Metacognitive Strategy Knowledge: Comparison of Former Reading Recovery Children and Their Current Classmates

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ABSTRACT

The purpose of this study was two-fold: (a) to explore the nature of elementary school children's metacognitive knowledge of strategies appropriate for before, during, and after reading; and (b) to determine whether children who had participated in Reading Recovery instruction in the first grade had similar understandings as their current third- and fourth-grade classmates. Groups that totaled 486 randomly selected former Reading Recovery children and their current third- and fourth-grade classmates were tested using the Metacomprehension Strategy Index (Schmitt, 1988, 1990) to determine their levels of strategy awareness. Comparison of means using analysis of variance was conducted to determine if there were differences in children's levels of declarative strategy knowledge, and an item analysis of the Metacomprehension Strategy Index was generated to illustrate the types of strategies children indicate they use, including the conditional knowledge of knowing when to use them. In addition to results, the efficacy of the Reading Recovery program in helping children reach and maintain cohort-level performance in strategy knowledge is discussed as a means of exploring the timely question of children's subsequent performance.

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Metacognition in literacy learning has received much attention in the literature in the last 15 to 20 years. Writers have noted, however, that metacognition is perhaps not a new construct but rather a new label for the age-old concept of reflective problem solving (e.g., Baker & Brown, 1984; Schmitt, 1986; Smith, 1994). Many suggestions for the implications of metacognitive theory in literacy education have been proffered. For example, Baker and Brown (1984) called for instructional attention to making learners "aware of the active nature of reading, and the importance of employing problem-solving, trouble-shooting routines to enhance understanding" (p. 376). They insist that such awareness is a "prerequisite for self-regulation, the ability to monitor and check one's own cognitive activities while reading" (p. 376), and they refer to the awareness as metacognitive knowledge.

This study explores such knowledge with distinct groups. The purpose was two-fold: (a) to explore the nature of elementary school children's metacognitive knowledge of strategies appropriate for before, during, and after reading; and (b) to determine whether children who had participated in Reading Recovery instruction in the first grade had similar understandings as their current third- and fourth-grade classmates. The latter involves an attempt to investigate how Reading Recovery children compare to their classmates in later years. There are so many intervening variables, it is impossible to attribute their later status to their participation in Reading Recovery in the first grade (Askew, Fountas, Lyons, Pinnell, & Schmitt, 1998); however, it is useful to explore their achievement in a variety of ways, and this study represents a unique way to do so.

LITERATURE REVIEW

Theorists have explained that metacognition refers to both knowledge and control of cognitive processes (e.g., Baker & Brown, 1984; Brown, 1980; Flavell, 1976, 1979). Metacognitive knowledge reflects awareness of the variables of self (e.g., "I know about this topic"), task (e.g., "I know that reading is a left-to-right activity"), and strategy (e.g., "I know that rereading might help me figure this out"). According to the work of Flavell (1976), Garner (1987), Baumann and Schmitt (1986), and Paris, Lipson, and Wixon (1983), metacognitive knowledge can be declarative (knowing that or what about something), procedural (knowing how to proceed), and conditional (knowing when to use a strategy and why it is relevant). Of interest in this paper is the declarative and conditional metacognitive knowledge learners have of appropriate strategies to promote reading comprehension.

Metacognition and Young Readers

Paris, Wasik, and Turner (1991) discuss the notion of learners becoming strategic readers, suggesting that awareness of appropriate strategies for problem-

solving in reading is characteristic of older, more proficient learners rather than younger, novice, or less proficient ones; and it seems logical that learners would be developing expertise in this area over time.

Clay's early and more recent writings regarding the cognitive operations of beginning readers, however, include the necessity of their developing "an interlocking network of appropriate strategies which include monitoring and evaluation of consonance or dissonance among messages that ought to agree" (Clay, 1991, p. 329). Consider the strategic processing and the requisite knowledge involved in trying to construct a plausible interpretation of text as described by Clay in *Reading: The Patterning of Complex Behavior* (1979b):

> The competent children resourcefully cast around all their experience to find cues, strategies, and solutions.
>
> At the moment of making an error a child reading for meaning will notice the error; it will become self-evident. This is a monitoring activity. The reader takes some action. At this moment he is observing his own behavior very closely because he will have to decide which response is the best fit, which to retain and which to discard.
>
> As he searches and selects he must carry out two further types of self-regulatory action. He observes his own behavior and he assesses his own behavior. Has he solved it? Has he got it right? Do all the angles of this piece of the jigsaw fit in that particular slot? (pp. 252–253)

