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Promoting Strategy Generalization Through Self-Instructional Training in Students with Reading Disabilities

Lorna K.S. Chan

Twenty Grade 5 and 6 students with reading disabilities, 20 average readers in Grade 3, and 20 average readers in Grades 5 and 6 were taught to use a self-questioning strategy for the identification of main ideas. They were randomly assigned to either a standard instruction or a generalization induction condition. In the latter, informed training and self-instructional training techniques were employed to promote generalization of strategy use. Subjects were posttested under both a cued and an uncued condition in their homerooms. Results indicated that the self-instructional training succeeded in facilitating the identification of main ideas among students with reading disabilities and in helping them to maintain their improved performance when they were no longer prompted to use the strategy in a transfer setting.

In recent years metacognition has gained cognizance in the field of learning disabilities (Wong, 1985a, 1986). Research indicates that students with reading disabilities, in particular, benefit from explicit instruction in the use of cognitive and metacognitive strategies (e.g., Baker & Brown, 1984; Chan, 1988; Chan, Cole, & Barfett, 1987; Paris & Oka, 1986). However, strategy maintenance and generalization are not often demonstrated. It has typically been observed that students with learning disabilities who do not spontaneously make use of cognitive strategies can easily be taught, and benefit from, the use of strategies; however, when they are no longer prompted to use the learned strategy, they fail to generalize its use to relevant learning situations (e.g., Chan & Cole, 1986; Chan, Cole, & Morris, 1990; Ringel & Springer, 1980).

Ellis (1986) maintained that some techniques of cognitive strategy training may, in fact, interfere with goals of generalization. Many cognitive training programs use teacher-oriented and direct instruction approaches to teach students to employ self-instruction in guiding strategy use. Some of these instructional practices, if not counteracted appropriately, may inadvertently encourage an external locus of control and subdue student use of metacognition. For example, the use of teacher-oriented feedback and extrinsic reward systems, or instruction that is

highly organized and tightly structured, can subtly reinforce dependency behaviors and conflict with independence in action required for strategy generalization. Hence, researchers in the field have paid particular attention to the search for instructional practices and procedures that will promote strategy generalization.

The general conclusion from the relevant literature is that, in order to induce generalization, certain "conditions of generalization" (Wong, 1985b) have to be met. Specifically, the instructional procedures should include one or more of the following elements: (a) explicit information given to students about the what, when, why, and how of strategy use, and feedback about the effectiveness of the new strategy—that is, informed training (Brown & Palincsar, 1982); (b) the teaching of general control strategies to supplement task-specific strategies and to allow internalization of the new task-specific strategy—that is, training executive control directly (Borkowski & Cavanaugh, 1979); (c) procedures for systematically changing the teacher, setting, material, cues, and reinforcers—that is, explicit generalization training (Ellis, Lenz, & Sabornie, 1987); (d) explicit directions requesting students to generalize the strategy to similar types of tasks and situations—that is, environmental transfer (Ellis, Lenz, & Sabornie, 1987); and (e) helping students to overcome the feelings of helplessness they

experience when faced with difficulties in task completion, by changing their causal attributional beliefs (Ellis, 1986).

Many recent strategy instruction programs have included one or more of these elements. Paris, Cross, and Lipson's (1984) program, *Informed Strategies for Learning*, focused on informed training. Palincsar and Brown (1984) and Palincsar (1986) advocated the use of reciprocal teaching to assist the gradual transfer of control of strategy use from the teacher to the students. Anderson-Inman (1986) advocated a transenvironmental programming approach, consisting of environmental assessment, intervention and preparation, promotion of transfer across settings, and evaluation in the target environment. Borkowski, Weyhing, and Turner (1986) proposed a technique of attributional retraining to enhance strategy generalization. As yet, few studies have examined the effectiveness of such strategy generalization instruction for students with learning disabilities, relative to average readers.

The present study aimed to promote strategy generalization by means of self-regulatory (Loper & Murphy, 1985) or self-instructional (Ryan, Weed, & Short, 1986) training. *Self-instructional training* refers to a set of procedures designed to teach students to gain conscious, personal executive control over a learning task by using self-instructions or self-statements to guide their problem-solving process. Such self-guiding instructions often take the form of internalized speech. The methodology usually involves a set of modeling and rehearsal procedures for internalization of the control function of language, and fading procedures for systematically transferring the control of behavior from external to self-generated cues and from overt to covert self-instructions. The procedures have been developed by researchers in cognitive behavior modification (CBM) (Meichenbaum, 1977); their application extends beyond academic skills to a wide range of learning domains, including skills in the cognitive and affective domains.

