

Strategy Instruction in Reading Comprehension: An Intervention Study for Students with Learning Disabilities

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Teaching reading strategies and guiding students towards self-regulated reading routines are promising approaches to fostering reading comprehension in students with learning disabilities. The aim of this study was to evaluate in a sample of 73 fifth to eighth graders with learning disabilities (IQ higher than 85 and reading skills below expectation) a reading-strategy program containing reading and self-regulation strategies. The program was taught to the experimental group by their general or special education teachers, whereas the control group received traditional reading instruction. A pre-, post- and followup design was used during an entire academic year assessing reading-strategy knowledge, reading comprehension, and reading self-efficacy. Immediately after completion of the program only effects on reading strategy knowledge were significant; however, followup measures yielded meaningful gains in the experimental group for reading comprehension (d = .80), reading-strategy knowledge (d = .62), and reading self-efficacy (d = .78).

Key Words: Reading Comprehension, Strategy Instruction, Learning Disabilities, Explicit Teaching

A large number of studies have shown that most students (80%) with learning disabilities (LD) manifest with difficulties in reading acquisition, particularly comprehension of written material (Gersten, Fuchs, Williams, & Baker, 2001; Joseph, 2002). Students with identified LD constituted 2% of the school-aged population in the early 1970s (Powell, 1994); however, the number of students has profoundly increased, reaching levels of up to 20% in 1992 (Calhoon, 2005) with about 40% of them having reading difficulties (Hitschcock, Prater, & Dowrick, 2004). Unfortunately, identification of students as having learning disabilities comes at a cost: labeling and exclusion (Jenkins, Jewell, Leicester, O'Conner, Jenkins, & Troutner, 1991; Padeliadu, 2004). Due to the difficulty students with LD face in becoming academically and socially competent, they often (approximately 38% of them) quit school (Calhoon, 2005). It is a main goal of instruction to support the learning of students with LD, toward a broader goal of successful integration in society (Deshler et al., 2004).

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Although word decoding and fluency are major components of reading, reading comprehension is the element that is most tightly linked to the LD students' academic and professional success (Baumert et al., 2001). Successful understanding of written text involves certain prerequisite skills (Mastropieri & Scruggs, 2002). Briefly, the main prerequisites for successful reading comprehension include the ability to decode words and to read fluently, as well as the use of active strategies to understand the meaning of printed text (Palincsar & Brown, 1984). Reading comprehension is, therefore, a combination of knowledge- and text-oriented constructions. In other words, it is the result of a systematical reading process that integrates basic as well as higher-order reading skills (Kintsch, 1998).

Students with LD face great difficulties in comprehending text due to a number of deficits that affect their reading skills and competence (Gersten et al., 2001). First of all, they fail to recall strategies needed for comprehension, they do not control their progress, nor do they adjust or regulate specific behaviors associated with successful comprehension. Students with LD have deficits in implementing and monitoring effective learning strategies spontaneously (Botsas & Padeliadu, 2003). They also apply insufficient text-comprehension strategies, use few monitoring procedures, and show little sensitivity to a text's structure (Gajria & Salvia, 1992). As a result, they often develop negative or self-depreciative thoughts (Sideridis, 2005; Souvignier, 2003). These negative thoughts and cognitions, in turn, are associated with low levels of self-efficacy, reading interest (Schiefele, 1996), and motivation to read (Guthrie, Wigfield, Metsala, & Cox, 1999; Sideridis, 2003, 2006).

Over the last few years a broad range of strategy-driven interventions and instructional programs have been developed to help enhance the reading comprehension of students with LD (Graham & Harris, 1997). Also, an emphasis on using cognitive and metacognitive strategies has proven to be effective for reading comprehension purposes (Gersten et al., 2001; Pressley, 2000; Swanson, 1999b). However, although the literature shows that students with LD can learn cognitive and metacognitive strategies (Gersten et al., 2001; Mastropieri & Scruggs, 1997; Swanson, 1999b), some researchers have reported that it is only possible for a limited time (Chan, 1991). Others have shown that students with LD can learn strategies and apply them in various situations, thus achieving generalizability (Jenkins, Barksdale, & Clinton, 1978). Specifically, when self-instructional techniques are the main construct of strategy instruction, students attain internalization and self-regulation of strategy use (Chan, 1991).