It now appears that as young children develop literacy skills, they are already exhibiting signs of emergent metacognitive awareness and control, especially during the individual first-grade intervention called Reading Recovery. For example, Cox, Fang, and Schmitt (1998) provided evidence to suggest that Reading Recovery instruction results in the development of metacognitive awareness and control as its contribution to children's literacy growth. They found that program children exhibited significant and qualitatively distinct growth during the experience not only in their knowledge about self, literacy task, and task-related strategies, but also in their regulatory capacities to gain control over text content and to accommodate audience needs in stories they were dictating for others to read. In addition, Schmitt (2001) analyzed running records of text reading and found that children made significant gains in strategic processing (e.g., self-monitoring, self-correcting, rereading to problem-solve) over the course of their Reading Recovery instructional program (see Clay, 2002 for more information on running records).

Measuring the Development of Metacognitive Knowledge of Reading

Schmitt (1998) used a Metacognitive Interview to study the development of children's metacognitive knowledge during Reading Recovery instruction in

comparison to their average-achieving peers. She found that program children generally began the year with lower or roughly equal metacognitive knowledge of reading and writing tasks and strategies in comparison to the average cohort children. However, the Reading Recovery children achieved not only accelerated growth in metacognitive knowledge as predicted, but they also achieved task and strategy knowledge at levels above their counterparts, thereby surpassing them. These results suggest that children learn more than how to perform reading and writing strategies during the intervention; they also develop metacognitive knowledge about tasks and strategies.

While it is true that metacognitive knowledge can only be hypothesized or presupposed by evidence of behaviors that indicate cognitive control (e.g., if readers are observed making a self-correction, one can suppose that they had knowledge of a strategy that allowed for the monitoring and revision processes), it is also possible to question or elicit information from learners regarding their declarative and conditional knowledge of strategies via a variety of self-report measures. In addition to the use of the Metacognitive Interview by Schmitt (1998), Paris and his colleagues developed the Index of Reading Awareness (Paris, Cross, & Lipson, 1984; Paris & Jacobs, 1984), a self-report measure of awareness of the need to evaluate, plan, and regulate reading processes; and Duffy et al. (1987) developed Lesson Interviews and Concept Interviews to assess awareness of strategic processes that were taught in training studies.

The measure used in the current study to explore metacognitive knowledge is the Metacomprehension Strategy Index (MSI; Schmitt, 1988, 1990), a multiple choice questionnaire that was originally developed to measure the strategic awareness of third-grade students who had participated in an experience that promoted the use of metacomprehension strategies (Schmitt, 1988). The MSI will be described further in the procedures section.

The following questions guided the exploration:

1. Which types of strategies (e.g., predicting) and conditional relevance (e.g., before reading versus during reading) appear to be the most commonly known?

2. Are there differences in the types of declarative strategy knowledge and conditional relevance known to children who had and had not successfully completed Reading Recovery in the first grade compared to the cohort group at each current grade level?

3. Are there differences in the levels of strategy knowledge (i.e., numbers of strategies) known to children who had and had not successfully completed Reading Recovery in the first grade compared to the cohort group?

4. Are there differences in level of knowledge between third and fourth graders in these groups such that a developmental pattern of metacognitive knowledge as a construct can be substantiated?

METHOD

Brief Description of Reading Recovery

Reading Recovery is an early literacy short-term intervention for first graders. It involves individual daily tutoring provided by specially trained teachers (Clay, 1993). The goal of this intervention is for children to reach the average level of their peers on measures of text reading, word identification, concepts about print, writing vocabulary knowledge, and phonemic awareness in approximately12–20 weeks. The intervention serves to close the gap between average- and low-progress learners and reduces the numbers of struggling readers in first-grade classrooms and beyond. The instructional goal is that children develop a self-extending system of strategies that allows them to become better readers each time they have the opportunity to read and problem-solve on more challenging text (Clay, 1991).

There are two positive outcomes of Reading Recovery instruction: (a) children reach the average level of their peers and their service is discontinued, or (b) after at least 20 weeks of intensive instruction, a group of educators reviews the information gained relative to the child's strengths and weaknesses and makes a decision regarding a longer-term intervention. In the latter case, the child's program is considered not-discontinued (Askew et al., 1998).

Participants

Children included in this study were randomly selected from the total population of third- and fourth-grade children from 253 schools that had been involved in Reading Recovery for at least 2 years in a mid-sized Midwestern state. To select the sample populations of former Reading Recovery children and a cohort sample group of children who had not received Reading Recovery and represented their classmates, class lists were collected of all children who would be in Grades 3 and 4 in the fall. An interval random sampling technique was used to select 100 children in each group. The groups were designated as follows: third and fourth graders who successfully completed Reading Recovery in the first grade (3RRSD and 4RRSD respectively in the figures and tables accompanying this article); third and fourth graders who had not successfully discontinued from the program (3RRND and 4RRND respectively); and third and fourth graders who had not received the intervention (3CS and 4CS respectively).