Self-instructional training, with its emphasis on the development of self-regulation through self-statements, is particularly appropriate for teaching students with learning disabilities in the

use and generalization of cognitive strategies. Recent research has supported the hypothesis that poor task performance among students with learning disabilities is often the result of deficits in self-regulation of strategic behaviors, rather than an inability to acquire and execute specific strategies (Harris, 1986; Torgesen, 1982; Wong, 1985a).

Specifically, the present study was designed to provide instruction in the use of a self-questioning strategy for the identification of main ideas. That is, the self-questions were used for skill development and not just skill utilization, as discussed in Wong (1985b). The identification of main ideas was chosen to be the focus of instruction because it is a skill critical to both reading comprehension and learning from text (Brown & Day, 1983; Hare & Borhardt, 1984; Rinehart, Stahl, & Erickson, 1986). In the program, students were taught five subskills, which were adapted from Brown and Day's (1983) basic summarization rules: (1) deleting redundant information, (2) deleting trivial information, (3) rating sentences in order of importance, (4) identifying explicit main ideas, and (5) identifying implicit main ideas.

The self-questioning strategy has been taught frequently in cognitive and metacognitive training programs conducted in the area of reading to learn or learning from text. Students are taught to generate their own questions when reading text, to enhance comprehension and recall. Self-generated questions during reading promote learning through (a) involving the learner in active interaction of the text, (b) activating prior knowledge relevant to the text, (c) setting a purpose for the reading activity, (d) directing attention to important propositions in the text, (e) reflecting on semantic propositions of the text (and thus involving oneself in the higher levels of text-processing), and (e) checking for difficulties in comprehension and working out means of overcoming those difficulties (Wong, 1985c). From a quantitative synthesis of metacognitive studies, Haller, Child, and Walberg (1988) concluded that the use of self-questioning as a monitoring and regulating strategy was one of the most effective of metacognitive skills.

To summarize, the present study aimed

to examine the effects of strategy generalization instruction on the comprehension performance of students with reading disabilities. The program provides instruction in the use of a self-questioning strategy for the identification of main ideas and incorporates self-instructional training techniques to promote generalization of strategy across settings.

METHOD

A 3 (Subject group: reading disability, chronological age [CA] match, reading ability [RA] match) x 2 (Instruction Type: standard instruction, generalization induction) x 3 (Testing Condition: pretest, cued, uncued) repeated-measures design was employed, with testing condition being the within-subjects factor.

Subjects

A total of 60 subjects participated in the study. They came from three different schools in Newcastle, Australia. The student population in all three schools came from families of low-average income, but with few ethnic minorities. There were 20 Grade 5 and 6 students with reading disabilities (reading disability group), 20 average readers in Grade 3 (RA-match group), and 20 average readers in Grades 5 and 6 (CA-match group). This reading level design (Backman, Mamen, & Ferguson, 1984) was employed to rule out the possibility that any observed differences between the reading disability group and average readers could be attributed to the

former group's inferior word recognition performance.

Subjects in the reading disability group were 14 boys and 6 girls receiving remedial assistance from resource teachers on a part-time withdrawal or team teaching basis. They had no subnormal IQs or primary physical, sensory, or emotional disabilities, but were reading at a level 2 or more years below average expectations for chronological age. This group had a mean chronological age of 11 years 2 months and a mean reading age of 8 years 9 months (see Table 1), as assessed on the St. Lucia Graded Word Reading Test (Andrews, 1973). The St. Lucia is an individual test of oral word reading that was constructed in Australia and had a reported test-retest reliability coefficient of 0.947. Subjects were also assessed on the GAP Reading Comprehension Test, Form B3 (McLeod, 1977), and a mean reading age of 9 years 1 month was indicated. The GAP is an Australian test of reading comprehension using the Cloze technique, with reported split-half reliability coefficients ranging from 0.90 to 0.94 (McLeod, 1977). No individual IQ scores were revealed to the researcher, but information from the school counselors indicated that all subjects had IQ scores above 80. No students of minority ethnic origin were included in this group.