Boekaerts (1999) suggested a three-layered model for supporting self-regulated learning, including (a) students' use of strategies, (b) students' use of special skills to direct their learning, and (c) students' motivational-emotional competence and control (see also Souvignier & Mokhlesgerami, 2006). Specifically, students with LD use reading strategies (Wong, 1985) under explicit teaching, instruction on monitoring strategies, explicit generalization training (changing, set, material, cues, etc.), and attributional training (Chan, 1991). While it seems that these students are able to maintain and spontaneously use and generalize concrete reading strategies (Gajria & Salvia, 1992), this is only possible when the instructed strategies are categorized in a simple schema that can be easily learned and remembered (Souvignier & Mokhlesgerami, 2006).

Beyond strategy knowledge, the ability to regulate one's own learning is equally important for reading comprehension (Boekaerts, 1999). Self-regulation is achieved when students adapt reading strategies to a specific reading situation by use of a pre-planned procedure, "which gives an external structure to the process of cognitive (self-)regulation and divides cognitive abilities into those used before, during and after reading" (Souvignier & Mokhlesgerami, 2006, p. 59). Similarly important for increased reading comprehension is enhancement of self-efficacy by prompting motivational aspects of self-regulation (goal setting, attributions of success and failure, self-monitoring and judgements, etc.) (see Gaskil & Murphy, 2004; Pintrich & De Groot, 1990; Schunk & Zimmermann, 2003). It seems that self-efficacy does not increase without the simultaneous presence of adaptive cognitive and motivational mechanisms; thus, in their absence, students with LD may become less interested in the text (Guthrie & Wigfield, 2000). However, the belief that a task can easily be achieved by activating a reader's cognitive resources holds only when accompanied by adaptive motivational schemas (Pintrich, 2003). Thus, when self-efficacy and motivational beliefs are at high levels, the reading strategies taught for text comprehension are maintained and generalized (Borkowski, Weyhing, & Carr, 1988; Guthrie et al., 1999; Nelson & Manset-Williamson, 2006).

As stated above, effective reading requires the use of strategies that are explicitly taught (Souvignier & Antoniou, 2007). Explicit teaching in this context implies the use of small steps in which students are guided through initial practice, lots of practice with reinforcement (Rosenshine, 1997), modeling (Duffy et al., 1986), and corrective feedback and reinforcement (Morgan & Sideridis, 2006). Thus, programs that are based on explicit instruction have proven effective for enhancing reading comprehension (Ross, Smith, Casey, & Slavin, 1995; Simmons, Fuchs, Fuchs, Mathes, & Hodge, 1995). Multicomponent Strategy Programs – where strategies to foster reading comprehension and strategies to accelerate self-monitoring are taught in a way that starts with (explicit) modeling by the intervener and aims at transferring the responsibility for choice and application of strategies to the student – seem to be one approach that can enhance reading comprehension in students with LD (Mastropieri, Scruggs, Bakken, & Whedon, 1996; Souvignier & Antoniou, 2007; Swanson, 1999a).

Instructional Approaches for Enhancing Reading Comprehension

The increased prevalence of learning disabilities has led to the construction of a number of interventions to accelerate reading competence in both general and special education settings (Jenkins, Jewell, Leicester, O'Connor et al., 1994). However, even if most of these programs improve reading skills, the gap between students with LD and typical students does not seem to close (Calhoon, 2005). Due to the importance of reading comprehension, LD students' text understanding should be prompted through well-designed reading programs. However, not all programs are equally effective. The following description may shed light on treatment characteristics and which ones enhance or do not enhance reading comprehension.