The final sample included children who could be located in the fall and for whom parental permission was granted. The composition of the groups is described in Table 1.

Table 1. Participants

	Female		Male		Total	
	n	%	n	%	n	%
3rd grade cohort sample (3CS)	42	50%	42	50%	84	100%
3rd grade successfully discontinued (3RRSD)	53	60%	36	40%	89	100%
3rd grade not discontinued (3RRND)	56	66%	30	34%	86	100%
4th grade cohort sample (4CS)	35	38%	57	62%	92	100%
4th grade successfully discontinued (4RRSD)	60	65%	33	35%	93	100%
4th grade not discontinued (4RRND)	26	62%	16	38%	42	100%

Procedures

To assess both declarative and conditional metacognitive strategy knowledge, Reading Recovery and classroom teachers administered the MSI (Schmitt, 1988, 1990) to the third- and fourth-grade random sample groups of children in the target schools. This measure was the most suitable to answer the research questions posed because it can evaluate types of strategic knowledge, as well as conditional relevance of strategies appropriate for before, during, and after reading. The MSI assesses students' awareness of a variety of metacomprehension behaviors that fit within six broad categories as follows:

1. Predicting and verifying: Predicting the content of a story promotes active comprehension by giving readers a purpose for reading (i.e., to verify predictions). Evaluating predictions and generating new ones as necessary enhances the constructive nature of the reading process.
2. Previewing: Previewing the text facilitates comprehension by activating background knowledge and providing information for making predictions.
3. Purpose setting: Reading with a purpose promotes active, strategic reading.

4. Self-questioning: Generating questions to be answered promotes active comprehension by giving readers a purpose for reading.
5. Drawing from background knowledge: Activating and incorporating information from background knowledge contributes to comprehension by helping readers make inferences and generate predictions.
6. Summarizing and applying fix-up strategies: Summarizing the content at various points in the story serves as a form of comprehension monitoring. Rereading or suspending judgment and reading on when comprehension breaks down represents strategic reading.

The strategies assessed by the MSI are consistent with those taught in several metacomprehension instructional studies (e.g., Braun, Rennie, & Labercane, 1986; Palinscar & Brown, 1984; Paris et al., 1984; Risko & Feldman, 1986).

In addition, the survey is divided by the stage of reading represented by before, during, and after. As such, it reflects conditional knowledge because the child must decide the appropriateness of the strategy relative to the stage.

A sample question that relates to strategy knowledge for each stage follows:

Before I begin reading, it's a good idea to
- A. look at the pictures to see what the story is about.
- B. decide how long it will take me to read the story.
- C. sound out the words I don't know.
- D. check to see if the story is making sense.

While I'm reading, it's a good idea to
- A. read the story very slowly so that I will not miss any important parts.
- B. read the title to see what the story is about.
- C. check to see if the story is making sense by seeing if I can tell what's happened so far.
- D. check to see if the pictures have anything missing.

After I've read a story, it's a good idea to
- A. look up all of the big words in a dictionary.
- B. read the best parts aloud.
- C. think about how the story was like things I already knew about before I started reading.
- D. have someone read the story aloud to me.

For the complete survey, see *A Questionnaire to Measure Children's Awareness of Strategic Reading Processes* (Schmitt, 1990).

There is considerable support for the credibility of the MSI because it has been used extensively in both research and practice. In practical settings, the

questionnaire is considered an effective measure of metacomprehension strategies. For example, it has been included in the following nonexhaustive list of textbooks as a suggested and valid means for measuring learners' metacognition or metacomprehension for the purpose of designing instructional programs: *Reading Assessment: Principles and Practices for Elementary Teachers* (Barrentine, 1999), *Literacy Disorders: Holistic Diagnosis and Remediation* (Huber, 1993), *Teaching Reading to High-Risk Learners* (Wood & Algozzine, 1995), and *Psychology in Education Portfolio: Learning Style and Metacognition* (Cameron & Reynolds, 1999).