The average readers were nondisabled students attending the same three schools as the reading disability group. In each school, average third-grade readers were also individually tested on the St. Lucia, and those with reading ages that were comparable (within 1 or 2 months) to

Table 1
Characteristics of the Three Subject Groups

	<i>n</i>	Chronological age (in months)		Reading age (in months)			
		<i>M</i>	<i>SD</i>	St. Lucia		GAP Test	
				<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Reading disability group							
Standard instruction	10	134.90	8.03	103.30	11.28	109.20	11.46
Generalization induction	10	132.60	7.14	106.30	11.55	109.30	10.18
CA-match group							
Standard instruction	10	130.80	6.05	138.90	11.41	124.70	9.11
Generalization induction	10	132.40	8.11	133.10	15.10	125.20	6.03
RA-match group							
Standard instruction	10	108.50	6.36	108.30	10.71	108.30	11.24
Generalization induction	10	103.90	3.38	107.40	6.54	108.10	4.38

those of the reading disability group were selected to form the RA-match group. Average readers from fifth and sixth grade with chronological ages comparable to the reading disability group were selected to form the CA-match group. Thus, the RA-match group (10 boys and 10 girls) were third-grade average readers who had word recognition ability comparable to that of the reading disability group; and the CA-match group (12 boys and 8 girls) were fifth- and sixth-grade average readers comparable to the reading disability group on chronological age. Table 1 depicts the means and standard deviations of the chronological and reading ages of the three subject groups.

Materials

Instructional and assessment materials were constructed for use in the study. All reading texts were written at the third-grade readability level, as determined by the Lix readability index (Anderson, 1983).

Instructional Materials. The instruction program involves five topics: (1) deleting redundant information, (2) deleting trivial information, (3) rating sentences in order of importance, (4) identifying explicit main ideas, and (5) identifying implicit main ideas. For each of the first three topics, six short paragraphs of expository text on a range of topics were prepared. Each paragraph consisted of four to five sentences typed in enlarged print onto a 14 cm x 21 cm page. The sentences in the paragraphs for the third topic were typed on separate lines, each with a box at the beginning of the line for students to write in a numeral indicating the rank order of the sentence. Each set of six paragraphs was then stapled together into a booklet.

Two expository passages were written for each of the last two topics, each passage consisting of four or five related paragraphs and typed in enlarged print onto 21 cm x 30 cm paper. The two passages for the identification of explicit main ideas were about ways that animals move and what trees do for us. They were written to include a topic sentence in each paragraph, which was not in any fixed location within the paragraph. The two passages for the identification of

implicit main ideas were about bees and animals in the Dubbo zoo. They were written to contain no topic sentences, but each passage was accompanied by a sheet of multiple choice main idea questions, one question for each paragraph in the passage and a final one for the main idea of the whole passage.

Assessment Materials. Three main idea tests were constructed, one for a pretest and two for posttests. The main idea pretest consisted of 10 unrelated paragraphs, each with an explicit or implicit main idea presented in multiple choice format. Each of the two main idea posttests consisted of a passage of four related paragraphs, and five multiple choice items for the identification of the explicit or implicit main idea in each paragraph and the main idea for the whole passage. One paragraph from each of these two main idea posttests was then developed into a separate test requiring subjects to rate the sentences in order of importance. A third posttest, a 12-item multiple choice reading comprehension test, was also constructed.

Procedure

Pretesting. All subjects were administered the St. Lucia, the GAP, and the main idea pretest before beginning the instructional program. The St. Lucia was administered individually, while the GAP

and the main idea pretest (both group tests) were administered to the whole class in each school.

Instruction. The teaching program provides instruction in the use of a self-questioning strategy for the identification of main ideas. There were five daily 40-minute sessions, one on each of the five topics described earlier. For each topic, subjects were taught to ask themselves a set of questions while reading through the given text. For example, for deleting redundant information, subjects were taught to ask themselves the following questions: Does this sentence repeat what has already been said? Shall I leave it out? What is the paragraph mainly about? A complete list of the self-questions used is included in Table 2.

Subjects were randomly allocated to either a standard instruction condition or a generalization induction condition. Instruction was conducted in small groups of five or six students in a resource room setting. Only subjects of similar chronological age were placed in the same teaching group. All instruction was provided by the same teacher.

