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Metacognition, Cognitive Strategy Instruction, and Reading in Adult Literacy

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INTRODUCTION

Every time people think about what they said (e.g., Was I tactful?), check something they did (e.g., Did I get the correct change?), or decide whether they have finished a task (e.g., Is this note to my daughter clear enough?), they are engaging in metacognition, or thinking about thinking. Metacognition is very important for reading comprehension. This chapter focuses on understanding the role of metacognition in reading, sources of metacognition problems, and ways to remedy these problems—all of which can be powerful tools for improving adults' reading comprehension.

The ability to monitor thinking (metacognitive monitoring, or comprehension monitoring) and to modify one's thoughts and thinking strategies (metacognitive control) develops gradually and unevenly in different

areas (e.g., social, academic) through childhood and across the lifespan (Schraw, 1998). That is, children do not naturally "check their work" and sometimes do not know how to do it until they are taught (e.g., checking the answer to a subtraction problem by adding). Teachers often see adult literacy students engaging in monitoring in their daily lives (e.g., Is this the right bus to take?), but also see students failing to check their understanding of what they read (e.g., reading a word incorrectly and not noticing that the sentence does not make sense). Adult literacy students' metacognitive abilities from daily life may not easily transfer to their reading or other academic learning in classes.

The lack of transfer from learning in one area, or domain, to other areas may have several causes (Detterman & Sternberg, 1993). These include having less background knowledge about the target domain (Singley, 1995), having fewer domain-specific problem-solving strategies (Goldman, Petrosino, & the Cognition and Technology Group at Vanderbilt, 1999), or not knowing what to notice about the target domain (Bransford, Brown, & Cocking, 1999).

Metacognitive monitoring and control both play an important role in reading comprehension—the goal of reading—and there are promising techniques for improving students' metacognition when they read. This chapter reviews what we know about the ability to monitor one's own thinking during reading (metacognitive monitoring) and strategies that can be taught to help readers monitor, and thereby comprehend, better. I offer potential causes of low monitoring, including poor decoding, limited background knowledge, low vocabulary, dysfunctional beliefs about reading, low strategy use, working memory issues, and motivational barriers. I then review the research on the kinds of metacognitive monitoring readers do (or do not do) when reading, and how this can be measured. I close by summarizing research on teaching reading comprehension strategies to increase metacognitive monitoring.

As is often the case in adult literacy, there is a limited research base on metacognition with adult literacy students themselves. However, the few studies that have been conducted are highly consistent with findings from both younger readers, adult low-literate readers who are not in the adult literacy system, and other adults. We need a much larger research base on adult literacy students' reading, and metacognition and comprehension strategy instruction are prime areas for more research. Until there is a larger research base, we can and should cautiously apply findings from these other populations to adult literacy students, because the research base with K–12 students is so sound and so promising.

METACOGNITIVE MONITORING DURING READING

People with good reading comprehension tend to monitor their reading, often without being aware of it. If you have ever read a paragraph and realized that you were not paying attention or did not understand something, you were engaging in metacognitive monitoring. This kind of monitoring goes on continuously, not just when readers are aware of it. Monitoring is also related to other aspects of reading besides simply monitoring the level of understanding. When the goal is to read a newspaper article for work and the reader realizes it is relevant to something at home, he or she is engaging in monitoring. When a reader predicts who the villain is in a mystery and then realizes the prediction was wrong, she or he is engaging in monitoring. People with poor reading comprehension, on the other hand, tend to show less evidence of monitoring: They more often fail to notice when they do not understand, and they use fewer strategies, such as re-reading, summarizing, and generating questions and predictions, that are associated with monitoring.