In the area of research, in addition to the original study, *The Results of an Elaborated Directed Reading Activity on the Metacomprehension Skills of Third Graders* (Schmitt, 1988), the MSI has also been used in *The Development and Validation of a Self-Report Measure of Reading Strategy Use* (Pereira-Laird & Deane, 1997), *Effects of Think-Aloud Instruction on Elementary Students' Ability to Monitor Their Comprehension* (Baumann, Seifert-Kessell, & Jones, 1987), *The Effect of S2RE, a Metacognitive Learning Strategy, on the Reading Comprehension of Elementary Students* (Campbell-Beal, Hall, & Napier, 1993) and *Reading Rescue: Intervention for a Student "At Promise"* (Lee & Neal, 1992–1993).

Reliability and validity data are available for the MSI from a variety of sources. Schmitt (1988) found a statistically significant correlation between the questionnaire and the Index of Reading Awareness ($r = .48$, $p < .001$), the measure devised by Paris et al. (1984) for third-grade students who participated in a metacomprehension training study. In the same study, there were also statistically significant correlations between the MSI and two measures used to assess metacomprehension ability: an error detection task ($r = .50$, $p < .001$) and a cloze task ($r = .49$, $p < .001$). Lonberger (1988) reported an MSI internal consistency value of .87 using the Kuder-Richardson Formula 20, and Pereira-Laird and Deane (1997) reported a Cronbach alpha of .68 for the MSI when used to measure metacomprehension in intervention studies. In the current study, internal consistency values for the MSI resulted from Cronbach alpha coefficients are reported as follows: 3CS = .71, 3RRSD = .71, 3RRND = .47, 4CS = .82, 4RRSD = .72, 4RRND = .59.

ANALYSIS

Statistical analyses comparing means of the various groups were conducted using analysis of variance. An item analysis of the MSI was generated and a Cronbach alpha reliability test was conducted to measure internal consistency (the latter is reported above). The results of these analytic comparisons among groups and across grade levels are presented and discussed in the following sections, including information on levels of strategy knowledge in general and by condition (i.e., before, during, and after reading), and types of strategies.

FINDINGS

Strategy Type: Similarities and Differences

To answer questions regarding the types of strategies (e.g., previewing) known by the children in these groups, an item analysis of the MSI questions was conducted and frequency distributions of the categorical items were compared. To reiterate from an earlier explanation, the categories included "(a) predicting and verifying, (b) previewing, (c) purpose setting, (d) self-questioning, (e) drawing from background knowledge, and (f) summarizing and applying fix-up strategies" (Schmitt, 1990, p. 455).

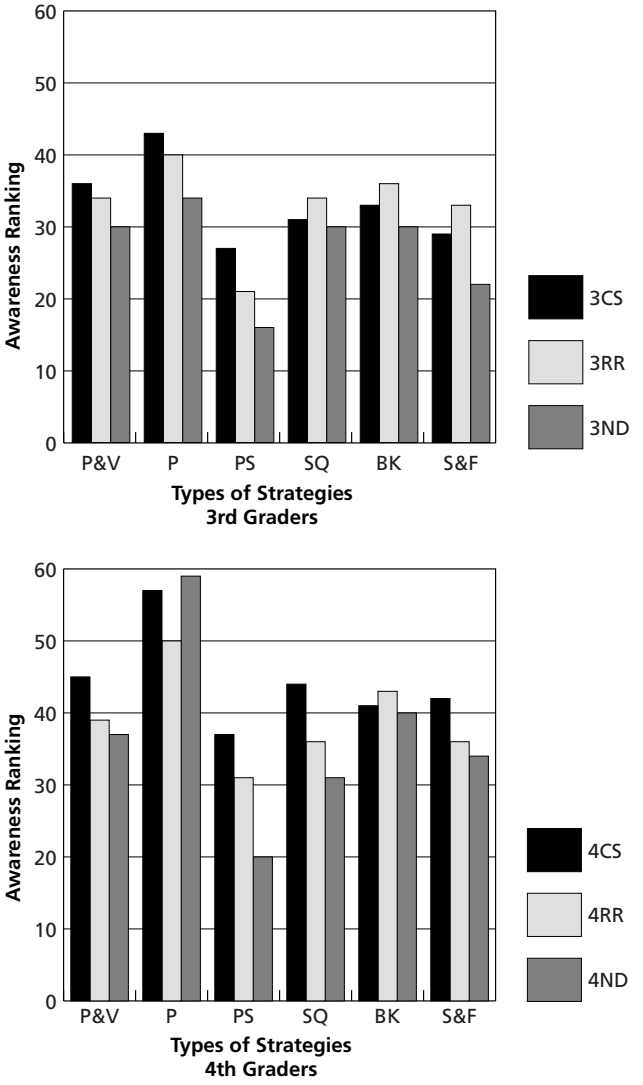
Every time an item from a category was chosen, it was added to the list for that category and frequencies were totaled. The categories were then rank ordered according to the number of times items from it were selected. Specifically, there were six categories of items. Once they were rank ordered, the category that received the most attention by a group received a point value of 6, the category that received the next highest level of attention received a point value of 5, and so on. Table 2 displays means and standard deviations for the

