and strategic. Static knowledge refers to what people state about cognition verbally, and strategic knowledge involves the steps people take in order to regulate, control, and modify their cognitive activity. Flavell's (1979) work suggests that differences in the adequacy of planning, orchestrating, monitoring, and modifying cognitive processes and strategies account for many of the observed differences between older and younger children, more and less "able" learners and problem solvers. This position was based on research data that concerns the cognitive, personality, and social characteristics of LD children.

Cognitive characteristics. Within a learning situation, it is insufficient for any child to have either only background knowledge or learning strategies. Equally important, if not more so, the child must be able to use his or her background and strategic knowledge effectively during learning. If unaware of his or her strategic repertoire, the child would be unlikely to deploy suitable strategies flexibly and precisely in response to task demands. Researchers have concluded that LD children's initially poorer performance reflects their failure to spontaneously apply a strategy that already exists in their strategic repertoire (Kamann & Wong, 1993; Rosenberg, 1997). Children with LD have been characterized as lacking the spontaneous use of various attentional (Minder, Das-Smaal, Brand, & Orlebeke, 1994; Stanford & Hynd, 1994) and mnemonic strategies (Montague, 1997). Teachers report that LD children approach tasks unsystematically. Their actions seem characteristic of a hastily applied trial-and-error approach, at best.

Personality characteristics. According to review data on children's learning and cognition (Millar & Irving, 1995), there is growing awareness of the interrelationship of children's academic locus of control and understanding of what factors affect mental events and their attributions, beliefs, and attitudes about the task (Metallidou & Efklides, 2001). This line of inquiry has focused on motivational and personality variables that affect children's learning (Swanson, 1991). It includes investigations of children's locus of control and attributions for success and failure

(Light, Kishner, Ozkanagot, Shapiro, & Clausen, 1985). Children with LD tend to believe that their learning difficulties are controlled by external variables and attribute failure to uncontrollable factors such as lack of ability, task difficulty, or teacher bias (Lindsay, Michie, Batty, Smith, & Miller, 1994). As a result, they often enter a vicious cycle of academic failure and low motivation that works against them (Efklides & Sorrentino, 2001; Lepola, Vauras, & Poskiparta, 2002; Rosenberg, 1997). In turn, further failure is experienced, which reinforces lower self-perceptions in the academic area, more negative feedback about themselves, and decreased self-concept and self-esteem (Fennell, 1997; Rosenberg, 1997; Vaughn, Elbaum, & Schumm, 1996).

Social characteristics. LD children's peer acceptance and social status outcomes were selected based on an extensive literature review indicating that, compared to nondisabled peers, children with LD are less well accepted and more frequently rejected by classmates (Bryan, 1974; Stone & La Greca, 1990), less likely to be selected as playmates, more likely to be ignored by classmates (Bryan, 1974), and viewed negatively even prior to being identified as having LD (Vaughn, Haager, Hogan, & Kouzekanani, 1992).

Cognitive-Behavioral Interventions with Children

For children with LD who daily encounter academic problems, it is particularly important to teach them to understand the nature of their learning problems, to be able to define for themselves exactly what is impeding their learning (internal locus of control), and to develop cognition about themselves as learners and about the learning process (self-awareness), thereby increasing task and academic performance in the face of failure (Millar & Irving, 1995).

During the 1980s and the 1990s the area of child psychotherapy moved from assessment and diagnosis to a focus on outcomes. As a result of the evolution of cognitive-behavioral techniques specific emphasis was put on:

1. the achievement of rapid outcomes and
2. the need for evaluative and comparative studies of treatment efficacy (Bergin & Garfield, 1994; Kazdin, 1988).

Cognitive-behavior therapy is based on the assumption that the person's problems derive from irrational thinking and that the connection between thoughts and emotions constitutes the main cause of problematic behavior (Beck, 1976). Cognitive treatment methods raise awareness and modify cognitive processes (such as perceptions, attributions, and problem-solving skills and strategies) that are presumed to underlie maladaptive behavior (Kazdin, 1988). Cognitive treatments require the child's active participation in learning to identify irrational thoughts, initiating an internal dialogue, halting his/her automatic way of thinking (Meichenbaum, 1977; Stallard, 2002), changing automatic thoughts to mediate new ones, and using cognitive methods to change unwanted behavior (Beck, 1976).

Cognitive-behavioral methods for children include (but are not limited to) self-instruction training, cognitive structuring, self-monitoring, self-evaluation, self-reinforcement, and imagination. They all aim at teaching children how to use self-instruction, inhibit disadvantageous response, become aware of cognitive processes, reinforce themselves, and produce more adaptive coping responses. Self-instruction

training (SIT) was the first type of cognitive-behavioral methods to be applied to children with learning and behavioral problems. The influence of Vygotsky (1956) and Luria (1963) has been significant. For example, the socio-historic theory of Vygotsky is primarily a learning theory, and from this point of view applies to learning to think. Vygotsky values the interaction between adults and children throughout their development. Luria's (1963) work traced the developmental changes in children's ability to regulate their behavior, by the shift from adult verbalizations to self-talk.

Metacognitive components also play an important role in SIT of academic skills. Specifically, they are purpose-setting, they bring about a smooth execution of the steps in cognitive training, and they help monitor/self-check learning/performance and evaluate the learning/performance outcome (Meichenbaum & Asarnow, 1979; Ronen, 1994, 1997, 2003).

