Journal of Educational Psychology
2002, Vol. 94, No. 2, 249–259

0022-0663/02/$5.00 DOI: 10.1037//0022-0663.94.2.249

Assessing Students' Metacognitive Awareness of Reading Strategies

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This article describes the development and validation of a new self-report instrument, the Metacognitive Awareness of Reading Strategies Inventory, which is designed to assess adolescent and adult readers' metacognitive awareness and perceived use of reading strategies while reading academic or school-related materials. There were 3 strategy subscales or factors: Global Reading Strategies, Problem-Solving Strategies, and Support Reading Strategies. The reliability and factorial validity of the scale were demonstrated. After a brief review of the literature, the development and validation of the instrument are described, and its psychometric properties are discussed. In addition, directions for administering and scoring the instrument are provided, and suggestions for interpreting the results obtained are offered. Finally, the scales' implications for reading research and instruction are discussed.

Recent trends within the domain of reading comprehension have led to an increasing emphasis on the role of metacognitive awareness of one's cognitive and motivational processes while reading (Alexander & Jetton, 2000; Guthrie & Wigfield, 1999; Pressley, 2000; Pressley & Afflerbach, 1995). Indeed, researchers agree that awareness *and* monitoring of one's comprehension processes are critically important aspects of skilled reading. Such awareness and monitoring processes are often referred to in the literature as *metacognition,* which can be thought of as the knowledge of the readers' cognition about reading and the self-control mechanisms they exercise when monitoring and regulating text comprehension.

The construct of metacognition has been richly built through the efforts of several prominent researchers representing diverse research traditions using various data sources. Although it is a challenge to account for all the characterizations of metacognition, we attempt, in our brief review, to reflect the richness of inquiry behind the construct, which provides a foundation for developing a valid and reliable instrument aimed at measuring readers' metacognitive awareness and control of the strategic processes invoked while reading. Researchers generally agree that *metacognition* refers to the "knowledge about cognitive states and abilities that can be shared among individuals while at the same time expanding the construct to include affective and motivational characteristics of thinking" (Paris & Winograd, 1990, p. 15). In his classic article "Metacognition and Cognitive Monitoring," Flavell (1979) described the process of cognitive monitoring as occurring through the actions and interactions of four classes or interrelated phenomena: Metacognitive knowledge, metacognitive experiences, goals (or tasks), and actions (or strategies). Other researchers (e.g., Wade, Trathen, & Schraw, 1990) have used examples of students' reflections about their thinking while reading to illustrate what they do when they read. Readers' reflections show how they plan, monitor, evaluate, and use information available to them as they make sense of what they read. Such reflections unveil judgments about the readers' thinking processes that serve as conventional descriptions of metacognition. Recent conceptions of reading comprehension depict efficient readers as strategic or "constructively responsive" readers who carefully orchestrate cognitive resources when reading (Pressley & Afflerbach, 1995).

Researchers investigating reading comprehension monitoring among skilled and unskilled readers have long recognized the importance of metacognitive awareness in reading comprehension because it distinguishes between skilled and unskilled readers. Paris and Jacobs (1984) provided an illustration of the differences between these two types of readers:

> Skilled readers often engage in deliberate activities that require planful thinking, flexible strategies, and periodic self-monitoring. They think about the topic, look forward and backward in the passage, and check their own understanding as they read. Beginning readers or poor readers do not recruit and use these skills. Indeed, novice readers often seem oblivious to these strategies and the need to use them. (p. 2083)

Skilled readers, according to Snow, Burns, and Griffin (1998), are good comprehenders. They differ from unskilled readers in "their use of general world knowledge to comprehend text literally as well as to draw valid inferences from texts, in their comprehension of words, and in their use of comprehension monitoring and repair strategies" (p. 62). Pressley and Afflerbach (1995) pointed out that skilled readers approach the reading task with some general tendencies. For example, they tend to be aware of what they are reading; they seem to know why they are reading; and they have a set of tentative plans or strategies for handling potential problems and for monitoring their comprehension of textual information.

Unskilled readers (typically young developing readers and some inexperienced adolescents and adults), on the other hand, are quite limited in their metacognitive knowledge about reading (Paris & Winograd, 1990). They do relatively little monitoring of their own memory, comprehension, and other cognitive tasks (Flavell, 1979; Markman, 1979) and tend to focus on reading as a decoding process rather than as a meaning-getting process (Baker & Brown, 1984). In addition, they are less likely than skilled readers to detect contradictions or resolve inconsistencies in understanding text

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(Snow et al., 1998). Finally, they seem not to realize that they do not understand (Garner & Reis, 1981) and as a result fail to exercise control of their reading processes (Wagner & Sternberg, 1987).

The central role of metacognition and comprehension monitoring in the current descriptions of the reading process is reflected in the steady growth of interest in reading comprehension monitoring research. The value placed by teachers and researchers on this important aspect of reading is supported in the literature that documents the link between comprehension monitoring and academic learning. Paris and Winograd (1990) maintained that metacognition can promote academic learning and motivation. The idea is that students can enhance their learning by becoming aware of their own thinking as they read, write, and solve problems at school. Teachers can promote this awareness by simply informing students about effective problem-solving strategies and discussing cognitive and motivational characteristics of thinking. Paris and Winograd (1990) argued that such "consciousness-raising" has twin benefits: "(a) it transfers responsibility for monitoring learning from teachers to students themselves, and (b) it promotes positive self-perceptions, affect, and motivation among students. In this manner, metacognition provides personal insights into one's own thinking and fosters independent learning" (p. 15).