Table 2. Means and Standard Deviations for MSI Strategies by Groups and Grade Levels

	3CS	3RRSD	3RRND	4CS	4RRSD	4RRND
Predicting and Verifying	36 (11)	34 (12)	31 (12)	42 (9)	37 (11)	36 (13)
Previewing	42 (19)	40 (10)	33 (8)	57 (25)	50 (18)	59 (15)
Setting Purposes	27 (14)	21 (17)	16 (14)	36 (20)	31 (14)	19 (11)
Self-Questioning	31 (13)	34 (5)	29 (5)	44 (17)	36 (9)	31 (18)
Drawing from Background Knowledge	33 (12)	36 (15)	29 (9)	40 (10)	43 (9)	40 (14)
Summarizing and Applying Fix-Up Strategies	29 (14)	33 (18)	22 (10)	42 (20)	36 (16)	34 (17)

Note: CS = Cohort sample children; RRSD = Former Reading Recovery children who were successfully discontinued; RRND = Former Reading Recovery children who were not successfully discontinued; MSI = Metacomprehension Strategy Index (Schmitt, 1988, 1990).

Figure 1. Third and Fourth Graders' Awareness of Strategy Types



Note: P&V = Predicting and verifying; P = Previewing; PS = Purpose setting; SQ = Self-questioning; BK = Drawing on background knowledge; S&F = Summarizing and using fix-up strategies. CS = Cohort sample children; RR = Former Reading Recovery children who were successfully discontinued; ND = Former Reading Recovery children who were not successfully discontinued.

category selections and Figure 1 graphically displays the distributions by category and grade level.

From the distributions of strategy types (Figure 1), it can be noted that previewing is a strategy about which all groups of children across the two grade levels had knowledge (e.g., "Before I begin reading it's a good idea to look at the pictures to see what the story is about").

Second, the strategy of making predictions and reading to verify them seemed important to all children as a way to promote comprehension (e.g., "While I'm reading, it's a good idea to keep thinking about the title and the pictures to help me decide what is going to happen next"). Drawing from background knowledge was the next strategy recognized, although it was given less notice by the cohort sample group of fourth graders (e.g., "Before I begin reading, it's a good idea to think of what I already know about the things I see in the pictures"). Summarizing and applying fix-up strategies seemed to increase in importance for all groups in the fourth grade (e.g., "While I'm reading, it's a good idea to reread some parts or read ahead to see if I can figure out what is happening if things aren't making sense"). It is clear that setting purposes for reading is not a strategy recognized as salient for any of these children, perhaps being one that will develop later.

Qualitatively there are other interesting characteristics of the questions' alternative responses. For example, 15 of the questions have distracter responses that could be considered item oriented or perhaps less effective comprehension strategies. "Look up all of the big words in the dictionary" or "check to see if most of the words have long or short vowels in them" as pre-reading strategies are not as effective as "read the title to see what the story is about." There are also 11 distracter items that reflect effective strategies but ones that are appropriate for a different stage of reading (e.g., before reading rather than while reading). These questions provide information regarding the conditional knowledge (i.e., knowing when and why) that Paris and his colleagues (1983) discuss. A one-way ANOVA was conducted to see if there were differences among groups at each grade level relative to these items. No significant differences were found, suggesting that the groups were similar in their levels of understanding about effective strategies and their conditional use.

However, despite the lack of significant differences in these categories as a whole, there were a few questions that revealed differences between the children who had successfully completed Reading Recovery and the cohort sample group with respect to knowledge about less effective or item-oriented strategies. For example, in response to the question "Before I begin reading, it's a good idea to," 21% of the fourth-grade cohort sample responded that they would "make a list of words I'm not sure about," compared to 11% of the Reading Recovery children who said they would "use the title and the pictures to help me make guesses about what will happen in the story." In the same manner, when asked

"After I've read a story, it's a good idea to," 23% of the cohort sample children said they would "look up all of the big words in the dictionary," while only 11% of the former Reading Recovery children who had or had not been discontinued responded similarly with a less effective strategy.

And with respect to strategies that are appropriate for a different stage of reading demonstrating conditional knowledge, 31% of the third-grade cohort sample group indicated they would "check to see if I am understanding the story so far" as a pre-reading strategy, while only 18% of the third-grade Reading Recovery successfully discontinued group did so. And 35% of the fourth-grade cohort sample group responded they would "reread some parts to see if I can figure out what is happening if things aren't making sense," relative to 21% of the fourth-grade Reading Recovery successfully discontinued group.