Why Skilled Readers Do More Metacognitive Monitoring

There could be several reasons why highly skilled readers do more monitoring. First, they might have more attention available for monitoring because they recognize words automatically; that is, monitoring interacts with word recognition (LaBerge & Samuels, 1974). Second, they might notice when something does not make sense because they already know a lot about the topic (Recht & Leslie, 1988) or have a large vocabulary (Stanovich, 1988). In these instances, monitoring interacts with background knowledge or vocabulary knowledge. Third, they might have been taught to pay attention to meaning (Norman & Malicky, 1987) or to use reading comprehension strategies (e.g., generating questions) that reveal when something does not make sense (Hansen & Pearson, 1983). In this case, monitoring interacts with cognitive strategy use.

Some readers have difficulty monitoring for a number of possible reasons. There is some evidence that people can have reading comprehension strategies but not use them. These people fail to see the value of reading the assigned text or are simply not interested in the text or topic (Pintrich & Schrauben, 1992). Second, low levels of monitoring

could be related to limited working-memory capacity (Siegler, 1998), problems teachers occasionally see in students with brain injuries or substance abuse. However, memory capacity also interacts with background knowledge.

The role of background knowledge merits more discussion. Background knowledge could affect monitoring in several ways because:

1. Simply knowing more about a topic makes reading easier; there is less new information to process (Recht & Leslie, 1988).
2. This background knowledge can be used to draw logical conclusions from the text to make inferences (Neuman, 1990).
3. Knowing about the topic helps readers know what to notice (Bransford, Brown, & Cocking, 1999). For example, unless you know a lot about statistics, you might not know what confuses you in the following passage and may simply feel lost: The Quartimax criterion is indifferent to where the high values are located within the P matrix—many of them could be on a single factor, for example. The Varimax modification awards a bonus to solutions in which the variance is spread out more evenly across the factors in P, so Varimax tends to avoid solutions containing a general factor. (Loehlin, 1998, p. 173)

Therefore, it is possible that adult literacy students could monitor better if they had enough background knowledge to allow them to make inferences and knew what to pay attention to in the text. Low-comprehending students monitor when they read texts that are easy for them but fail to use the same strategies when they read texts they find difficult. For example, Kletzien (1991) compared monitoring and other strategy use by good and poor 10th to 11th grade comprehenders as they read social studies texts of varying difficulty. Differences in monitoring between good and poor readers on independent or instructional level texts were not significant. On frustration-level texts (those in which more than 10% of the words were not recognized immediately), poor readers used significantly less prior knowledge than did good readers, perhaps because they had less prior knowledge to activate. This supports the first two explanations of monitoring: Monitoring interacts with word reading and background knowledge. This implies that simply telling students that reading is about meaning, without also making their word reading more automatic, building background knowledge and vocabulary, and teaching other comprehension strategies, may not be very helpful.

MEASURING METACOGNITIVE MONITORING

Researchers have used many different approaches to measure metacognitive monitoring during reading. These include (a) asking readers to "think out loud" while reading, (b) asking people to answer reading comprehension questions and then rate their confidence in their answer (calibration), (c) inserting mistakes into a text and asking readers to detect these errors, (d) measuring the amount of time it takes people to read sentences with and without mistakes (sentences with errors require extra monitoring and often rereading, so readers should therefore take longer to read those sentences), and (d) giving readers questionnaires or conducting interviews. These approaches are discussed next.

Think-Aloud Studies

One way to measure metacognitive monitoring is to ask people to "think out loud" while reading. Typically, readers verbalize many different cognitive strategies (e.g., paraphrasing or summarizing what was just read) and metacognitive strategies (e.g., stating that they did not understand what they just read). Students with higher reading comprehension in 4th and 5th (Meyers, Lytle, Palladino, Devenpeck, & Green, 1990), 9th (Christopherson, Schultz, & Waern, 1981; Rogers, 1991; Smith, 1991), and 10th (Olshavsky, 1976–1977) grades, as well as electronics technicians (Mikulecky & Ehlinger, 1986), college students (Steinberg, Bohning, & Chowning, 1991), medical students (De Grave, Boshuizen, & Schmidt, 1996), and lawyers (Lundeberg, 1987) have been shown to use more metacognitive monitoring on difficult texts than less-skilled readers.