In the standard instruction condition, subjects were provided with a demonstration of how to ask themselves the designated set of questions while reading a given paragraph, and how to look for the answers to the questions. They were then allowed to practice the strategy on their

Table 2
Self-Questions for Each Topic

For each topic, students were taught to ask themselves a set of questions while reading through the given text. The sets of self-questions taught are:

For deleting redundant information:

- (a) Does this sentence repeat what has already been said?
- (b) Shall I leave it out?
- (c) What is the paragraph mainly about?

For deleting trivial information:

- (a) Does this sentence tell us anything new or more important?
- (b) Shall I leave it out?
- (c) What is the paragraph mainly about?

For locating topic sentences:

- (a) What does the paragraph seem to be about?
- (b) Does this sentence tell us anything new or more important than the main idea?
- (c) Is my guess right?
- (d) Which sentence gives the main idea?
- (e) Which answer gives the main idea of the passage?

For identifying implicit main ideas:

- (a) What does the paragraph seem to be about?
- (b) Does this sentence just tell me more about the main idea?
- (c) Which answer gives the main idea?
- (d) Which answer gives the main idea of the passage?

own. In the generalization induction condition, informed training and self-instructional training techniques were employed. The procedures involved the teacher explaining how, why, and when the self-questioning strategy could be used, followed by these five stages:

1. *Cognitive modeling*—the teacher modeled the self-questioning routine by “thinking aloud” while reading through the text, that is, verbalizing the self-questions and answers to oneself.
2. *Overt external guidance*—the students imitated the teacher’s self-questioning routine; that is, teacher and students read through the given text together, using overt self-questions and answers. This allowed the teacher to guide the students through the task.
3. *Overt self-guidance*—the students read through the text by themselves while verbalizing the self-questions and answers aloud. This provided the teacher the opportunity to monitor the students’ independent use of the self-questioning strategy.
4. *Faded self-guidance*—the students read the text while whispering the self-questions. This allowed the teacher to continue monitoring while fading the self-questions from the overt level.
5. *Covert self-guidance*—the students read the text using covert self-questions.

Posttesting. All subjects were post-tested on three dependent measures: the

identification of main ideas, rating of importance of sentences in the text, and comprehension competence. All post-testing was conducted in the students’ homerooms by their class teachers to assess generalization across settings. They were tested on identification of main ideas and rating of sentences on two separate occasions during the week following the completion of the instructional program, under a cued and an uncued condition. In the cued generalization condition, subjects were prompted to employ the self-questioning strategy they had learned, but no such prompts were provided in the uncued generalization condition. The order of the cued and uncued generalization was counter-balanced across subjects.

RESULTS

The means and standard deviations of the three dependent measures are presented in Table 3. Two simple contrasts were set up for the three subject groups, comparing the reading disability group with the CA-match group in the first and with the RA-match group in the second. All statistical analyses were conducted on SPSSx, Release 3.1.

Identification of Main Ideas

Data on the main idea measure were analyzed using a Subject Group (3) x Instruction Type (2) x Testing Condition (3)

repeated measures analysis of variance, with testing condition as the within-subjects factor. Two Helmert contrasts were set up for the three testing conditions, comparing the pretest with the cued and uncued conditions combined in the first, and then comparing the cued with the uncued generalization in the second.

Results indicated a significant subject group main effect, $F(2,54) = 14.25$, $p < .001$; a significant instruction type main effect, $F(1,54) = 3.87$, $p < .05$; a significant testing condition main effect, $F(2,108) = 20.88$, $p < .001$; and a significant Instruction Type x Testing Condition interaction, $F(2,108) = 4.36$, $p < .02$.

The finding of central interest is a significant 3 x 2 x 3 interaction, $F(4,108) = 2.46$, $p < .05$. Single-degree-of-freedom tests (Finn, 1974) revealed that the significant interaction was located in the interaction among the reading disability versus RA-match contrast, instruction type, and cued versus uncued generalization contrast, $F(1,54) = 5.49$, $p < .03$. As depicted in Figure 1, for the reading disability group, cued generalization was demonstrated by subjects in both instruction types, but uncued generalization (when subjects were not explicitly told to use the strategy they had learned in the resource room) was observed only in those subjects receiving self-instructional training. Such uncued generalization effect of the generalization induction training, however, was not observed in the RA-match group. For

Table 3
Means and Standard Deviations (in Parentheses) of the Main Ideas, Ratings, and Comprehension Measures