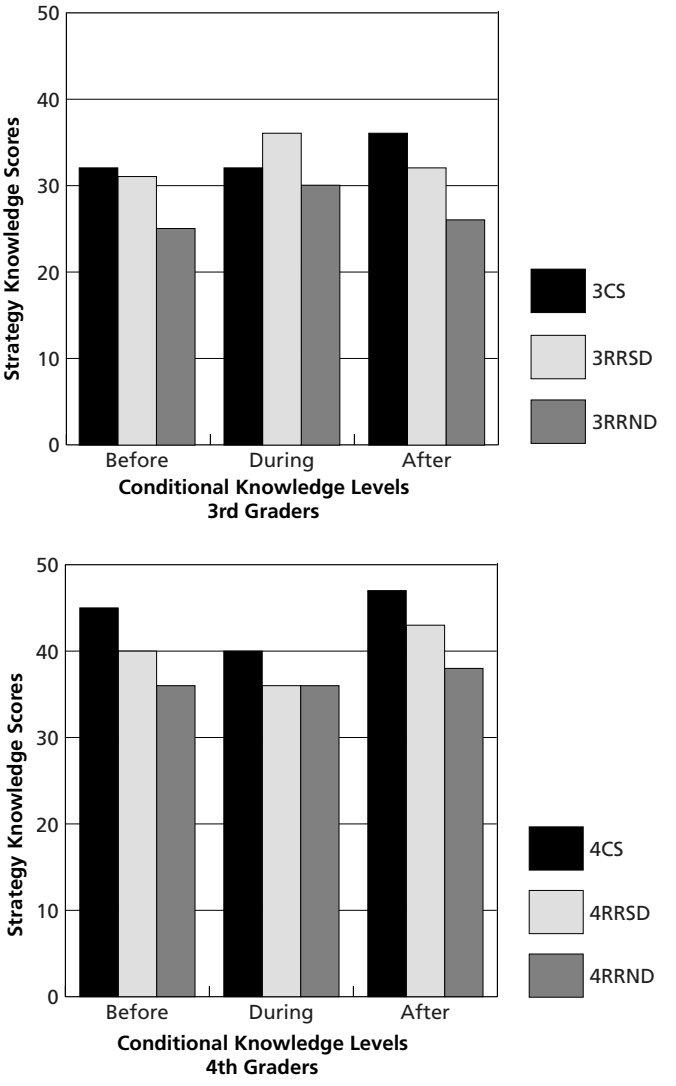
Conditional Knowledge: Similarities and Differences

To explore children's levels of conditional knowledge, group mean scores for items representing before-, during-, and after-reading strategies were compared by ANOVA. Figure 2 reflects these distributions that include the following means and standard deviations: before-reading strategies: third-grade cohort sample = 32.3 (13.6), third-grade Reading Recovery successfully discontinued = 31 (14.7), third-grade Reading Recovery not-discontinued = 25.3 (11), fourth-grade cohort sample = 44.7 (16), fourth-grade Reading Recovery successfully discontinued = 39.7 (12.2), and fourth-grade Reading Recovery not-discontinued = 36 (17.8); during-reading strategies: third-grade cohort sample = 32.4 (12.3), third-grade Reading Recovery successfully discontinued = 35.5 (13.9), third-grade Reading Recovery not-discontinued = 30.4 (9.9), fourth-grade cohort sample = 40.3 (15.2), fourth-grade Reading Recovery successfully discontinued = 36.1 (12.5), and fourth-grade Reading Recovery not-discontinued = 35.8 (15); after-reading strategies: third-grade cohort sample = 35.8 (12.4), third-grade Reading Recovery successfully discontinued = 32.4 (12.9), third-grade Reading Recovery not-discontinued = 26 (12.6), fourth-grade cohort sample = 46.8 (11.9), fourth-grade Reading Recovery successfully discontinued = 43.2 (11), and fourth-grade Reading Recovery not-discontinued = 38 (18).

The ANOVA indicated there were no significant differences between the groups of children either at each grade level or within groups when conditional knowledge was analyzed. Specifically, the data indicated that (a) cohort sample third- and fourth-grade children were equally as knowledgeable about strategies for before reading as for during or after reading, and former Reading Recovery children displayed the same patterns; and (b) former Reading Recovery children were equally as knowledgeable about strategies for before, during, and after reading as their counterparts in third and fourth grades.