For example, Mikulecky and Ehlinger (1986) observed, interviewed, and tested electronics technicians as they read and wrote in the course of their jobs. Observers noted, for example, whether the technicians skimmed a text, searched using an index, or read the text from start to finish, and whether they asked questions, verbally rehearsed information (repeated it out loud), or related information from two texts. In follow-up interviews, technicians were asked to explain what they did to be more efficient at job literacy tasks. They were also asked to read, explain, and summarize job-related materials using a short job-related passage. High-performing electronics technicians had significantly better metacognitive monitoring, including focusing on and summarizing key ideas, than did low-performing technicians.

Lundeberg (1987) asked lawyers and nonlawyers (all with master's degrees) to think out loud while reading legal cases. The lawyers noticed whether they already were familiar with the case, the judge, when the case was decided, and the judge's decision, indicating that they were monitoring what they read. Nonlawyers, all excellent readers, did not engage in any of this monitoring for familiarity (because everything was unfamiliar), and blamed themselves for not understanding (e.g., "I feel like an idiot"; Lundeberg, 1987, p. 416). In other words, metacognitive monitoring is not an all-or-nothing skill for a reader; it also depends on the text, including factors such as familiarity with the content, vocabulary, and type of writing (e.g., specialized writing used for legal briefs). These types of "think-aloud" studies have not been done with adult literacy students. One weakness of think-aloud studies is that readers may not verbalize everything they are thinking. Readers may have strategies but not be able to use them on the particular text they are asked to read, so they appear not to have the strategy. Finally, the kind of statistics (non-parametric statistics) that can be used with think-aloud studies does not allow generalization to other populations.

Calibration of Comprehension

A second way to measure metacognitive monitoring is to ask people to answer reading comprehension questions and then rate their confidence in their answers. A reader who gives a wrong answer but strongly believes that answer is correct has poor calibration; that is, her or his monitoring is inaccurate. Maki (1998) has done many studies on calibration with college students and has found that more-skilled readers have better calibration (see also Commander & Stanwyck, 1997). One problem with calibration studies is that some people are overconfident or underconfident in general, and this may obscure what the confidence ratings tell us about their monitoring in reading specifically.

Error Detection

A third way to measure monitoring is to insert mistakes into a text—either contradictory statements or statements that are untrue—and ask readers to find them. Again, studies have found that students with higher reading comprehension and/or older students are better able to monitor and find inconsistencies in texts than are poorer and/or younger readers. These studies have found consistent results for children in 2nd (Markman, 1979; Markman & Gorin, 1981), 3rd (Vosniadou, Pearson, & Rogers, 1988), 4th

(Markman & Gorin, 1981), 5th (Vosniadou et al., 1988), 6th (Markman, 1979), and 12th (Otero, 1998) grades and college students (Baker, 1989; Schommer & Surber, 1986).

Markman (1979) tested children in 3rd and 6th grades on expository text that contained inconsistencies (e.g., "[Ants] cannot see this chemical, but it has a special odor. . . . Ants do not have a nose," p. 646). Sixth-grade students who were forewarned about the inconsistencies were significantly more likely to monitor their comprehension than those who were not forewarned. Baker (1989) found that college students who were better comprehenders were more likely to find inconsistencies in passages from college textbooks than were low comprehenders. In an unpublished study, Forlizzi (1992) found similar differences among adult literacy students.

Overall, students are better able to find inconsistencies when they already know something about the topic. However, when very familiar and therefore easy-to-understand content is used, readers' failure to monitor seems to result from failing to *remember* what was just read (Vosniadou et al., 1988). One criticism of error detection tasks is that they are not like real reading because we do not often read texts with author errors.