	Reading disability		CA-match		RA-match	
	Standard	Generalization	Standard	Generalization	Standard	Generalization
Main Ideas^a						
Pretest	5.00 (3.13)	4.70 (2.67)	7.50 (1.43)	7.90 (1.73)	6.90 (1.10)	5.90 (2.51)
Cued Condition	7.20 (2.53)	7.80 (1.48)	8.80 (1.40)	9.40 (0.97)	6.80 (1.93)	8.20 (1.75)
Uncued Condition	3.40 (2.12)	7.00 (1.41)	7.60 (1.84)	7.80 (1.48)	5.00 (2.54)	6.00 (2.83)
Rating of Sentences^a						
Cued Condition	7.60 (2.07)	7.10 (1.20)	8.80 (1.69)	8.80 (1.69)	6.00 (1.83)	7.20 (1.14)
Uncued Condition	4.60 (1.78)	6.20 (1.40)	6.70 (1.57)	7.00 (1.89)	4.70 (1.42)	5.30 (1.42)
Comprehension^b						
	8.20 (2.82)	9.20 (2.15)	10.10 (1.10)	10.70 (0.95)	9.60 (2.12)	9.30 (1.77)

^aMaximum score = 10. ^bMaximum score = 12.

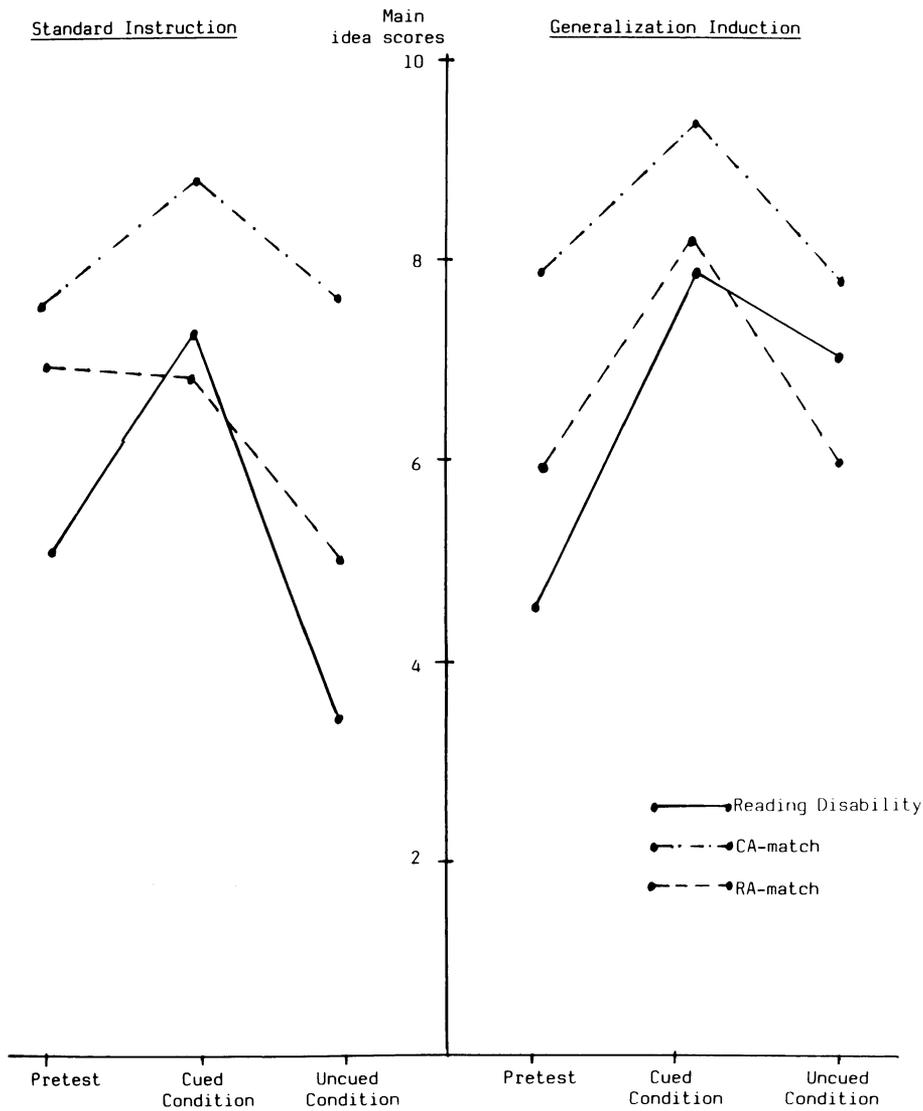


Figure 1. Mean main idea scores of the three subject groups as a function of instruction type and testing condition.