Meichenbaum (1977) initially conceptualized cognition as a covert self-statement, a form of private speech that could be modified via modeling and repetition. His approach combined cognitive restructuring with training in verbal self-instruction and behavioral self-management techniques. Further, Bandura's (1985) reciprocal determinism and other systemic perspectives encouraged acknowledgment of the interaction of interpersonal cognitive activity and environmental contributions to self-regulation behavior.

Following the above rationale, children are viewed as "self systems." Children have abilities, but also goals, attributions, beliefs, motives. In addition, they have mechanisms, which are responsible for the representation of these cognitive and affective qualities (metacognition), aiming at the control and modification of cognition and action taken in a given situation (self-regulation, self-control). According to cognitive psychology, affective factors have motivational power as they influence task choices, intensity of effort, and persistence in face of obstacles in a given achievement situation (Metallidou & Efklides, 2000; Pintrich, Garcia, & DeGroot, 1994). Thus, they are considered to be of great importance for learning and task performance. Moreover, cognitive and motivational/affective processes are considered by many theorists and researchers as inseparable and synergistic as they operate together in a dynamic way to produce combined effects. Furthermore, perceived personal control is associated to motivation indirectly through self-esteem. Research findings suggest that the dimensions of locus of perceived control is related to feelings of self-esteem and self-worth (Pintrich et al., 1994).

Problems of Implementation

The concepts as well as the process of change through cognitive therapy require a level of cognitive skills, rational thinking, and verbal communication that is often seen as too difficult and too complex for young children due to developmental limitations. However, a careful look at the cognitive tasks confronted during early childhood indicates that children do possess a sufficient capacity to gain from a cognitive approach (Durlak, Fuhrman, & Lampman, 1991; Karmba-Schina & Zafiropoulou, 2002; Ronen, 1997, 2003; Stallard, 2002).

Cognitive therapists argue that if a child can learn, he or she is a good subject for cognitive therapy. Children learn about the brain and the body, so why should they not learn how to change their way of thinking? Therefore, cognitive therapy with

children, unlike cognitive therapy with adults, must be based not on changing irrational thinking (Ellis, 1962), but on translating the treatment's abstract goals (mediating thinking) and concepts (brain commands) to concrete notions, and to simple situations that are familiar to them from day-to-day life and that enable them to comprehend and deal with these notions through various techniques such as imagination and figures (Stallard, 2002).

This transformation can be accomplished by translating abstract terms to concrete ones (e.g., "automatic thought" becomes "doing something without thinking about it"). Other methods include using simple words (e.g., "mediated thought" becomes "a command or order that the brain sends the body") and the use of demonstration and metaphors from the child's daily life. For example changing one's behavior becomes a matter of learning, just like learning to ride a bicycle. Relating the learned material to a day-to-day event enables the child to identify and become aware of his/her skills (e.g., by showing the child how he/she can overcome spelling problems during a sports lesson, it is easier to teach the role of self-regulation in overcoming problems). These techniques allow for translating complicated ideas into simple words, in the same way that children learn to read and write.

Regression and Generalization

Research has shown that LD students' task performance generally improves following SIT intervention. However, findings of strategy maintenance, transfer, and generalization have been elusive, suggesting that often these children do not internalize the strategies they are taught. Research on the metacognitive development of children with LD has helped to specify the cognitive requirements for achieving generalization of some routine to a novel situation. For example, Meichenbaum (1977), from the vantage point of trying to develop a theory of change, underscored many of the same processes; namely, the need for self-awareness, the role of de-automatizing a behavioral act, and the like. The point to be highlighted is that similar constituent processes are being repeatedly identified as being central to the change (generalization) process.

In general, little research has been conducted on the specific use of cognitive training with children. The few exisiting studies found that cognitive therapy helped children give themselves instructions (Stevenson & Fantuzzo, 1986); inhibit impulsive responses (Kendall & Hollon, 1979); and decrease problem behavior at school. However, studies carried out in recent decades have shown a large gap between outcomes at the termination of treatment and at a follow-up interval (Kazdin, 1988), highlighting the need to address problems such as regression and generalization. The need to develop direct methods to construct overlearning methods for preventing regression and fostering generalization has been strongly emphasized and integrated into the philosophy of cognitive treatment.

Children do not automatically transfer learned skills (Gresham, 1981), but require instruction and guidance in how to transfer knowledge and skills from one area to another, in addition to explanations in simple, understandable words (Rose & Edleson, 1988). These principles comprise the founding rules of cognitive intervention. Gresham (1981) suggested that generalization should receive as much attention as initial skill acquisition. Further, in order to facilitate generalization, steps should be taken

to introduce the necessary mediating behaviors into the child's repertoire and to encourage a wide range of situations that can be generalized (Rose & Edleson, 1988).

Aims and Hypotheses of the Present Study

As mentioned before, no complete training program exists for teaching children with LD to develop cognition about themselves as learners and about the learning process.

The present study aimed to fill this gap by investigating the effectiveness of a psycho-educational intervention program designed to provide children with LD with certain skills that they lack, in an effort to help them become not only better learners but also socially and emotionally adapted.

In line with the aforementioned research findings, two major questions were addressed in the present study:

1. Is a cognitive-behavioral psycho-educational intervention program (PEIP) generally effective for LD children?
2. Is there evidence of consistent generalization following implementation of this intervention?

Accordingly, the following hypotheses were formulated:

1. Regarding the efficacy and generalization properties of the PEIP, it was expected that the program would be successful in improving LD children's general school performance compared to the scholastic performance of the children in the self-instruction training (SIT) group and the two control groups.
2. Our consequent hypothesis was that after the implementation of PEIP, LD children would also show improved psychological adjustment in the form of heightened self-esteem, less external locus of control and higher peer-acceptance.