Researchers have shown that students' awareness of their own reading comprehension processes can be enhanced through systematic, direct instruction (Paris & Winograd, 1990). They concurred with other researchers that strategic reading can be taught to students who need it through carefully devised instructional techniques (e.g., Brown, Armbruster, & Baker, 1986). However, they cautioned that "metacognition should not be regarded as a final objective for learning or instruction." Instead, it should be regarded as an opportunity to "provide students with knowledge and confidence that *enables* them to manage their own learning and *empowers* them to be inquisitive and zealous in their pursuits" (Paris & Winograd, 1990, p. 22).

According to Garner (1987), reading strategies, which she operationally defined as "generally deliberate, planful activities undertaken by active learners, many times to remedy perceived cognitive failure" (p. 50), facilitate reading comprehension and may be teachable. Garner (1994) concurred with Paris, Lipson, and Wixon (1994) that reading strategies can and should be learned to the point of automaticity, after which they become skills, and that learners must know not only what strategies to use but also when, where, and how to use them.

The research on metacognition and reading comprehension is extensive (for recent reviews of the multidimensional nature of text comprehension, see especially Alexander & Jetton, 2000; and Pressley, 2000). This work has been very important in prompting reading researchers to examine readers' own awareness of their cognitive and motivational processes while reading and the actions they use to monitor comprehension. In addition, such research has provided teacher educators and practicing teachers with practical suggestions for helping struggling readers increase their awareness and use of reading strategies while reading. However, there are relatively few instruments to measure students' awareness and perceived use of reading strategies while reading for academic purposes.

Efforts to develop metacognitive awareness inventories have been well intentioned but generally not satisfactory from a measurement perspective. The few instruments available have been quite useful in helping to determine metacognitive awareness and use of reading strategies among elementary school students. However, most have shortcomings that limit their use for middle- or upper level students. Criticisms of existing measures of metacognitive awareness in reading pertain mainly to the use of scales with a small number of items, limited psychometric properties, evidence of reliability and validity, or an uncertain characterization of the construct of metacognition in particular and reading in general. For example, Jacobs and Paris (1987) developed the Index of Reading Awareness to measure metacognitive awareness of third- through fifth-grade students with grade-equivalent reading abilities ranging from second to seventh grade. The scale consists of 22 multiple-choice items measuring four aspects of metacognition in reading: evaluation, planning, regulation, and conditional knowledge. Its value as a measure of metacognitive awareness of reading strategies was assessed by McLain, Gridley, and McIntosh (1991), who obtained preliminary reliability and validity data and found the scale only marginally acceptable. McLain et al. (1991) found the reliability index (.61) to be "minimal" and stated that the Index of Reading Awareness "should be used cautiously as a measure of metacognition in reading" (p. 81).

Pereira-Laird and Deane (1997) developed a self-report measure called Reading Strategy Use (RSU) to assess the perceptions of adolescent students' use of cognitive and metacognitive strategies when reading narrative and expository texts. Pereira-Laird and Deane reported preliminary support for the reliability (.97) and validity of the RSU measure in assessing cognitive and metacognitive reading strategy use for adolescents. However, on close examination, we identified some critical shortcomings that lessen the validity of this scale. Several items from the scale do not appear to be reading strategies, which are deliberate actions taken by readers before, during, and after reading (e.g., "I find it hard to pay attention when reading," and "After I have been reading for a short time, the words stop making sense"). All items were forced into predetermined factors (Metacognitive and Cognitive) on the basis of judges' ratings, and then a confirmatory factor analysis was conducted. Because they skipped an exploratory factor analysis, Pereira-Laird and Deane retained some items that we feel are out of place, and therefore this scale, although valuable, can still be improved. Finally, it is unclear to what extent the RSU scale can be used reliably with students other than those used in the study (the majority being Caucasians) and different types of reading materials (text types used were narrative and expository).

Schmitt (1990) developed a 12-item multiple-choice questionnaire to measure elementary students' awareness of strategic reading processes. Although its reliability is good, it has limitations for use with research. Students are forced to choose among several alternatives (rather than choosing all that apply), and although the directions stress that there is no "right" answer, many of the choices do not make much sense, which would seem to lead students to the "correct" metacognitive answer. The instrument is strictly aimed at metacognition, excluding measurement of other types of reading strategies that might be helpful to readers.

Miholic (1994) developed a 10-item multiple-choice inventory aimed at stimulating students' metacognitive awareness of reading strategies. The inventory is intended for use with students from junior high through college. No reliability or validity data are presented. There is no scoring rubric. This instrument, like that of

Schmitt, seems to have limitations for use in research. It is aimed at increasing student and teacher awareness of metacognition in reading rather than measurement of metacognitive or other reading strategies.

The present article describes a new self-report measure, the Metacognitive Awareness of Reading Strategies Inventory (MARSI), which is designed to assess 6th- through 12th-grade students' awareness and perceived use of reading strategies while reading academic or school-related materials. The major purposes were to devise an instrument that would permit one to assess the degree to which a student is or is not aware of the various processes involved in reading and to make it possible to learn about the goals and intentions he or she holds when coping with academic reading tasks. Such information can increase students' awareness of their own comprehension processes. As well, it can help teachers better understand the needs of their students.