RA-match subjects, those receiving generalization induction instruction demonstrated cued generalization only, and no cued or uncued generalization effects were observed in those receiving standard instruction.

Rating Sentences

For this analysis there were only two testing conditions, the cued and the uncued generalization, because subjects were not pretested on this measure. Significant subject group and testing condition main effects were obtained, $F(2,54) = 12.30, p < .001$, and $F(1,54) = 61.04, p < .001$, respectively. Of the significant subject group main effect, only the first contrast, comparing the

reading disability group with the CA-match group, was significant, $F(1,54) = 22.74, p < .001$. An examination of the means revealed that the performance of the reading disability group was lower than that of the CA-match group and that performance in the uncued generalization condition was inferior to that in the cued generalization condition.

The Subject Group x Instruction Type x Testing Condition interaction approached significance, $F(2,54) = 2.86, p < .066$. An examination of the cell means depicted in Figure 2 revealed a trend similar to the results obtained on the main idea measure. The generalization induction instruction seemed to be more successful than standard instruc-

tion in promoting uncued generalization in the reading disability group.

Multiple Choice Comprehension

A Subject Group (3) x Instruction Type (2) analysis of variance was conducted on the comprehension posttest scores. Only the subject group main effect was significant, $F(2,54) = 3.91, p < .03$. Of the two contrasts, only the first contrast, comparing the reading disability group with the CA-match group, attained significance, $F(1,54) = 6.30, p < .02$; the second contrast, comparing the reading disability group with the RA-match group, did not. An examination of the means (see Table 3) indicated that the reading disability group had lower scores on the comprehension measure than their age peers, but their performance was not significantly different from the younger RA-match controls. However, the standard instruction and generalization induction instruction in identification of main ideas did not have differential effects on comprehension performance.

DISCUSSION

In general, informed training and self-instructional strategy training procedures (generalization induction) were more effective than the demonstration-practice techniques (standard instruction) for improving students' performance on identification of main ideas. This was true for all three subject groups. Students taught to use the self-questioning strategy for identifying main ideas by the self-instructional training technique achieved higher mean scores on the identification of main ideas than those taught through the standard procedure. Further, the generalization induction instruction was more successful than standard instruction in promoting unprompted generalization of the newly acquired strategy across settings among students with reading disabilities.

For the group of subjects with reading disabilities, instruction in the use of a self-questioning strategy was effective in improving their performance on identification of main ideas, regardless of whether the strategy use was taught by