The fact that all of the groups of children were consistent in their strategy

Figure 2. Third and Fourth Graders' Conditional Knowledge Levels



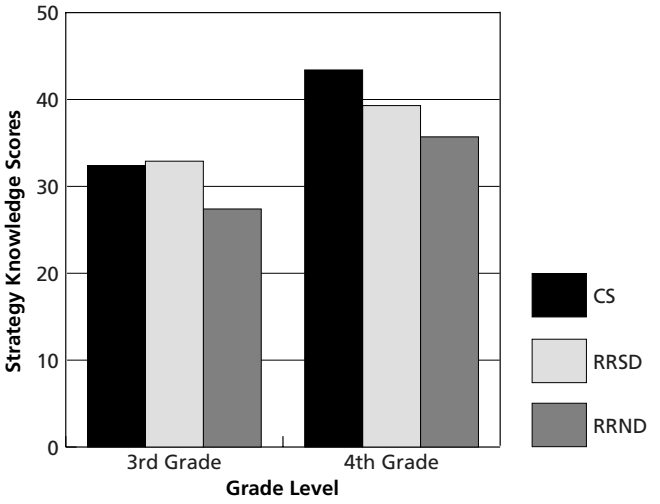
Note: CS = Cohort sample children; RRSD = Former Reading Recovery children who were successfully discontinued; RRND = Former Reading Recovery children who were not successfully discontinued.

knowledge by condition (i.e., before, during, and after reading) both within groups and across groups, suggests that children are developing more global metacognitive knowledge. That is, rather than learning strategies for during reading only, the children are developing knowledge about appropriate strategies throughout the process of reading narratives.

Declarative Knowledge Level: Similarities and Differences

To answer the question whether or not there were differences in the recognized levels of declarative strategy knowledge among the groups (cohort sample, Reading Recovery successfully discontinued, and Reading Recovery not-discontinued) at each grade level, mean scores from the MSI were compared and analyzed by ANOVAs for each grade level separately. Figure 3 is a graphic representation of the frequencies that include the following means and standard deviations: third-grade cohort sample = 32.4 (16.6), third-grade Reading Recovery successfully discontinued = 32.9 (16.1), third-grade Reading Recovery not-discontinued = 27.4 (11.6), fourth-grade cohort sample = 43.4 (20.6),

Figure 3. Group Declarative Strategy Knowledge by Grade Level



Note: CS = Cohort sample children; RRSD = Former Reading Recovery children who were successfully discontinued; RRND = Former Reading Recovery children who were not successfully discontinued.

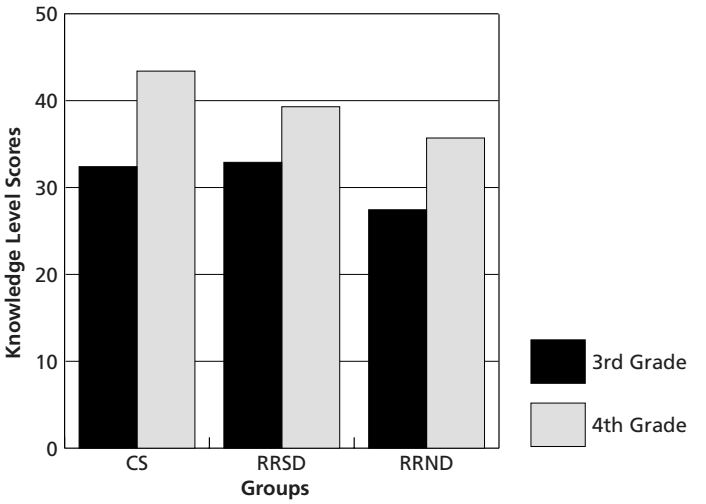
fourth-grade Reading Recovery successfully discontinued = 39.3 (17.2), and fourth-grade Reading Recovery not-discontinued = 35.7 (14.2).

The statistical comparisons of means indicated that all children who had participated in Reading Recovery in the first grade (third-grade Reading Recovery successfully discontinued, third-grade Reading Recovery not-discontinued, fourth-grade Reading Recovery successfully discontinued, and fourth-grade Reading Recovery not-discontinued) are as knowledgeable about reading strategies as their classmates (third-grade cohort sample and fourth-grade cohort sample) 2 and 3 years after the intervention. Specifically, the ANOVA and post hoc analyses indicated there were no significant differences between these two groups of children in either the third grade or the fourth grade.