More specifically, it was expected that (a) PEIP would be more effective than SIT in improving LD children's cognitive skills and (b) PEIP would prepare children to generalize their learned cognitive skills more readily than SIT.

Similarly, it was hypothesized that PEIP would be more suitable than SIT to help LD children improve their psychological adjustment as far as self-esteem, locus of control and social status are concerned.

Method

Participants

The initial sample of 200 students with below-average academic achievement was selected from a total urban student population of 3,154 1st–, 2nd–, and 3rd–grade students attending 35 mainstream public elementary schools in Volos (Central Greece) using a criterion-based assessment by their teachers concerning the children's performance in reading, writing, and mathematics (Karmba-Schina & Zafiropoulou, 1996). The following categories of students were excluded based on the DSM-IV criteria (APA, 1994): pupils with IQ scores below 85; those suffering from physiological, visual, auditory or motor defects; pupils with serious illnesses; and pupils on medication. A description of the final sample of 120 6- to 9-year-old children (mean age = 7 years, 8 months) appears in Table 1.

Table 1
Participants' Profile

Groups	ECI	SIT	AC	C	TOTAL
Boys	23	26	24	27	100
Girls	7	4	6	3	20
TOTAL	30	30	30	30	120

Participants' profile. Participants' academic achievement was below average in reading, writing, and mathematics. Their total IQ ranged from 85 to 110 (mean = 89) on the individually administered Wechsler (1992) Intelligence Scale for Children, WISC-III. Attention Deficit Disorder symptoms were evident in 48% of the children. Further, 46% showed Attention-Deficit/Hyperactivity-Impulsivity type symptoms, and 6% showed Attention-Deficit/Hyperactivity Disorder symptoms (DSM-IV; APA, 1994). According to the results of a questionnaire completed by teachers and parents, (Rutter, Tizard, & Witmore, 1981) participants did not suffer from any major psychological or behavioral disorder.

Using a double median split on the *Kagan's Matching Familiar Figures Test* (Salkind, Kojima, & Zelniker, 1977), 90 LD children showed the fastest (fast-inaccurate = impulsive) mean response latency (less than 7–8 sec. for each of the 12 items) and the greatest number of errors (more than 2 errors for each of 12 items), and 30 LD children showed the slowest (slow-inaccurate = impulsive) mean response latency (more than 7–8 sec. for each of the 12 items) and the greatest number of errors (more than 2 errors for each of 12 items). Their mean percentile performance on the Raven test was low (25%). Similarly, they produced low mean scaled scores in the Arithmetic ($M = 6$), Digit Span ($M = 4{,}5$), Coding ($M = 6$) and Symbol Search ($M = 5$) subtests of WISC (Wechsler, 1992). According to their scores on the Self-Esteem Inventory (Battle, 1981), they appeared to show low self-esteem in the academic, parental, and social areas, with $M = 12.42$ in the general self-esteem scores (according to the SEI norms, low self-esteem ranges between 11–13). Their answers to the Modified Intellectual Achievement Responsibility Questionnaire (MIARQ; Ringelheim, Bialer, & Morrissey, 1970) revealed low internal responsibility, with $M = 10.5$. Finally, the children's peer acceptance also appeared low, having been selected as playmates by less than three children each (Karba-Schina & Zafiropoulou, 1997).

Students were assigned to one of four groups. One group ($N = 30$) comprised the psycho-educational intervention group (PEIP); the second group ($N = 30$) comprised the self-instruction training group (SIT); the third group ($N = 30$) comprised the attention control group (AC); and the forth ($N = 30$) comprised the control group (C) (see Table 1). Assignment to these four groups was done subject to the constraints of (a) equating the groups on chronological age, (b) equating them on sex and (c) matching the groups on their IQ scores taken prior to training. No significant differences were found in IQ scores, $F(1{,}20) = 1.36$, $p = .26$, and chronological age, $F(1{,}20) = 1.18$, $p = .29$, among the four groups. Finally, assignment of children to the two experimental groups met the consent of their parents.

Tasks and Measurements

Cognitive Tasks

For the implementation of the two intervention conditions, the psycho-educational program and the self-instruction training, a number of cognitive tasks were selected, which involve performance on a variety of psychometric instruments previously used to assess children's IQ and cognitive tempo. First, children were examined performing these tasks (pre-test). Then, the training sessions took place, during which children were trained how to best perform the same tasks under either the SIT or the PEIP condition. The efficacy of the two intervention programs was assessed by testing the children's performance on the same tasks after training (post-test). The tasks were as follows.

Kagan's Matching Familiar Figures Test (MFFT; Salkind, Kozime, & Zelneker, 1977) was employed as a training task to improve children's general use of self-regulatory strategies. Designed to assess participants' cognitive tempo, each task consisted of matching each of 12 standard drawings to one of the six presented drawings. Latency of the first response and number of errors were the two performance measures. Low response latencies (under 7 or 8 sec.) and high error scores (more than 2 errors per card) are usually taken to represent *impulsive* behavior (Kagan, 1965). Children with mean response times greater than 12 sec. and mean error scores under 2 belong to the *reflective type.*

*Digit Span (*WISC-III subtest; Wechsler, 1992) loads the freedom from distractibility factor in WISC-III. In this task the child is asked to repeat verbatim a series of orally presented number sequences forward and in reverse order. It was employed to assess and improve children's short-term memory and freedom from distractibility.