Several researchers have shown that sensory, oralographic, or reinforcement interventions do not yield positive results (Carte, Morrison, Sublerr, Uemura, & Setrakian,1984; Ratekin, 1979). On the other hand, interventions based on reciprocal instruction have yielded positive effects for the enhancement of reading com-

prehension in students with LD (Aarnoutse, Brand-Gruwel, & Oduber, 1997; Brailsford, Snart, & Das, 1984; Klinger & Vaughn, 1996; Lysynchuk, Pressley, & Vye, 1990; Palincsar & Brown, 1984). Positive outcome have also been reported when using a variety of strategies under a particular instructional approach. These "multicomponent" reading programs are based on reciprocal instruction of self-regulation strategies (Pressley, 2001) or meta-memory and metacognitive training (Lucangeli, Galderisi, & Cornoldi, 1995). Furthermore, treatments consisting of oral reading and word recognition (Sindelar, 1982), paradigmatic language (Cartelli, 1978), or phonics (Jenkins, Peyton, Sanders, & Vadasy, 2004) have also proven effective for remediation of reading comprehension in students with LD.

In addition, several important findings have resulted from meta-analyses on the subject (e.g., Gersten et al., 2001; Mastropieri et al., 1996; Souvignier & Antoniou, 2007; Swanson, 1999a; Talbot, Lloyd, & Tankersley, 1994). Specifically, a combination of direct instruction of self-instruction and self-monitoring strategies has been associated with promising results in reading comprehension (Swanson, 1999a). Similarly, a combination of self-questioning plus self-monitoring (Mastropieri et al., 1996) or teaching of multiple strategies (Gersten et al., 2001) has been successful. In a recent meta-analysis, Souvignier and Antoniou (2007) reported that the most effective treatment packages to support reading comprehension in students with LD involved Summarization, Main Idea Strategies, Self-Monitoring, and Explicit Teaching. Thus, the integration of specific components of different intervention packages may prove to be highly effective for increasing reading comprehension in students with LD.

Purpose of the Study and Research Questions

The aim of the present study was to apply an instructional program that involves explicit teaching of reading enriched with the use of self-regulation strategies to improve the reading comprehension of students with LD. It was expected that the enriched program would have collateral effects on students' strategy knowledge and self-efficacy.

The specific research questions posed for this sample of students with learning disabilities were:

1. Can reading comprehension be enhanced by use of explicit teaching and self-regulatory strategies?
2. Can reading-strategy knowledge be improved by use of explicit teaching and self-regulatory strategies?
3. Can reading self-efficacy be increased after implementation of a reading-strategy program?

Method

Participants

Seventy-three students with LD from special and integrative schools of the Rhein-Main area in Hessen, Germany, took part in the study. The participant students were in the fifth to eighth grade and attended 27 classes. Fourteen classrooms were randomly assigned to the treatment group and 13 to the control group.

It is important to note that students attend special schools in Germany because they exhibit learning disabilities, mild mental retardation (IQ 55-85), emo-

tional and behavioral problems, language deficits or environmental disadvantages (poverty, immigration or lack of German language); and, thus, are generally identified as students with special educational needs (Powell, 1994). For placement purposes, participating students had to go through a series of achievement-ability tests, a medical test, and were occasionally screened by school psychologists.

However, these were not the sole criteria that led to identification of students as having LD. The principles employed to define the LD sample in the present study were based on the relevant research literature on LD diagnosis (Fletcher, Morris, & Lyon, 2003; Hallahan & Mock, 2003). Thus, to be involved in the study, students must have (a) adequate intelligence (IQ > 85); (b) reading deficits, with grade equivalent scores at or below two to three grades; (c) no physical handicaps; and (d) low reading achievement compared to expectation based on their IQ scores. Students' reading grade level was estimated by comparing their reading comprehension scores to those of a sample of fourth graders.

Out of 268 students, 73 met all criteria for inclusion. As Table 1 shows, 45 students with LD formed the treatment group and 28 students were assigned to a control group. Students' ages ranged between 12 years, 8 months for the treatment group and 12 years, 6 months for the control group at entry. Most students ($n = 29$) spoke a language other than German at home, 19 spoke German only, and the remaining 25 spoke German and another language.