In designing a measure sensitive to these purposes, we were guided by the premise that constructing meaning from text is an intentional, deliberate, and purposeful act. According to Pressley and Afflerbach (1995), skilled readers approach the reading task with some general tendencies. These tendencies are shaped into specific responses depending on the goals of reading and the nature of the text being read. Guthrie and Wigfield (1999) concurred that "constructing meaning during reading is a motivational act." In addition, they state the following:

> A person is unlikely to comprehend a text by accident. If the person is not aware of the text, not attending to it, not choosing to make meaning from it, or not giving cognitive effort to knowledge construction, little comprehension occurs. (p. 199)

Current reading research, which stresses the interactive, constructive nature of reading, suggests the need for all students (especially struggling ones) to become "constructively responsive" readers (Pressley & Afflerbach, 1995, p. 83), and "thoughtfully literate" individuals (Allington, 2000, p. 94) who are engaged, motivated readers in control of their own learning (Alvermann & Guthrie, 1993). This type of constructively responsive, thoughtful, and engaged reading clearly involves much more than simply having good decoding skills, an adequate reading vocabulary, and an ability to recall what the text said. Learning from text, like all learning, demands readers who are "*strategically* engaged in the construction of meaning" (Alexander & Jetton, 2000, p. 295).

MARSI Scale Development and Validation

The development of the MARSI was guided by several efforts, including (a) a review of recent research literature on metacognition and reading comprehension (e.g., Alexander & Jetton, 2000; Baker & Brown, 1984; Garner, 1987; Paris & Winograd, 1990; Pressley, 2000; Pressley and Afflerbach, 1995), (b) the use of expert judgment with respect to assignment and categorization of items within the inventory, (c) insights gained from existing reading strategies instruments regarding format and content (e.g., Jacobs & Paris, 1987; Miholic, 1994; Pereira-Laird and Deane, 1997; Schmitt, 1990), and (d) the use of factor analyses to examine the structure of the scale.

Following standard measurement criteria for developing valid, reliable, and sensitive measures (e.g., Churchill, 1979; Crocker & Algina, 1986; Sax, 1997), we subjected the items used in the MARSI to successive cycles of development, field-testing, validation, and revision. After a thorough review of the research literature pertaining to text comprehension, we examined four published reading strategy instruments for ideas regarding general format and content. We also searched several reading methods textbooks for ideas that could be used in statements about global reading strategies.

We used an extensive body of work on metacognition and reading comprehension by several researchers (e.g., Alexander & Jetton, 2000; Baker & Brown, 1984; Garner, 1987; Paris & Winograd, 1990; Pressley & Afflerbach, 1995, to name only a few) who had provided much of what is currently known about this important topic. We drew on Pressley and Afflerbach's (1995) notion of constructively responsive reading, which appears to be quite consistent with recognized theories of reading such as Rosenblatt's (1978) reader response theory, in which the transaction between readers and texts is emphasized. The concept of constructively responsive reading also embraces key principles of the top-down processing model of reading reflected in schema theory (Anderson & Pearson, 1984), bottom-up text-processing strategies emphasized by van Dijk and Kintsch (1983), and the comprehension monitoring processes advocated by several notable researchers in this line of inquiry (e.g., Baker & Brown, 1984; Garner, 1987; Paris & Winograd, 1990). In their book, *Verbal Protocols of Reading: The Nature of Constructively Responsive Reading*, Pressley and Afflerbach (1995) offer a very helpful thumbnail sketch of various strategies skilled readers use before, during, and after reading. Appendix A provides a summary of some of these strategies.

Initially, we generated a pool of nearly 100 items from which the final set of items was constructed. Each of the 15 skilled reader strategies listed on Pressley and Afflerbach's (1995) thumbnail outline was accounted for in the original strategy pool. This summary of some of the strategies skilled readers use when responding to text constructively was quite important in our efforts to develop our own instrument because we believe they represent a research-based conceptualization of what constitutes a metacognitive reading strategy, informed by a richness of inquiry into the construct of metacognition. We concur with Pressley and Afflerbach that skilled readers approach the reading task with some general tendencies (such as the ones described in Appendix A). These tendencies, which constitute constructively responsive reading, are shaped into specific responses or reading strategies depending on the goals of reading and the nature of the text being read. The initial collection of 100 reader strategies was designed to contain some redundancy. As a result, we anticipated refining or deleting some of the items to produce a shorter version of the scale. We took special care to write the items in a positive and easy-to-read manner using a response format that would seem appealing to students.

When selecting and categorizing the strategy statements within the instrument, we were assisted by a group of three expert judges (two professional research colleagues and a research assistant) who were knowledgeable about and experienced in the teaching and assessment of reading strategies. These judges were instructed to review the initial pool of items for clarity, redundancy, and readability. The initial review resulted in the elimination of 40 items due mainly to redundancy among the items used. Throughout the review process, whenever disagreements occurred, a dis-

cussion ensued until consensus was reached. Sixty items were retained for initial testing, in addition to a short biographical section asking participants for their age, gender, ethnicity, and self-evaluation of reading ability and interest in reading.

Finally, we field-tested the inventory with a large sample of students ($N = 825$) in Grades 6–12 drawn from 10 urban, suburban, and rural school districts in five midwestern states. School records from each of the districts, indicating that the participants shared similar linguistic, cultural, and socioeconomic backgrounds, documented similarity of student populations. None of the participants were identified as having any specific learning problems or handicapping conditions. Of the respondents, 47.2% were boys, and 52.8% were girls. Of the total number of participants, 52.2% were Caucasian, 19.1% were Native American, 4.4% were Asian; 6.4% were African American; 7.2% were Hispanic; and 10.8% described themselves as "Other." The ethnic makeup of our sample was typical for the areas from which the majority was obtained.