*Object Assembly (*WISC-III subtest; Wechsler, 1992) loads the Perceptual Organization factor in WISC-III. In this task the child is requested to assemble a set of jigsaw puzzles of common objects, each presented in a standardized configuration, to form a meaningful whole. This task was selected to help children improve their perceptual organization.

Colored Progressive Matrices (CPM; Raven, Court, & Raven, 1990). In this task chosen to improve visual-spatial skills, the child is asked to choose a figure to be inserted so that the problem is completed.

Generalization Tasks

The following tasks, three performance and one verbal WISC-III subtests, were employed to assess the transfer or generalization properties of the two cognitive intervention conditions. Care was taken to measure the transfer of cognitive skills that had already been taught to the children through SIT or PEIP.

Coding (WISC-III subtest; Wechsler, 1992) contains a series of simple shapes or numbers, each paired with a simple symbol, and assesses concentration, processing speed, motor speed, and activity level. The child's task is to draw a symbol in its corresponding shape or number.

Symbol Search (WISC-III subtest; Wechsler, 1992) contains a series of paired groups of symbols, each pair consisting of a target group and a search group and assesses processing speed. The child is asked to scan the two groups and indicate whether or not a target symbol appears in these groups.

Picture Arrangement (WISC-III subtest; Wechsler, 1992) consists a set of colorful pictures presented in mixed-up order that the child is asked to rearrange into a logical story sequence. This subtest is designed to assess the ability to comprehend and size up a total situation requiring anticipation and planning.

Arithmetic (WISC-III subtest; Wechsler, 1992) is a series of arithmetic problems that the child has to solve mentally and respond to orally, used for the assessment of freedom from distractibility.

Personality and Social Status Factors

The following self-report measures were employed to assess children's personality and social characteristics before and after intervention.

The Modified Intellectual Achievement Responsibility Questionnaire (MIARQ; Ringelheim et al., 1970). This measure taps belief in one's control over, and responsibility for, intellectual-academic successes and failures. It is a modified form of the Intellectual Achievement Responsibility Questionnaire (IARQ; Crandall, Katkovsky, & Crandall, 1965) and differs from the original scale in three ways: (a) it contains 24 instead of 34 items, (b) the language level is simplified, and (c) instructions include two examples to ensure that the task is understood. The MIARQ uses a forced-choice format and a total I (internal or self-responsibility) score.

The Self-Esteem Inventory (SEI; Battle, 1981). Designed for children ages 6-14, it taps discrete domains of self-esteem separately and assesses self-esteem directly with a set of items that inquire about the children's sense of self-acceptance and worth as a person. It was used to provide a total self-esteem score. In addition, three interpretable factors were identified measuring academic self-esteem, social self-esteem, and parental self-esteem for each participant.

Peer Acceptance (Macmillan et al., 1978). LD pupils' peer acceptance within school was measured by asking pupils to list their closet friends, described as "the friends you hang around with and play with at playtime." A sociogram was used to assign LD pupils to peer groups on the basis of reciprocal friendships: (a) high peer acceptance group with more than 7 friends; (b) medium peer acceptance group with between 3–6 friends; and (c) low peer acceptance group with less than 3 friends.

Scholastic Performance

Finally, teachers performed a criterion-based assessment of their students' scholastic achievement in reading, writing, and mathematics. The teachers were informed that students had been selected to receive special intervention for their learning difficulties, but were unaware of the kind of treatment and of the group to which each child belonged to. Assessment of the children's academic performance was recorded using a 10-point scale (1–2 = very bad, 3–4 = bad, 5–6 = good. 7–8 = very good, 9–10 = excellent). The teachers filled in the scale immediately prior to and after training as well as seven months after the conclusion of the post-training assessment.

Students' performance on all other tests was scored by two independent judges before and after training and seven months after completion of the intervention. Agreement between raters was 92%.

Intervention Packages

Self-Instruction Training (SIT)

The self-instruction technique proceeded as follows: (a) the experimenter (E) performed the task talking aloud while child (S) observed (E acted as a model). Then the child performed the same task while E instructed him/her aloud; (b) the child performed the task again while instructing himself aloud; (c) the child performed the task while whispering to himself (lip movements); and (d) the child performed the task covertly. Training was considered complete when each child reached a criterion of 80% correct performance on each test.

The verbalizations that E modeled and S used (Meichenbaum & Goodman 1971) included: (a) questions about the nature and demands of the task; (b) answers to these questions in the form of cognitive rehearsal and planning; (c) self-instructions in the form of self-guidance; and (d) self-reinforcement (see example in Appendix A).

The four cognitive tasks employed to train the child to use self-instructions to control his nonverbal and verbal behavior varied along a dimension from simple visual-auditory abilities to more complex problem-solving abilities. The difficulty level of the training tasks gradually increased over the 13 training sessions.

The Psycho-Educational Intervention Program (PEIP)

The package is an adaptation of the *Help Yourself Program* developed by Ronen (1994, 1997) to suit the aims of the present study. This program was selected for the following reasons: (a) It is an innovative intervention program for children with LD; (b) unlike most of the clinical and educational applications of cognitive-behavior interventions with children that derive from treatment models formulated for adults, this treatment model was developed to teach self-control methods to primary-school pupils as part of their regular curricula. Outcome studies conducted to investigate the efficacy of the treatment package showed that children who participated in the program showed "self-change" behaviors. More specifically, second-grade children succeeded more than did sixth graders, who appeared not to work on the program as seriously as their younger counterparts (Ronen, 1994, 1997); (c) using a written manual, the self-control training is based on active participation in learning to look at irrational thoughts, stopping automatic thoughts, changing them to mediate new ones, starting an internal dialogue, and looking for alternative behaviors. All cognitive and affective behaviors attempt to engender competence in pupils by teaching LD children "how to think," rather than "what to think;" (d) the program covers a variety of techniques, such as self-instruction training, self-control methods (self-monitoring, self-evaluation, self-reinforcement), cognitive structuring, and imagination for installing general self-control and problem-solving strategies in children.