Table 1
Demographic Characteristics of Participating Students

Group	Age	Gender		Language		
				German *N* = 19	Other *N* = 54	
		M	F	German	German & Other	No German
TG (*N* = 45)	12,8 (.97)	22	23	11	15	19
CG (*N* = 28)	12,6 (.98)	17	11	8	10	10
Total (*N* = 73)	12,7 (.97)	39	34	19	25	29

Note. TG = Treatment Group, CG = Control Group, M = Male, F = Female.

As Table 2 shows, students of both groups were comparable across several characteristics, such as intelligence (IQ), vocabulary knowledge (VK), and decoding speed (DS).

Table 2
Learning Characteristics of Participating Students

	IQ	Vocabulary Knowledge	Decoding Speed
TG	94.71 (6.83)	12.80 (5.11)	56.49 (16.71)
CG	93.89 (6.89)	11.46 (4.47	62.07 (18.08)
	$t(71) = 0.50, p>.10$	$t(71) = 1.14, p>.10$	$t(71) = 1,35, p>.10$
Total	94.40 (6.82)	12.29 (4.89)	58.63 (17.34)

Note. TG = Treatment Group, CG = Control Group, IQ = Intelligence Quotient.

Description of Intervention Program

Participating teachers received a detailed handbook on how to apply the program, and students received a corresponding workbook and notebook. The handbook was designed in such a way that it would help teachers thoroughly implement the modified program in their classes. The main concept was that the teachers would teach explicitly cognitive and metacognitive reading strategies as well as self-regulation techniques. The program included four concrete reading strategies: Thinking About the Headline, Clarification of Text Difficulties, Summarization-Narrative Texts, and Summarization-Expository texts, as well as a self-regulation strategy in the form of a reading plan accompanied by a checklist.

The main concept of the program was a story, where students pretended that they were detectives assigned to unravel a mystery by deriving the relevant information from a situation ("text-detectives"). In that way students realized how essential it was to proceed with a systematic and planned method to comprehend a case/situation. The purpose of this background story at the beginning of the program was to familiarize the students with the specifics of the procedure. Students had, as cognitive organizers in their workbook, explanatory and auxiliary symbols, which helped categorize the strategies and other important aspects of the program.

The second unit included a cognitive strategy, Thinking About the Headline, which led to activation of students' prior knowledge. The teachers asked students what they already knew about themes related to the topic before they proceeded to read the passage and delivery of information about the passage. During this unit, the teachers familiarized the students with the structure of different texts and helped them discriminate between narrative and expository passages. After predicting what would follow in the text, students had to show that the content of the passage corresponded to their prediction of the content, when first reading the title of the passage.

The third unit incorporated a metacognitive strategy, Clarification of Text Difficulties. Here students had to read the text and monitor their understanding by finding unknown words. Each time they found a difficult word, they had to pause and mark it. They would then ask for help or find the meaning of the word on their own. Finally, the teachers asked students if they had identified the meaning of the unknown words and were ready to move on to the next unit.

The third and fourth units were based on the cognitive strategy of Summarization. Using this strategy, students acted like detectives by finding the most important pieces of information in a passage and putting them together in a brief form to better understand the main concepts of the passage. The most important issue was to distinguish the text's genre since that would indicate how the students would approach and comprehend the text. This was also the main difference between the third and fourth units. More specifically, during the third unit, the teachers taught the characteristics and structure of a narrative passage; namely, the main character, the character's goal, a problem, and its solution. Teachers also guided students to form and generate questions based on the passages. Then the students answered the questions that they had written, and their answers in turn guided the formation of their summaries.

By the fourth unit, summarization of an expository text, teachers had taught the students to transform the important sentences into questions and attempt to answer them as a way of summarizing the expository passage. At the end of each summary, the students monitored their script and controlled if every important piece of information was included in the text.