In addition to completing the inventory, students were asked to mark the items that were unclear or confusing to them. They were also asked to provide written feedback, if any, about any aspect of the instrument, including the clarity of instructions, wording of items, time devoted to completing the inventory, response format, and content. The feedback obtained throughout these phases resulted in additional enhancements to the final version of the instrument. We used the results of this field testing to determine the psychometric attributes of the inventory.

Exploratory factor analysis using a common factor model was used to identify potential factors or subscales for the 60-item instrument and to help identify any items that might need to be refined or deleted. The scree plot from the first factor analysis suggested that three factors should be retained. There were 13 eigenvalues greater than 1 (eigenvalues for Factors 4 through 13 ranged from 1.68 down to 1.00.). Gorsuch (1983) recommended evaluating the scree plot, the eigenvalues, and the interpretability of factors in tandem to decide the number of factors to retain. On the basis of this combination of criteria, three factors were retained. A two-factor solution was also attempted; however, it appeared that in this solution, items from the first two factors (of the three-factor solution) grouped together, whereas items from the third factor (of the three-factor solution) made up the second factor. Because there was evidence of interpretability for the three-factor solution, it was preferable.

A second principal-axis factor analysis was performed using three factors and an oblique Harris–Kaiser rotation. Cronbach's alpha was calculated for each subscale and for each grade level. Coefficients ranged from .89 to .93, and reliability for the total sample was .93, indicating a reasonably reliable measure of metacognitive awareness of reading strategies.

Next, the items were examined to see whether the analyses suggested they should be modified or deleted. Crocker and Algina (1986) suggested looking at (a) whether each item contributed or detracted from the reliability of the subscales; (b) whether items exhibited simple structure (loaded primarily on only one factor); (c) whether items had high factor loadings; and (d) for items that failed any of the above criteria, whether they appeared ambiguous or out of place in comparison with other items. For the analysis of reliabilities, items were included in a factor if their factor loadings were at least .20 or above, so there was some overlap of items. In addition, we examined each statement for redundancy, in hopes of shortening the scale without greatly reducing its reliability. All items were examined for ambiguity and lack of fit with other questions in the scale. Some were deleted if they did not exhibit simple structure or had rotated factor loadings below .30 for all three factors. In some cases, certain items were deleted when they reduced subscale reliabilities and did not seem to provide useful information. A number of other items were reworded or considered for deletion owing to a combination of (a) low factor loadings, (b) loading on more than one subscale, (c) reduced reliabilities, or (d) duplication with other questions. The resulting instrument contained 30 items that were reviewed for readability, response format, and completeness.

These remaining 30 items were reviewed by three raters (the same raters used to cull the initial sample of 100 items down to 60). Each statement was scrutinized for appropriateness and clarity, and disagreements were discussed until consensus among the raters was reached. After some revisions in wording, the inventory was administered to a small pilot group of students similar to the one used in the initial study. The students were asked to provide feedback on the clarity and ease of understanding of each of the items. The feedback was used to produce the final draft of the inventory (Version 1.0), which is displayed in Appendix B.

This revised instrument was administered again to a similar sample of 443 students in Grades 6–12. As in the analysis of the 60-item instrument, the analysis of the 30-item revised instrument yielded three factors or subscales. A second principal-axis factor analysis was performed using three factors and an oblique Harris-Kaiser rotation. The rotated factor patterns are shown in Table 1. The three factors explained 29.7% of the total variance. The correlations between factors and Cronbach's alpha reliabilities for each factor or subscale are shown in Table 2. Cronbach's alpha was calculated for each subscale (see Table 2) and for each grade level (see Table 3). Reliability for the total sample was .89.

The first factor (Global Reading Strategies) contained 13 items and represented a set of reading strategies oriented toward a global analysis of text (see Appendix C). Examples include "I decide what to read closely and what to ignore;" "I think about what I know to help me understand what I read;" and "I have a purpose in mind when I read." These strategies can be thought of as generalized, intentional reading strategies aimed at setting the stage for the reading act (e.g., setting purpose for reading, making predictions).

The second factor (Problem-Solving Strategies) contained 8 items that appeared to be oriented around strategies for solving problems when text becomes difficult to read. Examples of these strategies include "When the text becomes difficult, I reread to increase my understanding;" and "I adjust my reading speed according to what I read." These strategies provide readers with action plans that allow them to navigate through text skillfully. Such strategies are localized, focused problem-solving or repair strategies used when problems develop in understanding textual information (e.g., checking one's understanding on encountering conflicting information or rereading for better understanding).

The third factor (Support Reading Strategies) contained 9 items and primarily involved use of outside reference materials, taking notes, and other practical strategies that might be described as functional or support strategies. Examples include "I take notes while reading;" "I underline or circle information in the text to

Table 1
Rotated Factor Pattern (Standard Coefficients)