Adapted to meet the needs of LD children, the present psycho-educational intervention package consisted of one manual with 12 units. The manual explains the targets of each unit, the new concepts introduced in each, and gives instructions for guiding children's homework. It includes theoretical and practical material (intervention setting and home assignments) (see Appendix B).

The theoretical and practical material (units 1 to 12) is studied during intervention sessions. The practical material is designed as a self-change process to be

conducted at school under therapist supervision and at home under parent supervision. In the original treatment program teachers served as supervisors in the class setting. In the present study the experimenter was the supervisor in the intervention setting.

Aims of units 1 to 12. Units 1 to 12 provide children with LD with the basic knowledge to engage in self-change. The child acquires the information necessary for changing his/her behavior and learns about the ways in which human beings operate physically as well as psychologically. Each unit includes three activities: learning new material, practicing in the treatment setting, and applying the knowledge at home.

The study material includes theoretical and practical material (through figures and designs), instruction in knowledge areas new to the child, such as the relation of the body to the brain, automatic thoughts (doing something without thinking), and a variety of techniques such as self-instruction (the same procedure as with SIT), self-control (self-monitoring, self-evaluation, and self-reinforcement), and guiding imagery.

The practice part is carried out in the treatment setting in the form of role-playing, and discussions. At the same time, application takes place at home environment via assignments to the child (as self-record and self-evaluation of academic progress) and to the parents (as supervisors) making direct use of these new concepts and techniques. (Appendix B describes the aims, concepts and subjects in each of the 12 units.)

The same training tasks were used in both the SIT and the PEIP interventions.

Procedure and Design

Children in both the "Self-Instruction Training" group (SIT Group) and the "Psycho-Educational Intervention Program" group (PEIP Group) were seen individually for 13 training sessions (40–50 minute each session) once a week. Children in each training-experimental group followed the intervention program they were assigned to.

Pupils in the Attention Control Group (AC Group) were gathered for 30-40 minutes of "play" sessions with one of the research assistants. These meetings were arranged to take place once per week for 13 weeks, exactly as for the two experimental groups. Together with the researcher, the children played various games of their liking each time. They were encouraged to enjoy themselves playing in a civilized manner. They were *not,* however, trained to self-instruct or to self-control. Children in this group were pre- and post-tested and also received a follow-up test seven months later like the rest of the experimental and control groups.

The untreated Control Group received only the same pre-test, post-test, and 7-month follow-up assessments as all the other groups.

Both experimental and control groups also completed the MIARQ, SEI, and sociometric scales, before and after training and in the 7-month follow-up. Children in all groups were provided with social reinforcement for their participation and performance.

The experimental design was competed in three stages as follows.

Stage 1. The sample of LD children was selected, assessed in all cognitive training tasks, the questionnaires and scales mentioned above, and then divided in four groups according to the criteria described previously. Their scholastic achievement was also recorded (*pre-test assessment*).

Stage 2. The intervention packages were implemented and children's performance on the cognitive tasks was assessed. The children with LD were also asked to answer the same questionnaires as those in the first stage and their scholastic performance was again recorded together with their peer acceptance status (*post-test assessment*).

Stage 3. Seven months after training, follow-up tests were employed to assess generalization of cognitive skills as well as effects of the interventions implemented on personality and social characteristics (*follow-up assessment*).

Results and Discussion

Training Task Performance Scores

The efficacy of the two intervention conditions was assessed by means of analysis of variance, which yielded a group effect, an assessment phase effect (pre-test, post-test and follow-up assessments), and a group x assessment phases interaction. Multiple *t* test comparisons were performed on score differences for each of the measures. Comparisons between intervention and control groups were expressed in terms of the standardized effect size (Sideridis, 1999). [ES = (Mt–Mc)/*SD* pooled, where ES is the standardized effect size, MT is the mean of the intervention group, MC is the mean of the control group, and *SD* pooled is the pooled within group standard deviation (Cohen, 1988, 1992).] Positive scores indicate that the intervention groups improved more than the controls; negative scores indicate the opposite outcome.

On all four training tasks, both experimental groups showed marked improvements. The PEIP group improved greater than the SIT group on MFF (latency), MFF (errors) scores, Object Assembly, Digit Span, and Raven's Matrices. The mean improvement scores for the four groups on the training tasks are shown in Table 2.