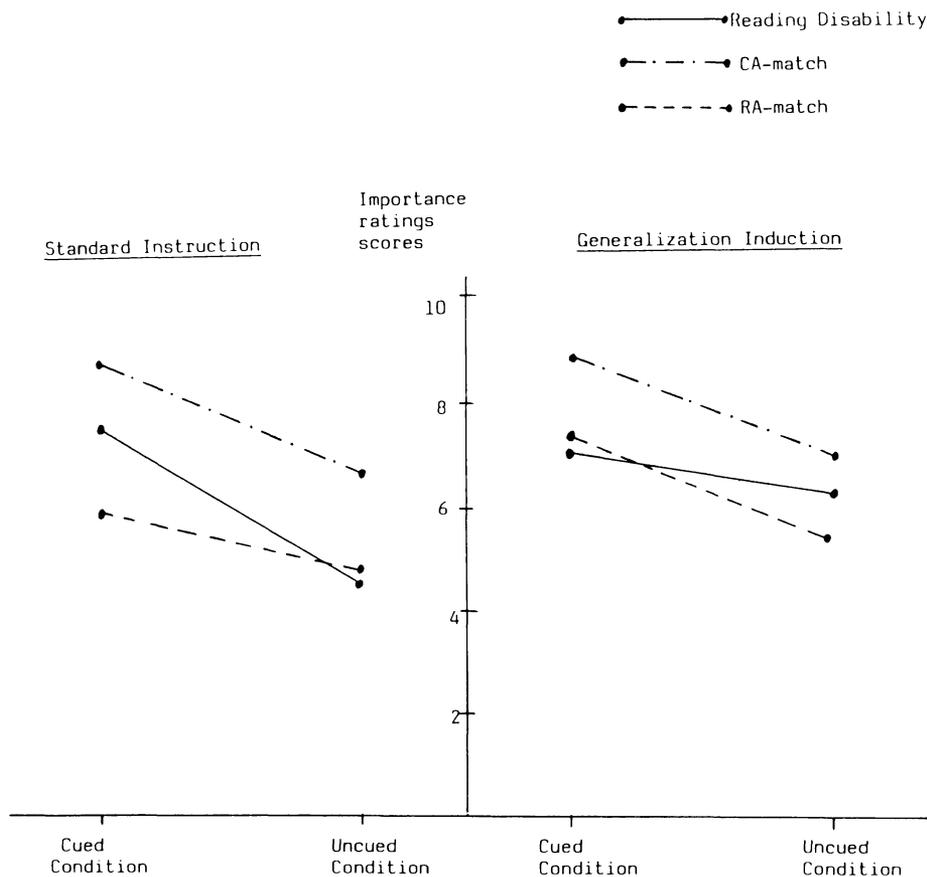


Figure 2. Mean importance ratings scores of the three subject groups as a function of instruction type and testing condition.

means of a standard demonstration-then-practice procedure or one specifically designed to enhance generalization. Before implementation of the main idea instruction program, the subjects with reading disabilities had very low scores on the main idea pretest—even lower than the younger average readers at a compatible reading level. After the instruction program, and when prompted to use the self-questioning strategy on return to their homerooms, the main idea scores of the reading disability group, regardless of instruction type, increased substantially to a level that matched what was achieved by the younger average readers. For students with reading disabilities taught through the standard strategy training procedure, however, unprompted generalization was not observed. In other words, the superior performance was no longer observed in their homerooms when no prompting to use the newly acquired strategy was provided. Only those who received strategy generalization induction instruction were

more likely to demonstrate unprompted generalization to their homerooms. The procedures designed for the gradual internalization and self-regulation of strategy use were successful in promoting generalization in students with reading disabilities. This self-instructional training technique is consistent with the independent level of generalization instruction proposed by Ellis, Lenz, and Sabornie (1987), which involves the training of executive processes to facilitate generalization.

The lack of an unprompted generalization effect of the generalization induction instruction for average readers in the study (both the CA-match and RA-match controls) requires consideration. For these two groups of subjects receiving generalization induction instruction, performance on identification of main ideas was also greatly improved on the posttest when they were prompted to employ the strategy they had been taught, but the improved performance was not observed in the unprompted con-

dition. In the case of the RA-match average readers, their younger age level may explain their relatively weaker self-regulatory abilities and tardiness in acquiring metacognitive skills. It is recognized that the effectiveness of metacognitive instruction depends in part on the developmental level of the learner (Loper, 1982). Alternatively, the brevity of the intervention could also have prevented the training from taking full effect. In the case of the CA-match average readers, spontaneous use of other previously acquired or personally preferred strategies could have interfered and hindered the use of the newly acquired strategy. This possible explanation could be tested in future studies by requesting subjects to “think aloud” while completing given tasks.

A somewhat similar pattern of results (though not statistically significant) was indicated on the importance rating task. But such was not the case with the comprehension measure: No differential effects of instruction were observed. It appears that the effects of self-instructional training in the use of the self-questioning strategy for identifying main ideas were restricted to identification of main ideas and rating sentences in order of importance. Such effects failed to transfer immediately to the more general reading comprehension measure. It may require more time and more extensive interventions for improvements in main idea skills to facilitate higher levels of comprehension competence among students with reading disabilities. Further research is required to address this particular issue. One further limitation of the study, apart from the brevity of the intervention and the lack of “think-aloud” data on strategy use, relates to the lack of a delayed maintenance test of the generalization effect.

The findings of the present study have important implications for improving the reading performance of students with reading disabilities. These students would benefit from explicit strategy instruction aimed at enhancing comprehension skills. Further, self-instructional training techniques should be employed in the strategy instruction to promote internalization and self-regulation of strategy use, which would subsequently lead to enhanced generalization of strategy use.

ABOUT THE AUTHOR

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AUTHOR'S NOTES

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