The last unit included a self-regulation strategy consisting of a reading plan accompanied by a checklist. This plan provided a graphical illustration of the reading procedure and indicated to students how to systematically use their strategies. According to this plan, students thought about the headline and made predictions about the text's outcome. Then they read the passage once and clarified parts of the text that were unknown. After a second reading, students summarized the passage. Last, students monitored their scripts to make sure they were comprehensible and to the point. Using this metacognitive strategy, the teachers aimed to direct students to plan independently their reading and use of strategies and to monitor correct application of reading strategies.

Material and instructional principles. The materials for the teachers and students guided the instructional procedure. First, the detailed handbook, which was developed to help teachers implement the reading strategies in their classrooms, was based on the above principles. It included clear and precise information to help teachers adopt and implement the strategies in their classroom. There were also elaborate examples for the lesson's sequence and guidance for the function of every strategy. Four cards, each presenting one of the four strategies, served as guides for the students to remember and apply the recommended strategies while reading. Last, a bookmark listing all the important steps of the reading-strategy procedure was designed to help students to orient themselves while working on texts.

Students with LD were explicitly instructed on how to apply reading and self-monitoring strategies in order to better comprehend a text. First, the teachers introduced an easy-to-understand text as a way to model the way that the reading-strategy program could be used and implemented. During the introductory step, the teachers provided students successively with the four cards corresponding to the first four strategies. The students practiced using the strategies reciprocally and "interacted" with the text with supportive feedback from the teacher. At the end of each unit, students monitored their achievement and demonstrated the correct application of each strategy. This consisted of two steps, where students first had to demonstrate that they understood the strategy (in the form of a classroom discussion and by completing a questionnaire). This was included in their workbook and served as a feedback form where students could monitor and control their progress. Teachers repeated the function and use of a reading strategy before introducing a new one. The purpose was to enhance strategy maintenance and stabilization. At the end, teachers gave students assignments on which they had to apply the learned strategies in order to ensure independent use.

Intervention process. The study began in September 2004 and lasted for an academic year. The reading-strategy program was introduced to the teachers in an informal meeting, and all students were assessed in all control and criterion variables prior to the commencement of the program and two times afterwards (i.e., post- and followup). Each testing lasted for approximately 45 minutes. After the pretest

assessment, teachers received the lesson material (teacher's handbook, students' workbook, cards, and checklist), in order to be able to implement the reading-strategy program. The program was designed to be in place for 29 academic hours, with the teachers designing the final schedule of when units would take place.

During the implementation of the program by the experimental group, the control group students received traditional reading instruction. Posttests took place for all classes in April of 2005. The followup tests took place on July 2005. At both testing times, the teachers filled in questionnaires reporting their willingness to implement the reading strategies after completion of the program.

Students' learning characteristics. Before the start of the program students were assessed on intelligence, vocabulary knowledge, and decoding speed. Then classrooms were assigned to experimental and control groups to make sure students were "equivalent" on those measures.

Measures

Intelligence. Intelligence was assessed using the Culture Fair Intelligence Test (CFT 20; Cattell, Weiss, & Osterland, 1987). The CFT 20 consists of 46 items divided into four subtests: rank procedure, classifications, matrices, and topological closures. Students were asked to form figural relationships and solve formal rational thought problems with different levels of complexity, all within a specified time. All items were constructed in a multiple-choice format with four response categories (cf. Weiss, 1998). The internal consistency of the test was *Cronbach's* $\alpha = .90$.

Vocabulary knowledge. The vocabulary knowledge measure was a subtest of the CFT 20. After a modification made for the purposes of this study, the test included 28 (out of 30) words of the basal German language and aimed to identify the status of students' vocabulary abilities. Two words were excluded since they were not compatible with this study's sample knowledge. Students had to find the meaning of a word by choosing among five alternatives with the same or similar meaning. Students could earn a maximum of 28 points. The measure had ample levels of internal consistency (*Cronbach's* $\alpha = .81$).