Table 2

Pre-Test, Post-Test and Follow-Up Mean Training and Generalization Task Scores for the Psycho-Educational Intervention Program (PEIP), Self-Instructional Training (SIT), Attention Control (AC), and Control (C) Groups

Groups	PEIP						SIT						AC						C					
Measures	pre-		post-		follow-up		pre-		post-		follow-up		pre-		post-		follow-up		pre-		post-		follow-up	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Training tasks																								
MFF (latency)	7.03	2.55	24.1	5.55	22.8	5.27	6.56	2.16	11.3	2.08	10.7	1.91	10.4	5.49	10.6	3.94	9.9	3.7	5.6	1.56	5.83	1,34	5,13	1,43
MFF (errors)	25.5	2.3	11.8	0.79	11.8	0.92	23.5	3.13	24.1	1.45	24.2	1.38	24.8	2.08	23.5	2.5	23.6	2.78	25.4	6.27	24.6	5.79	247.	5.77
CPM	14.4	1.54	24.4	1.5	24.9	2.2	15.8	1.73	22.9	2.03	22.9	1.72	15	1.36	15.3	0.99	15	1.22	16.6	1.42	16.9	1.18	16.6	1.37
OA	9.66	1.26	22.6	2.44	22.8	2.23	10.6	1.44	20.9	3.51	20.8	3.38	0.06	1.63	9.46	1.19	9.06	1.22	11	1.66	10.5	1.9	10.6	1.71
DIGIT SPAN	6.26	0.9	9.06	0.78	9.06	0.69	6.43	1.3	8.03	1.09	7.8	0.92	6.36	1.09	5.6	1.1	5.56	0.85	5.56	0.97	5.36	0.85	5.03	0.71
Generalization Tasks																								
Arithmetic	9.53	2.47	13.9	1.38	14.3	1.66	9.8	1.21	12.9	1.01	12.9	1.04	10.7	2.18	10.8	2.09	10.8	2.09	9,4	2,32	9.5	2.25	9.6	2.17
Coding	32.7	4.13	40.4	4.96	40.4	4.8	32.1	4.07	35.4	4.01	35.3	4.05	33.1	5.8	34.1	5.62	34	5.77	32.6	5.41	33.4	5.13	33	5.23
Symbol Search	9.36	1.35	15.7	1.13	16.1	0.94	9.26	1.28	13.2	1.14	13.3	1.05	9.4	1.13	10.2	1.06	10.4	1.03	9.96	1.03	9.43	1.1	9.16	0.87
PA	9.06	2.27	20.1	3.35	20.5	3.35	10.6	1.63	18.6	4.68	18.2	4.2	8.73	1.77	8.83	1.85	8.86	1.88	9.86	1.13	9.63	1.15	10.1	1.46
School achievement																								
Reading	2.96	0.88	6	0	7.5	0.5	3.13	0.77	4.63	0.71	5.1	0.54	2.7	0.74	3.03	0.55	3.03	0.55	2.56	0.77	2.6	0.77	2.6	0.77
Writing	1.96	0.92	6	0	7.56	0.5	2.1	0.92	3.4	0.56	4.43	0.97	1.96	0.66	3	0	3	0	2.06	0.78	3	0	3	0
Maths	3.2	0.8	6.36	0.55	8.33	0.54	3.3	0.74	4.66	0.84	5.33	0.66	3.03	0.18	0.06	0.25	3.06	0.25	3	0	3	0	3	0
Questionnaires																								
SEI(general)	6.4	0.81	8.03	1.03	8.1	0.92	6.16	1.08	6.46	1.19	6.5	1.1	7,16	0.94	6.4	1	6.36	0.92	7.43	0.97	6.9	0.92	7.16	0.87
SEI(academic)	2.06	1.14	3.93	0.82	3.93	0.82	1.83	0.91	2.63	0.66	2.63	0.6	1.83	0.91	1.96	1.03	1.96	1.03	2	1.05	1.53	0.77	1.56	0.81
SEI(parental)	1.63	0.49	4.03	0.61	4,03	0,61	1.73	0.44	2.53	0.5	2.53	0.5	1,56	0.5	2.23	0.43	2.23	0.43	1,6	0.56	1.56	0.56	1.3	0.53
SEI(social)	2.23	1.1	4.06	0.98	4.06	0.98	2.1	1.02	2.7	0.65	2.7	0.65	1.73	1.08	1.86	1.1	1.86	1.1	2.43	0.93	1.9	1.02	1.9	1.02
Locus of control	10.4	0.81	14.4	0.85	14.5	0.67	10.9	1.33	10.3	0.92	10.8	1.06	10.8	1.28	11.7	0.94	12	0.37	10	1.8	10.6	1.32	10.7	1.33
Sociometric measure	1.46	0.5	1.73	0.44	1.73	0.44	1.66	0.66	1.73	0.63	1.73	0.63	1.8	0.71	1.8	0.71	1.8	0.71	1.63	0.55	1.7	0.53	1.7	0.53

A significant difference emerged among overall pre-test, post-test, and follow-up performance scores $F(1, 26) = 14$, $p < .001$] in the four training tasks. Significant differences were also found in the groups (4) x assessment phases (3) interaction, $F(1, 26) = 12.7$, $p<.001$.

Comparisons between experimental and control groups in terms of the standardized effect size (ES) showed that differences between the two experimental and the two control conditions were quite high (see Table 3). The ES between the groups ranged between 0.2 and 5.7. Also, for three out of the four comparisons, the ES between groups was more than 1, which is considered to be a large effect size.