Inventory item	Factor 1	Factor 2	Factor 3
1. I have a purpose in mind when I read.	.639		
2. I take notes while reading to help me understand what I'm reading.			.728
3. I think about what I know to help me understand what I'm reading.	.418	.404	
4. I preview the text to see what it's about before reading it.	.470		
5. When text becomes difficult, I read aloud to help me understand what I'm reading.		.375	.375
6. I write summaries to reflect on key ideas in the text.			.773
7. I think about whether the content of the text fits my purpose.	.597		
8. I read slowly but carefully to be sure I understand what I'm reading.		.454	
9. I discuss my reading with others to check my understanding.			.573
10. I skim the text first by noting characteristics like length and organization.	.640		
11. I try to get back on track when I lose concentration.		.679	
12. I underline or circle information in the text to help me remember it.			.616
13. I adjust my reading speed according to what I'm reading.		.512	
14. I decide what to read closely and what to ignore.	.582		
15. I use reference materials such as dictionaries to help me understand what I'm reading.			.493
16. When text becomes difficult, I begin to pay closer attention to what I'm reading.		.553	
17. I use tables, figures, and pictures in text to increase my understanding.	.385		
18. I stop from time to time to think about what I'm reading.		.605	
19. I use context clues to help me better understand what I'm reading.	.407		
20. I paraphrase (restate ideas in my own words) to better understand what I'm reading.			.526
21. I try to picture or visualize information to help me remember what I'm reading.		.632	
22. I use typographical aids like boldface type and italics to identify key information.	.425		
23. I critically analyze and evaluate the information presented in the text.	.308		.354
24. I go back and forth in the text to find relationships among ideas in it.			.511
25. I check my understanding when I come across conflicting information.	.352	.325	
26. I try to guess what the text is about when reading.	.373	.303	
27. When text becomes difficult, I reread to increase my understanding.		.634	
28. I ask myself questions I like to have answered in the text.			.510
29. I check to see if my guesses about the text are right or wrong.	.389		
30. I try to guess the meaning of unknown words or phrases.		.533	

Note. Items were categorized using the highest factor loading, with the exception of Item 23, which appeared to fit best as a Global Reading Strategy. Factor 1 = Global Reading Strategies; Factor 2 = Problem-Solving Strategies; Factor 3 = Support Reading Strategies.

help me remember it;" and "I summarize what I read to reflect on important information in the text." Strategies such as these serve a useful function for some of the students who seem to invoke them as needed. These strategies provide the support mechanisms aimed at sustaining responses to reading (e.g., use of reference materials such as dictionaries and other support systems). These three types of strategies (i.e., Global, Problem-Solving, and Support Strategies) interact with each other and have an important influence on text comprehension. The information gleaned from the inventory serves as a catalogue of strategies students report using while reading academic or school-related materials such as textbooks, library materials, and magazine articles.

Looking at the relationship between self-reported reading ability and strategy usage provides preliminary evidence of construct validity. In keeping with prior research on the relationship between reading strategy awareness, usage, and reading ability (see, e.g., Alexander & Jetton, 2000; Pressley, 2000), we suspected that skilled readers would use strategies more frequently; in particular, we predicted highly skilled readers to use Global and Problem-Solving Strategies more frequently than less skilled readers. As Table 4 shows, we found significant differences in the use of Global and Problem-Solving Strategies by self-reported reading ability but no significant differences in the use of Support Strate-

Table 2
Factor Correlations

Factor	1	2	3
1	.92	—	
2	.20	.79	—
3	.73	.09	.87

Note. Cronbach's alphas are presented on diagonal. Factor 1 = Global Reading Strategies; Factor 2 = Problem-Solving Strategies; Factor 3 = Support Reading Strategies.

Table 3
Cronbach's Alpha Reliabilities by Grade Level

Grade	*n*	Cronbach's α
6	31	.91
7	76	.87
8	74	.86
9	76	.87
10	70	.91
11	71	.91
12	45	.93

Table 4
One-Way Analysis of Variance of Perceived Strategy Use by Reading Ability

	Self-reported reading ability										
	Whole group		Excellent		Average		Not so good				
Strategy use	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*MSE*	*F*(2, 440)	*p* >
MARSI	2.83	0.63	2.96	0.68	2.80	0.60	2.70	0.62	.39	7.05	.0009
GLOB	2.77	0.65	2.94	0.70	2.74	0.62	2.57	0.60	.41	12.53	.0001
PROB	3.19	0.78	3.40	0.81	3.13	0.75	3.01	0.84	.60	11.34	.0001
SUP	2.59	0.79	2.60	0.68	2.59	0.77	2.61	0.75	.63	0.02	.9829

Note. MARSI = Metacognitive Awareness of Reading Strategies Inventory; GLOB = Global Reading Strategies; PROB = Problem-Solving Strategies; SUP = Support Reading Strategies.

gies by self-reported reading ability. Post hoc comparisons of Global Reading Strategies scores using the Ryan–Einot–Gabriel–Welch multiple-range test with α equals 0.05 yields a critical range of 0.136, which is smaller than the differences between any two of the means shown in Table 4. This means that readers who rate their reading ability as excellent have a significantly higher use of Global Reading Strategies than readers who rate their reading ability as average or not so good, and readers who rate their reading ability as average have a significantly higher use of Global Reading Strategies than readers who rate their reading ability as not so good. Similarly, post hoc comparisons of Problem-Solving Strategies scores using the Ryan–Einot–Gabriel–Welch multiple-range test with α equals 0.05 yields a critical range of 0.165, which is smaller than the differences between excellent and the other ability levels shown in Table 4. This means that readers who rate their reading ability as excellent have a significantly higher use of Problem-Solving Strategies than readers who rate their reading ability as average or not so good.

Overall, the psychometric data demonstrate that the instrument is a reliable and valid measure for assessing students' metacognitive awareness and perceived use of reading strategies while reading for academic purposes. We have also shown promising evidence of construct validity through higher use of Global and Problem-Solving Strategies by those who rate themselves as good readers. Further research using external measures of reading ability can help solidify this finding. We can meaningfully isolate three measurable strategy components or categories, as reflected in the three-factor solution obtained. The instrument is ready to be used as a tool for assessing students' metacognitive awareness of reading strategies while reading.