Decoding speed. The decoding speed test Wuerzburger Leise LeseProbe Test (WLLP) by Kuespert and Schneider (1998) was used to assess students' decoding ability. The students were required to match single words to one of four pictures (multiple-choice format). The words were phonologically similar, and the exercise had to be completed within a limited time period (4 minutes). Reading accuracy was not measured because the German orthography enables a distinction between poor and good readers by the speed of reading (Kuespert & Schneider, 1998). In other words, German is an "orthographically shallow" language that has an absolute grapheme-phoneme correspondence, and its pronunciation is of a high consistency (Jenkins, 2002). The WLLP was developed for use with primary-school children (grades 1-4) within 5 minutes. Because the study's sample involved students who attended grades 5 through 8, time constraints were imposed (testing time was reduced from 5 to 4 minutes). Students could accumulate a maximum of 140 points. The decoding speed test's retest reliability was $r = .82$.

Reading comprehension. Reading comprehension was assessed using a modified version of the reading comprehension test designed by Souvignier and Ruehl

(2005; based on the diagnostic test of Nauck & Otte, 1980). Modifications involved word alterations. Students were asked to read a 250-word text and answer seven multiple-choice and five open-ended questions corresponding to the text. Parallel versions of this test were used at the different testing points. Five of the seven multiple-choice questions referred to concrete text details, whereas the last two required the reader's total appraisal of the content of the text, which could prove a deep understanding of the text's meaning. The open-ended questions dealt with the main character, his/her aims, a problem emerging in the story, and the solution to the problem. Students could earn up to 17 points, and there was no time limit for completion of the test. The texts implemented had been previously used in experimental studies (Antoniou, 2006; Souvignier & Ruehl, 2005) and were age-appropriate.

Reading-strategy knowledge. In order to assess the extent to which students retrieved and used reading strategies, they were introduced to a reading-strategy knowledge test that was based on the metacognition questionnaire of Schlagmueller and Schneider (1999), and further modified by Souvignier and Ruehl (2005). The inventory included three short passages presenting a problematic situation regarding reading. For example, the text presented a student whose goal was to understand an interesting text that included a number of difficult words. Students were asked which were the best of six suggested strategies to accomplish the task (a. He/she has to read the text until the end; b. He/she has to look up the difficult words in a dictionary; c. He/she has to look over the text, see if the difficult words are explained later on; d. He/she has to write somewhere else the difficult words and ask his teacher for help; e. He/she has to circle the difficult words; f. He/she has to learn the story by heart, because then he/she will understand it better). Students had to give grades, pretending to be teachers, on every choice. The grades that students gave ranged from 1, for the best strategy, to 6, for the worst. The range of points, however, that the students could achieve at the end varied between 0 and 34. The internal consistency (*Cronbach's* α) of the test was $\alpha = .76$.

Reading self-efficacy. The measure of reading self-efficacy was constructed by Jerusalem and Satow (1999). The scale contains 11 statements, such as "If I make an effort, I can also understand difficult texts" or "If I have to work on my own a difficult text, I believe that I can make it." The available choices were "I absolutely agree," "I partially agree," "I disagree," or "I absolutely disagree," and students could achieve between 11 and 44 points on the test. The internal consistency estimate (Cronbach's α) of the test was α) = .75.

Results

T-tests were computed in order to assess the effectiveness of the reading strategy program in a pre-, post-, and followup design with reading comprehension, reading strategy knowledge, and reading self-efficacy as the dependent variables. Means (*M*) and standard deviations (*SD*) of all variables are shown in Table 3.

Table 3
Means and Standard Deviations of the Treatment Control Groups Across the Three Variables.

		TG (*N* = 45)		CG (*N* = 28)	
		M	*SD*	*M*	*SD*
Reading Comprehension	Pre-	5.64	(2.06)	5.32	(2.14)
	Post-	11.18	(2.95)	9.36	(3.06)
	Followup	11.58	(2.84)	8.75	(3.13)
Reading-Strategy Knowledge	Pre-	16.27	(6.00)	16.32	(4.49)
	Post-	19.42	(6.87)	15.93	(4.46)
	Followup	19.69	(4.75)	16.96	(3.96)
Reading Self-Efficacy	Pre-	30.64	(6.14)	32.79	(3.85)
	Post-	28.76	(7.34)	31.21	(5.08)
	Followup	33.84	(6.35)	31.57	(5.10)

Note. TG = Treatment Group, CG = Control Group.