Table 3

Effect Size Analysis for the Comparisons Between Experimental and Control Group Task-Performance Scores

	PEIP/AC	PEIP /C	SIT/AC	SIT/C
Digit span	2.7	4	1.6	2.4
MFF (latency)	1.7	4.2	-0.2	2.3
MFF(errors)	-4.2	-2.4	-3.1	-1.9
OA	5.7	4.2	3.3	1.2
RAVEN	4.3	3	3.8	2.5
Coding	0.8	1	0	0.2
Symbol search	3.7	4.3	1.9	2.5
Arithmetic	0.9	1.5	0.6	1.4
PA	3.3	4.8	2.1	2.3
SEI (general)	1	0.5	-0.3	-0.8
SEI (social)	1.7	1.5	0.8	0.6
SEI (academic)	1.5	2	0.6	1
SEI (parental)	3.2	3.6	0.7	2
Locus of control	2.2	2.4	-1.1	0.1
Sociometric	-0.4	0	-0.3	0
Reading	5	5.8	2.1	2.8
Writing	8.3	8.3	1.7	1.4
Math	9.6	7.2	3.5	2.8

Multiple *t* comparisons indicated that the PEIP group produced significantly different task performance scores ($p<.001$) from those of the SIT, AC, and C groups on the MFFT (response latency and errors), Object Assembly, and Digit Span. Further evidence for the efficacy of the PEIP derived from assessment of cognitive impulsiveness (MFFT scores). The PEIP group increased their mean total decision time for the 14 MFFT items from pre-test to post-test by 20 sec. ($SD = 8.09$) compared to the SIT group. They also increased their total post-test decision time by 10 sec. ($SD = 5.1$). The AC group decreased their total post-test decision time by 1 sec. ($SD = 3.38$), whereas the control group decreased it by 2 sec. ($SD = 3.50$). The PEIP and SIT groups recorded a total error decrease of 12 and 11 errors, respectively, on the post-test, compared to the AC group, which demonstrated a group total decrease of 3 in the post-test. The control group, on the other hand, increased their post-test errors by 3.

Generalization Task Performance Scores

The mean improvement scores for the four groups on the generalization tasks are shown in Table 2. On all four tasks, both experimental groups showed marked improvements, the PEIP group showing greater improvement than the SIT group in the Arithmetic, Symbol Search, and Picture Arrangement.

A significant difference emerged among the overall pre-test, post-test, and follow-up performance scores, $F(1,8) = 15,77$, $p<.001$. A 4 (groups) x 3 (assessment phases) ANOVA carried out for the generalization scores revealed a statistically significant groups x trials interaction effect, $F(1,8) = 15.77$, $p<0.001$. Evidence of generalization was shown by the students' markedly improved scores on the Arithmetic, Symbol Search, and Picture Arrangement tasks. More specifically, a statistically significant difference was found in the groups x trials interaction for Symbol Search, $F(1,8) = 25.9$, $p<.001$, and for Picture Arrangement, $F(1,8) = 24.8$, $p<.001$. Performances on the Arithmetic and Coding subtest did not yield significant group trials or group x trials interaction. In general, the results suggest that the experimental groups showed significantly better generalization performance in comparison to the control groups, which appears to come as a result of training.

Comparisons between experimental and control groups were again expressed in terms of the standardized effect size. The ES between the groups ranged between 0.2 and 4.8. However, for two comparisons, SIT-AC and SIT-C groups in Coding, the standardized effect size (ES) was less than 0.5, which is considered to be a rather insignificant effect (Cohen, 1992), thus offering practically meaningless differences between groups.

Self-Report Scores

The mean improvement scores for the four groups on the self-report measures are shown in Table 2.

For two out of the three self-report measures, both experimental groups reported noticeable changes through all phases, with the PEIP group showing greater differences at post-test and follow-up assessment in self-esteem and locus of control scores than the SIT group. However, neither experimental group showed improvement in the sociometric measure.

Comparing the self-esteem inventory scores after the end of training, two tendencies were observed. As expected, the scores of the experimental groups as compared with those of the AC and C groups increased. Groups (4) x phases (3) interaction analyses revealed a strong trend towards significance on the academic self-esteem, $F(2,9) = 29.2$, $p<.001$. The significance of the groups x trials interaction suggests that the experimental groups improved their self-esteem scores more than did the control groups as a result of the interventions implemented.

Significant difference was also found between the two experimental groups on the academic self-esteem, $F(2,9) = 16.8$, $p<.001$, as well as on the social self-esteem, $F(2,9) = 14.5$, $p<.001$. A Tukey HSD post-hoc analysis revealed that the mean social self-esteem and academic self-esteem scores of the PEIP group were significantly higher than the SIT group mean ($p< .05$). However, no significant difference was found on the parental self-esteem between the experimental and the control groups.

Moreover, decreased external locus of control scores were reported after the intervention. A groups (4) x phases (3) analysis of variance was carried out to investigate

the potential importance of the findings. The result revealed a significant groups x phases interaction, $F(1,8) = 11,37$, $p < .001$. A Tukey HSD post-hoc-analysis showed no strong difference between the four groups prior to intervention, but the PEIP group decreased their external locus of control scores in MIARQ significantly ($p<.001$). Therefore, it appears that there is evidence of consistent generalization following the specific intervention.

Comparisons between the experimental and control groups in the self-esteem and locus of control scores were expressed in terms of the ES. The ES between the groups ranged between 0.5 and 2.4. However, for two comparisons, those between SIT and AC and SIT and C groups for the general and social self-esteem scores and for the MIARQ scores, the standard difference between groups was less than 0.5, which is considered to be rather insignificant (Cohen, 1992), thus, offering practically meaningless differences between groups (see Table 3).

Academic Achievement Scores

Both experimental groups showed satisfactory improvement in academic achievement compared to the AC and C groups, which stayed at the same levels as before. Multiple *t* test comparisons indicated that the PEIP group's academic performance improvement was significantly higher ($p<.001$) than the SIT group in writing, math, and reading (see Table 2).