Developmental Nature of Metacognitive Knowledge

Displayed in Figure 4, fourth-grade groups achieved significantly higher levels of strategy knowledge than third graders in each of the groups ($F(5,375) = 6.89$, $p < .000$). This significant growth in declarative strategy knowledge

Figure 4. Growth in Declarative Strategy Knowledge by Group and Grade Level



Note: CS = Cohort sample children; RRSD = Former Reading Recovery children who were successfully discontinued; RRND = Former Reading Recovery children who were not successfully discontinued.

between third and fourth grade suggests that the development of metacognitive knowledge may be a developmental characteristic. Such growth is consistent with Paris and Jacobs' (1984) findings regarding differences between early elementary age groups' reading strategy awareness, noting increases in age cohorts. This information also substantiates that the MSI is measuring a developmental construct.

DISCUSSION

The declarative and conditional strategy knowledge demonstrated by the groups and across grade levels allows for possible interpretations relative to learning and instruction for the various groups of children. The comparisons that can be generated are telling and prove insightful. For example, the children who participated in Reading Recovery in the first grade appear to be on equal footing with their classmates in Grades 3 and 4. If one considers that these former Reading Recovery participants were among the lowest-achieving children in their cohorts at the outset of their primary schooling (see Askew et al., 2002 for evidence of entry levels), it is perhaps the case that a strong early intervention that focused on and resulted in increased strategic processing (e.g., Schmitt, 2001), strategy awareness (Schmitt, 1998), and sound subsequent classroom instruction contributed to their development and maintenance of metacognitive strategy knowledge.

Such a conclusion is only tentative and exploratory at best because the rules for establishing causation cannot be met in this particular case. It would not have been possible to test children as first graders using the MSI to provide for entry-level knowledge of strategy awareness. However, explorations such as this respond to the now timely and important call by Shanahan and Barr (1995) to demonstrate that early interventions are worth the effort and investment because of long-term maintenance of gains made. It has been shown that first-grade achievement predicts with alarming accuracy (Allington & Walmsley, 1995) later placement in schooling. For example, Juel (1998) found that a child who was a poor reader in Grade 1 had a high probability of being a poor reader in Grade 4, while average readers remained in that status over time.

While numerous studies have demonstrated that former Reading Recovery children compare favorably with their average-achieving peers on standardized reading tests in higher grade levels (e.g., Askew et al., 2002; Brown, Denton, Kelly, & Neal, 1999; Rowe, 1995; Schmitt & Gregory, 2001), this study presents a picture in time of how former Reading Recovery children compare to their peers on reading strategy awareness (i.e., metacomprehension) and adds to the body of knowledge regarding subsequent performance of children benefiting from early intervention in literacy.

IMPLICATIONS

The educational implications of these findings relate to instruction that fosters strategic reading and the assessment of metacognitive knowledge. As Paris et al. (1991) explain,

> Strategic reading is a prime characteristic of expert readers because it is woven into the fabric of children's cognitive development and is necessary for success in school. There are six crucial reasons why strategic reading is fundamental to the development and education of children. First, strategies allow readers to elaborate, organize, and evaluate information derived from text. Second, the acquisition of reading strategies coincides and overlaps with the development during childhood of multiple cognitive strategies to enhance attentions, memory, communication and learning. Third, strategies are controllable by readers; they are personal cognitive tools that can be used selectively and flexibly. Fourth, strategic reading reflects metacognition and motivation because readers need to have both the knowledge and disposition to use strategies. Fifth, strategies that foster reading and thinking can be taught directly by teachers. And sixth, strategic reading can enhance learning throughout the curriculum. (p. 609)

An overarching thread that transverses the various ways this paper analyzes metacognitive knowledge relates to Clay's (1991) notion that children need to develop a self-extending system of literacy strategies that allows them to increase their strategic processing capabilities each time they read. Clay suggests that "this act of reading expands the range and effectiveness of strategies which the reader can bring to the task, and the size of the practiced response repertoire upon which he can draw" (p. 317). Moreover she notes, "The acquisition of appropriate strategies could explain how such a system extends itself" (p. 331).

Clay (1991) suggests that teachers can design instruction that facilitates children's attempts to build a self-extending system of strategies by attending to the cognitive operations the child initiates and carries out rather than attending to the items of knowledge a child has. "The teacher is more concerned to reinforce how the child worked to get the response than whether the child arrived at the precise correct response. In this way, the teacher is responding to the learner's construction of strategic control over reading and writing processes" (p. 343).

In conclusion, this study provides information regarding the strategies that early elementary children can recognize as valuable and suggests that awareness of strategies is developmental. Interestingly, the results indicate that children who participated in Reading Recovery in the first grade are on equal footing

with their peers in third and fourth grades in terms of their levels of strategy knowledge, the types most commonly reported, and their understanding of when to perform them.

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