Reading Comprehension

Table 4 summarizes the outcome of the reading comprehension measurement. The difference in score change between the pre- and posttests revealed that there was a trend for the treatment group to demonstrate greater gain scores than the control group after the program's implementation, $t(71) = 1.72$, $p < .10$. Even if the finding was not significant, it confirmed that the LD students in the treatment group attained and maintained the program's content with regard to the strategies that enhance reading comprehension. The significant effect shown by the long-term difference of the change scores (between the pre- and followup performance) revealed that the treatment group outperformed the control group on the reading comprehension measure, $t(71) = 3.19$, $p = .002$. The treatment group showed great comprehension skills and competence in the long-term ($d = .80$), although the short-term effect was small to medium in Cohen's (1992) terms $d = .45$ in the short term.

Table 4
Results for Reading Comprehension in Post- and Followup Tests

		Difference TG-CG	*SD*	*t* (*df* =71)	*p*	*d*
Reading Comprehension	Post-	1.50	.87	1.72	.089	0.45
	Followup	2.51	.79	3.19	.002	0.80

Note. TG = Treatment Group, CG = Control Group.

Reading-Strategy Knowledge

As illustrated in Table 5, LD students in the treatment group showed a significant improvement in strategy knowledge in the short term, $t(71) = 2.77$, $p = .007$. This sizeable transfer of strategy knowledge was not evident in the control group, $t(71) = 2.16$, $p = 0.34$. With an effect size of .62 (medium to large, according to Cohen's conventions), the effectiveness of the program on the strategic knowledge of the students proved to be stable over time.

Table 5
Results for Reading Strategy Knowledge

		Difference TG-CG	*SD*	*t* (*df* =71)	*p*	*d*
Reading Strategy Knowledge	Post-	3.55	1.28	2.77	.007	0.59
	Followup	2.78	1.29	2.16	.034	0.62

Note. TG = Treatment Group, CG = Control Group.

Reading Self-Efficacy

The difference in reading self-efficacy between the treatment and control groups' growth scores was not significant between pre- and posttest, $t(71) = .18$, $p > .10$. Thus, implementation of the program did not seem to influence students' self-efficacy (small effect size, $d = .02$). However, an interesting outcome emerged in the long-term results obtained from the difference of progress scores between the pre- and followup tests: Students with LD in the treatment group demonstrated greater gains than the control group, $t(71) = 3.36$, $p = .001$.

Table 6
Results for Reading Self-Efficacy in Post- and Followup Tests

		Difference TG-CG	*SD*	*t* (*df* =71)	*p*	*d*
Reading self-efficacy	Post-	.32	1.81	.18	.861	0.02
	Followup	4.41	1.31	3.36	.001	0.78

Note. TG = Treatment Group, CG = Control Group.

Discussion

The aim of this study was to enhance the reading comprehension, reading-strategy knowledge, and reading self-efficacy of students with LD through an explicit instruction program enriched with self-regulation strategies. Results showed that the students with LD benefited from implementation of the reading-strategy program in the long term. That is, immediately after completion of the program, the treatment group students' progress was significant only on reading-strategy knowledge; however, their followup gains in reading comprehension, reading-strategy knowledge, and reading self-efficacy were significant. Since the effect sizes were rather large for all variables, it was concluded that the students with LD achieve significant long-term effects from implementation of a reading-strategy program in the classroom.

Specifically, the results revealed a trend for the students in the treatment group to perform better than those in the control group. Even if the results were not significant in the short term, the long-term results demonstrated that the reading comprehension gains of the students in the training group were significantly higher than the gains of control group students. This finding replicates the outcome of several meta-analytical studies, which demonstrated that students with LD are likely to enhance their reading comprehension competence by the usage of reading and self-regulation strategies, and are able to generalize them to new academic situations (Gersten et al., 2001; Souvignier & Antoniou, 2007; Swanson, 1999b).