A groups (4) x phases (3) analysis of variance carried out separately on the participants' reading, writing, and math performance showed a significant group x phases interaction in each, $F(1,90) = 30.39$, $p<0.001$; $F(1,9) = 50.41$, $p<0.001$, and $F(1,9) = 35.24$, $p<0.001$, respectively. These statistically significant findings suggest that the experimental groups improved in academic performance more than the control groups as a result of training. The ES between the groups ranged between 1.7 and 9.6. Furthermore, for all four comparisons the effect size was more than 1, which is considered to be a significant result.

The results of the present investigation are meaningful in terms of each of the three research questions addressed. First, both conditions were found to be effective in improving LD students' skills and strategies. Second, evidence of generalization was found following both conditions. Third, the psycho-educational intervention effects were stronger in generalization than the self-instruction training.

In interpreting these finding one could argue that cognitive-behavioral interventions are effective not only with behavioral but also with learning difficulties. This is an important finding, if we consider that this type of intervention has recently been implemented in the classroom and only to treat behavior problems. Based on the current results, it seems to be equally successful with learning difficulties. It appears, therefore, that both experimental conditions employed in the study had the capacity to provide children with LD with sufficient strategic knowledge and skills to improve their academic performance. Both the psycho-educational intervention program and the self-instruction training helped the children overcome their mediator deficiencies and approach the most important educational goal of learning how to learn. It also appears that the two intervention conditions were efficient in training primary-school children with learning disabilities to understand the nature of their problems and to engage in self-change.

Though both intervention conditions seemed to be successful in achieving the targets of the study, the present design allowed us to further determine any differences between the two conditions. As already mentioned, a general trend was evident for the PEIP condition, compared to the SIT, to be more effective in most areas of investigation, and especially as far as generalization is concerned. The degree of maintenance and generalization of behavior change following the psycho-educational intervention program is of primary importance in evaluating that intervention. It is widely recognized that generalization has to be programmed rather than expected. This observation could lead us to the suggestion that the superior effectiveness of PEIP may be attributed to its integrated, multidimensional design. In this capacity it proved more sufficient in satisfying the needs and in treating the disorders of LD children. Self-instruction has been one of the consisting elements of this program. Self-instruction training, on the other hand, restricted to address only certain cognitive deficiencies, could not achieve general and lasting effects. Though both conditions were specially designed for children, the PEIP is broader, more flexible, and thus, more interesting and enjoyable. The observed generalization effects also suggest that even the young children with learning disabilities can be taught self-control in a playful manner and that they can change their own behaviors. This appears to contribute also to a broader psychological adjustment of the children in question in terms of self-awareness, self-esteem, and attributions of success and failure.

The psycho-educational intervention program for learning difficulties presented here, though presently implemented by a psychologist, is primarily intended for use by teachers as an innovative method of intervention to impart cognitive and behavior skills to children with learning disabilities. This is expected to be achieved with only a small amount of teacher training as it consists of a clearly written manual, including theoretical and practical material for both classroom and home assignments. Further, and most important, the program is designed to teach self-control techniques to primary-school children as part of their regular curricula and can, therefore, function as a treatment as well as a preventive program.

In conclusion, the present study suggests that a psycho-educational intervention program that activates and guides children with learning disabilities to understand the nature of their learning problems, to define for themselves what is impeding their learning, and to develop cognition about themselves as learners and about the learning process (self-awareness) is capable of increasing cognitive and metacognitive performance considerably in the face of failure and improve their psychological adjustment overall. Results of the present study are, therefore, encouraging and suggest that further efforts to develop this approach for use by school personnel should be fruitful.

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Appendix A

Content of Self-Instruction Training (SIT)

Problem definition: "My first step is to make sure I know what I'm supposed to do."	"I'm to find the picture that is the same as the standard."
Problem approach: "Well, I should look at all the possibilities."	"I look carefully at this one (the standard) and then I look at these (the variants). Is this one different? Yes it has an extra leaf.
Focusing of attention: "I should think about only what I'm doing right now."	Good, I can eliminate this one. Now, let's look at this one (another variant). I think it's this one, but let me first check the others."
Self-reinforcement: "Hey, good job. I'm doing very well!"	"Good, I'm going slowly and carefully. Okay, I think it's this one."
Coping statements: "Well, if I make a mistake I can remember to think more carefully next time, and then I'll do better."	

Appendix B

Psycho-Educational Intervention Program (PEIP): Units and Targets

Session	(Ronen, personal communication) The Unit	The Target	New Concepts
1st	1. My school problems and me	Introduction to the program Understanding individual differences in school behavior	behavior, problem
1st	2. Are you responsible or not?	Understanding one's misconceptions	control, responsibility
1st	3. Your school behavior depends on you	Understanding that behavior can be learned just like other things	regression, improvement
2nd	4. You can overcome	Understanding that behavior is connected to learning	brain
3rd	5. The brain and the body	Learning to identify automatic commands	command of the brain
3rd	6. It is not magic	Understanding that it is possible to change a command	automatic behavior
3rd	7. The behavior we don't like	Learning to use imagination and self-reinforcement	retrain, inhibit, reinforcement
3rd	8. Automatic commands	Learning how to use the brain's commands	
4th	9. How to overcome	Learning how to use a new command	barrier
5th	10. Learn to know yourself	Understanding that change is a long process	knowledge, efforts
6th	11. The role of belief	Learning the role of self-efficacy	self-efficacy
6th	12. Is thinking enough?	Learning that change is hard Learning the role of being systematic and insistent	

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