Administration, Scoring, and Interpretation

Administration

The MARSI can be administered individually as well as to groups of adolescent and adult students with grade level equivalents ranging from fifth grade through college. Although there is no time limit set for the instrument, the average administration time is between 10 and 12 min, depending on the students' grade level and overall reading ability. After explaining the purpose of the inventory, teachers should direct students to read each statement and rate how often they report using the strategy described in that statement using a 5-point Likert-type scale ranging from 1 (*I never do this*) to 5 (*I always do this*). It is important at this point to remind students that their responses are to refer only to the strategies they use when reading school-related materials. They should also be encouraged to respond honestly to each statement in the inventory and to ask questions about any aspect of the inventory they do not understand. The following outline delineates the steps to be taken when administering MARSI.

1. Distribute copies of the inventory to each student.
2. Ask students to provide identifying information (e.g., grade level) in the spaces provided.
3. Read the directions aloud and work through the example provided with the students.
4. Discuss the response options and make sure the students understand the rating scale.
5. Ask if anyone has questions about any aspect of the inventory.
6. Instruct the students to read each statement carefully and circle the appropriate responses.
7. Encourage students to work at their own pace.

Scoring

Scoring the inventory is quite easy and can be done by the students themselves. Students simply transfer the scores obtained for each strategy to the scoring sheet, which accompanies the inventory. After the individual scores are recorded, they should be added up in each column to obtain a total score, then divided by the number of items to get an average response for the entire inventory as well as for each strategy subscale (i.e., Global, Problem-Solving, and Support strategies). These scores can then be interpreted using the interpretation guidelines provided.

Interpretation

The interpretation of the information derived from the instrument was inspired by interpretation schemes used in published instruments (e.g., Henk & Melnick, 1995; Oxford, 1990). In examining the reading strategy usage of individual and groups of students on the MARSI, which ranges from 1 to 5, three levels of usage were identified, as suggested by Oxford for language learning strategy usage: high (mean of 3.5 or higher), medium (mean

of 2.5 to 3.4), and low (2.4 or lower). These usage levels provide a helpful standard that can be used for interpreting the score averages obtained by individual or groups of students. The scores obtained should be interpreted using the high, moderate, and low usage designations shown on the scoring rubric that accompanies the scale. These usage designations are based on the average performance of the students who were used to validate the MARSI (the norm group).

As a general rule, the overall score averages indicate how often students use all the strategies in the inventory when reading academic materials. The averages for each subscale in the inventory show which group of strategies (i.e., Global, Problem-Solving, and Support Strategies) students use most or least when reading. This information enables them to tell if they score very high or very low in any of these strategy groups. A low score on any of the subscales or parts of the inventory indicates that there may be some strategies in these parts that they might want to learn about and consider using when reading. Note, however, that the best possible use of these strategies will ultimately depend, to a great extent, on the students' age, their reading ability, text difficulty, type of material read, and other related factors.

Potential Uses of the MARSI

The MARSI is not intended to be used as a comprehensive measure of students' comprehension monitoring capabilities. Rather, it is designed as a tool for helping students increase metacognitive awareness and strategy use while reading. The results obtained can be used for enhancing assessment, planning instruction, or conducting classroom or clinical research.

First, it enables students to increase awareness of their own reading strategies. This information will allow them to evaluate themselves in relation to other readers and also to amend the conceptions they hold about reading and learning from text. Becoming aware of one's cognitive processes while reading is a first important step toward achieving the type of constructively responsive and thoughtful reading that is emphasized by current models of reading. According to Paris and Winograd (1990), such "consciousness-raising" has twin benefits: "(a) it transfers responsibility for monitoring learning from teachers to students themselves, and (b) it promotes positive self-perceptions, affect, and motivation among students. In this manner, metacognition provides personal insights into one's own thinking and fosters independent learning" (p. 15).

Second, the information derived from the MARSI can provide teachers with a useful means of assessing, monitoring, and documenting the type and number of the reading strategies used by students. For example, teachers can examine the overall responses to get a general sense of the students' awareness and use of the individual reading strategies invoked using the guidelines provided. Over- or underreliance on a particular strategy may provide a hint about how the students approach the reading task. Students' internalized conceptions of the reading process are often related to the textual information they attend to. A student who reports overusing support strategies such as "using the dictionary" to look up every word in text may have a restricted view of reading. Support for this observation comes from Garner and Alexander (1989), who found that "children, particularly younger and poorer readers, often rely on a single criterion for textual understanding: understanding of individual words" (p. 145). On the other hand, underusing problem-solving strategies such as "rereading to increase understanding" may indicate lack of awareness of reading strategies and inadequate control of one's comprehension processes. Research tells us that certain strategies, particularly text reinspection and summarization are often difficult to learn and easy to abandon. Garner and Alexander noted that students often avoid reinspecting text to answer questions because it takes time and effort and evade summarization because it is difficult.

Third, MARSI can serve as a useful tool for teachers and researchers in investigating the impact of teaching strategic reading on students' reading comprehension under a variety of conditions, including reading for different purposes (e.g., reading to answer questions on a test vs. reading to research a particular topic); reading texts varying in length, difficulty, structure, and topic familiarity (e.g., reading a chapter book vs. reading a computer manual); and reading assigned versus self-selected readings. Teachers and researchers can use the data obtained from the instrument as a means of monitoring students' progress in becoming constructively responsive readers. They can administer it as a pretest and posttest in studies aimed at evaluating the impact of instruction on students' awareness and use of strategies while reading. They can use the individual and group average scores to derive a profile designating students along the three subscales of the inventory. Depending on the students' individual profiles, teachers might consider devising specific instructional strategies for addressing the specific weaknesses and needs. Some educators recommend maintaining performance data in portfolios, which can be used to demonstrate changes in the metacognitive awareness and use of strategies over time. Differences in performance can be documented along with other measures of reading in portfolios for individual students (see, e.g., Henk & Melnick, 1995).