The nonsignificant short-term results may be explained as follows. Besides having a need for direct and explicit teaching and self-monitoring, students with LD may also require more time to practice what they have learned in order to be able to implement the strategies (Souvignier, 2003). Further, there is a strong correlation between a program's duration and the setting where it is conducted. Thus, it seems that reading interventions for LD students that are conducted in general education classrooms are effective mostly when carried out over a larger number of sessions over time (Souvignier & Antoniou, 2007). The exact number of sessions required should be regulated by the teacher, because factors such as the intensity of the program or the teachers' flexibility and support may influence the efficiency of the intervention (Aarnoutse et al., 1997). However, it is not only the external factors that affect the outcome of a reading intervention; internal parameters play an equally important role. In line with that, it has been shown that students with LD require more time while working on texts than their peers without LD to internalize the new knowledge and to make the learned strategies a part of their own self/cognitive system (Aarnoutse et al., 1997).

Concerning reading-strategy knowledge outcomes, students in the treatment group showed significant improvements after the program's implementation. The gains were significant, while the long-term outcomes yielded medium effect sizes. This finding confirmed that students with LD can expand their knowledge of reading strategies and are able to make use of these higher-order skills to improve their reading comprehension (Gersten et al., 2001; Pressley, 2000; Swanson, 1999b). This outcome replicated the findings of a number of earlier studies (Adams, 1990; Mercer, Lane, Jordan, Allsopp, & Eisele, 1996; Rosenshine, 1997; Siegel, 1992; Souvignier & Ruehl, 2005; Wilder & Williams, 2001; Williams, 2003) in that students with LD are likely to learn and use cognitive and metacognitive comprehension skills that also generalize to new subject matter or over time.

Regarding reading efficacy, students in the training group did not demonstrate significantly greater gains than control group students in the immediate future. However, although there were no significant differences between the two groups in the short term, the long-term outcomes showed great benefits for the treatment group. This finding may reflect the fact that students with LD may need more time to realize their abilities (especially when they change). Nevertheless, high self-efficacy beliefs are necessary to develop competence (Lackaye & Margalit, 2006; Souvignier, 2003).

Implications for Research and Practice

The results of our study have both theoretical and practical value. Theoretically, this study's findings replicate those of previous studies (Gersten et al., 2001; Mastropieri et al., 1996; Swanson, 1999a) that strategic reading is adaptive for the reading comprehension ability of students with LD. Furthermore, they appear to support the focal finding of a recent meta-analysis (Souvignier & Antoniou, 2007) that explicit teaching and strategy use promote reading comprehension in students with LD. The study has also important implications for practice. It demonstrates that students with LD can benefit from an intensive reading intervention that enriches explicit teaching with the use of strategies. The implications are the development of self-regulated learning and competence (in the long term).

Limitations and Future Prospects

The intervention reported in this study is limited by the fact that there were no significant effects in (a) reading comprehension and (b) reading efficacy in the short term, although a large number of intervention programs have yield immediate effects (see Souvignier & Antoniou, 2007, for a review). Recent advances in the field of learning disabilities suggest that the creation of classroom environments that are conducive to learning may yield enhanced learning outcomes (Barron & Harackiewicz, 2003; Sideridis, in press; Urdan & Midgley, 2003).

Given the apparent inefficiency of the present intervention package to yield immediate positive effects on students' learning, one can explore the use of other learning methods. One such approach is peer tutoring, which has proven effective for increasing reading comprehension, almost as much as explicit teaching (Souvignier & Antoniou, 2007). Peer tutoring has been found to be effective for instruction not only of typical students (Cohen, Kulik, & Kulik, 1982) but also of students with LD (Fuchs, Fuchs, Mathes, & Simmons, 1997). Therefore, it would be interesting to explore whether explicit teaching methods can be implemented within a framework of cooperative learning techniques. Moving towards more complex and integrative ways of teaching (by combining effective teaching components), educators may be able to enhance the learning of all students, which should be the goal of education.

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