A Cautionary Note

Classroom teachers and researchers will find the MARSI to be a useful tool for assessing and promoting learner awareness of the underlying processes involved in reading. However, they should keep in mind some cautions when using it for making decisions about students' overall ability to read and to monitor their understanding while reading academic materials. First, like other measures of reading, it should be used to supplement rather than to supplant existing assessment measures of students' reading comprehension. Teachers should consider it as only one source of information about students' reading abilities that must be analyzed in conjunction with other measures of reading ability.

Second, although there is psychometric support for the adequacy of MARSI as a measure of metacognitive awareness of reading strategies, it remains a self-report measure, and as such, it should be interpreted with vigilance. For instance, one cannot tell from the instrument alone whether students actually engage in the strategies they report using. In other words, invoking certain strategies through an inventory such as MARSI may indicate that the students know about or are aware of those strategies. However, awareness of strategies does not guarantee that students actually use them. According to Baker and Brown (1984), it is not enough to simply know appropriate reading strategies. Students must also be able to regulate or monitor the use of such strategies to ensure success in reading comprehension. Teacher judgment and common

sense are clearly required to validate the discrepancy between students' beliefs about using the strategies and actual practice. Teachers should carefully scrutinize the responses to the reading strategies students report using while reading and interpret them in light of their own experiences observing and working with their students before they can make instructional decisions.

Third, although there is widespread agreement that constructively responsive reading is amenable to assessment and instruction, teachers who have helped students learn to become strategic readers often say that this process is work intensive and time-consuming on the part of teachers and students alike. Some estimate that it takes several months, perhaps as long as 1 year or more, for students to become strategic readers (Pressley, Beard El-Dinary, & Brown, 1992). Others caution that metacognition should not be regarded as a final objective for curriculum or instruction. Instead, it should be regarded as an opportunity to "provide students with knowledge and confidence that *enables* them to manage their own learning and *empowers* them to be inquisitive and zealous in their pursuits" (Paris & Winograd, 1990, p. 22). In other words, as teachers, we should strive first to better understand the thinking processes that support students' attempts to learn from texts; we should also help all readers, particularly struggling readers, learn to become actively engaged in reading. Increasing students' awareness of their comprehension processes while reading is an important first step toward their becoming constructively responsive, strategic, and thoughtful readers.

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Appendix A

A Thumbnail Sketch of Conscious Constructive Responses to Text

- Overviewing before reading (determining what is there and deciding which parts to process).
- Looking for important information in text and paying greater attention to it than to other information (e.g., adjusting reading speed and concentration depending on the perceived importance of text to reading goals).
- Attempting to relate important points in text to one another in order to understand the text as a whole.
- Activating and using prior knowledge to interpret text (generating hypotheses about text, predicting text content).
- Relating text content to prior knowledge, especially as part of constructing interpretations of text.
- Reconsidering and/or revising hypotheses about the meaning of text based on text content.
- Reconsidering and/or revising prior knowledge based on text content.
- Attempting to infer information not explicitly stated in text when the information is critical to comprehension of the text.
- Attempting to determine the meaning of words not understood or recognized, especially when a word seems critical to meaning construction.
- Using strategies to remember text (underlining, repetition, making notes, visualizing, summarizing, paraphrasing, self-questioning, etc.).
- Changing reading strategies when comprehension is perceived not to be proceeding smoothly.
- Evaluating the qualities of text, with these evaluations in part affecting whether text has impact on reader's knowledge, attitudes, behavior, and so on.
- Reflecting on and processing text additionally after a part of text has been read or after a reading is completed (reviewing, questioning, summarizing, attempting to interpret, evaluating, considering alternative interpretations and possibly deciding between them, considering how to process the text). Additionally if there is a feeling it has not been understood as much as it needs to be understood, accepting one's understanding of the text, rejecting one's understanding of a text.
- Carrying on responsive conversation with the author.
- Anticipating or planning for the use of knowledge gained from the reading.

Note. From *Verbal Protocols of Reading: The Nature of Constructively Responsive Reading* (p. 105), by M. Pressley and P. Afflerbach, 1995, Hillsdale, NJ: Erlbaum. Copyright 1995 by Lawrence Erlbaum Associates. Reprinted with permission.

(*Appendixes continue*)

Appendix B

Metacognitive Awareness of Reading Strategies Inventory (Version 1.0)

Directions: Listed below are statements about what people do when they read *academic or school-related materials* such as textbooks or library books. Five numbers follow each statement (1, 2, 3, 4, 5), and each number means the following:

- **1** means "I **never or almost never** do this."
- **2** means "I do this **only occasionally**."
- **3** means "I **sometimes** do this" (about **50%** of the time).
- **4** means "I **usually** do this."
- **5** means "I **always or almost always** do this."

After reading each statement, **circle the number** (1, 2, 3, 4, or 5) that applies to you using the scale provided. Please note that there are **no right or wrong answers** to the statements in this inventory.

Type	Strategy	Scale				
GLOB	1. I have a purpose in mind when I read.	1	2	3	4	5
SUP	2. I take notes while reading to help me understand what I read.	1	2	3	4	5
GLOB	3. I think about what I know to help me understand what I read.	1	2	3	4	5
GLOB	4. I preview the text to see what it's about before reading it.	1	2	3	4	5
SUP	5. When text becomes difficult, I read aloud to help me understand what I read.	1	2	3	4	5
SUP	6. I summarize what I read to reflect on important information in the text.	1	2	3	4	5
GLOB	7. I think about whether the content of the text fits my reading purpose.	1	2	3	4	5
PROB	8. I read slowly but carefully to be sure I understand what I'm reading.	1	2	3	4	5
SUP	9. I discuss what I read with others to check my understanding.	1	2	3	4	5
GLOB	10. I skim the text first by noting characteristics like length and organization.	1	2	3	4	5
PROB	11. I try to get back on track when I lose concentration.	1	2	3	4	5
SUP	12. I underline or circle information in the text to help me remember it.	1	2	3	4	5
PROB	13. I adjust my reading speed according to what I'm reading.	1	2	3	4	5
GLOB	14. I decide what to read closely and what to ignore.	1	2	3	4	5
SUP	15. I use reference materials such as dictionaries to help me understand what I read.	1	2	3	4	5
PROB	16. When text becomes difficult, I pay closer attention to what I'm reading.	1	2	3	4	5
GLOB	17. I use tables, figures, and pictures in text to increase my understanding.	1	2	3	4	5
PROB	18. I stop from time to time and think about what I'm reading.	1	2	3	4	5
GLOB	19. I use context clues to help me better understand what I'm reading.	1	2	3	4	5
SUP	20. I paraphrase (restate ideas in my own words) to better understand what I read.	1	2	3	4	5
PROB	21. I try to picture or visualize information to help remember what I read.	1	2	3	4	5
GLOB	22. I use typographical aids like boldface and italics to identify key information.	1	2	3	4	5
GLOB	23. I critically analyze and evaluate the information presented in the text.	1	2	3	4	5
SUP	24. I go back and forth in the text to find relationships among ideas in it.	1	2	3	4	5
GLOB	25. I check my understanding when I come across conflicting information.	1	2	3	4	5
GLOB	26. I try to guess what the material is about when I read.	1	2	3	4	5
PROB	27. When text becomes difficult, I reread to increase my understanding.	1	2	3	4	5
SUP	28. I ask myself questions I like to have answered in the text.	1	2	3	4	5
GLOB	29. I check to see if my guesses about the text are right or wrong.	1	2	3	4	5
PROB	30. I try to guess the meaning of unknown words or phrases.	1	2	3	4	5

Scoring Rubric

Student name: _____ Age: ____ Date: _____
Grade in school: □ 6th □ 7th □ 8th □ 9th □ 10th □ 11th □ 12th □ College □ Other

1. Write your response to each statement (i.e., 1, 2, 3, 4, or 5) in each of the blanks.
2. Add up the scores under each column. Place the result on the line under each column.
3. Divide the subscale score by the number of statements in each column to get the average for each subscale.
4. Calculate the average for the whole inventory by adding up the subscale scores and dividing by 30.
5. Compare your results to those shown below.
6. Discuss your results with your teacher or tutor.

Global Reading Strategies (GLOB subscale)	Problem-Solving Strategies (PROB subscale)	Support Reading Strategies (SUP subscale)	Overall Reading Strategies
1. _____	8. _____	2. _____	GLOB _____
3. _____	11. _____	5. _____	PROB _____
4. _____	13. _____	6. _____	SUP _____
7. _____	16. _____	9. _____	
10. _____	18. _____	12. _____	
14. _____	21. _____	15. _____	
17. _____	27. _____	20. _____	
19. _____	30. _____	24. _____	
22. _____		28. _____	
23. _____			
25. _____			
26. _____			
29. _____			
____ GLOB score	____ PROB score	____ SUP score	____ Overall score
____ GLOB mean	____ PROB mean	____ SUP mean	____ Overall mean

Key to averages: 3.5 or higher = high 2.5–3.4 = medium 2.4 or lower = low

Interpreting your scores: The overall average indicates how often you use reading strategies when reading academic materials. The average for each subscale of the inventory shows which group of strategies (i.e., global, problem solving, and support strategies) you use most when reading. With this information, you can tell if you score very high or very low in any of these strategy groups. Note, however, that the best possible use of these strategies depends on your reading ability in English, the type of material read, and your purpose for reading it. A low score on any of the subscales or parts of the inventory indicates that there may be some strategies in these parts that you might want to learn about and consider using when reading.

Appendix C

Categories of Reading Strategies Measured by the Metacognitive Awareness of Reading Strategies Inventory

Global Reading Strategies

Examples include setting purpose for reading, activating prior knowledge, checking whether text content fits purpose, predicting what text is about, confirming predictions, previewing text for content, skimming to note text characteristics, making decisions in relation to what to read closely, using context clues, using text structure, and using other textual features to enhance reading comprehension. (Items 1, 3, 4, 7, 10, 14, 17, 19, 22, 23, 25, 26, 29)

Problem-Solving Strategies

Examples include reading slowly and carefully, adjusting reading rate, paying close attention to reading, pausing to reflect on reading, rereading, visualizing information read, reading text out loud, and guessing meaning of unknown words. (Items 8, 11, 13, 16, 18, 21, 27, 30)

Support Reading Strategies

Examples include taking notes while reading, paraphrasing text information, revisiting previously read information, asking self questions, using reference materials as aids, underlining text information, discussing reading with others, and writing summaries of reading. (Items 2, 5, 6, 9, 12, 15, 20, 24, 28)

Received December 6, 2000
Revision received November 8, 2001
Accepted November 11, 2001 ■