Reading Times

A fourth way to measure monitoring is to put mistakes in text and see how often people reread the sentences that include contradictory information. In these studies, reading is usually done on a computer, one sentence at a time, so that the amount of time spent reading and rereading each sentence can be measured. Zabrucky and colleagues (e.g., Zabrucky & Moore, 1999) conducted a series of such studies, typically with younger (college-age), middle-aged (35–45), and older (60 and older) adults. Readers of all ages spend more time on sentences that include contradictory information, indicating that they are noticing the errors, which is evidence of monitoring. Baker and Anderson (1982) also found similar results with college students. This type of study has not been done with adult literacy students. Like error detection studies, reading time studies use text that is unlike real reading, as readers have to push buttons on the computer to see the text and may only look at one sentence at a time.

Questionnaires

A fifth way to measure metacognitive monitoring is questionnaires or interviews. Students with higher reading comprehension and/or older students

in 2nd (Myers & Paris, 1978), 3rd (Markman, 1979), and 6th (Myers & Paris, 1978) grades, as well as adult literacy students (Forlizzi, 1992; Gambrell & Heathington, 1981) report more knowledge of good metacognitive monitoring strategies than do students with lower reading comprehension and/or younger students. For example, Myers and Paris (1978) found that younger students knew little about strategies such as summarizing, memorizing, rereading, skimming, and text structure (e.g., topic sentence), when compared to 6th grade students. Gambrell and Heathington (1981) found virtually the same limited knowledge of reading strategies among adult basic education (ABE) students, compared to college juniors.

In addition, both adult literacy students (Fagan, 1988; Gambrell & Heathington, 1981; Keefe & Meyer, 1980, 1988; Poissant, 1994) and low-comprehending students in 2nd and 6th grades (Myers & Paris, 1978) report that the purpose of reading is "to say the words right." That is, lack of monitoring could partly result from ideas about what reading is (decoding vs. understanding the meaning). However, it is unlikely that this is the entire cause; lack of background knowledge, not knowing vocabulary words, never having been taught comprehension strategies, and not knowing when or how to apply those strategies are also likely contributors to a lack of monitoring.

Some problems with questionnaire and interview studies are that (a) people may give the answer they believe the interviewer wants to hear (social desirability bias), (b) people have to remember what they "usually" do when reading (retrospective or recall bias), (c) there are processes into which people do not have very good insights, and (d) a questionnaire limits the range of possible answers.

Metacognitive Control: Fix-Up Strategies

The main goal of metacognitive monitoring is to detect a lack of understanding so that it can be corrected. Once readers realize they do not understand what they read, they use a wide range of what researchers have called "fix-up" strategies to try to remedy their lack of comprehension. These corrective strategies include rereading, asking for help from others, using reference material such as a dictionary, reading an additional text, making logical inferences within the text or from background knowledge, making a diagram, or reading ahead to try to make sense of the text (Pressley & Afflerbach, 1995).

In addition to monitoring and fix-up strategies, think-aloud studies have shown that good comprehenders use a wide range of other reading com-

prehension strategies while they read, even if they have no trouble understanding. In fact, more than 150 different strategies have been identified at one time or another (Rosenshine & Meister, 1994). The most frequently used strategies include generating and asking questions about the text (e.g., Hansen & Pearson, 1983), activating prior knowledge (e.g., Fehrenbach, 1991), searching for specific information (e.g., Lundeberg, 1987), summarizing or paraphrasing while reading (e.g., Pritchard, 1990), and making predictions (e.g., Olshavsky, 1976–1977). Questionnaire studies have also shown that high comprehenders are more aware of reading comprehension strategies than are low comprehenders. For example, Kozminsky and Kozminsky (2001) found that high-performing 9th-grade students knew the most about reading comprehension strategies, whereas middle- and low-performing students knew the least.

Many of these monitoring, fix-up, and other reading comprehension strategies have been taught to younger children or low comprehenders, and have improved their monitoring and comprehension. These kinds of programs are called Cognitive Strategy Instruction (CSI).

COGNITIVE STRATEGY INSTRUCTION

In 2000, the National Reading Panel (NRP)[1] reviewed 204 CSI studies with children in grades K–12 and concluded that there was enough evidence to recommend six strategies: question generation, comprehension monitoring, summarizing, question answering, graphic organizers (diagrams, concept maps), and multiple strategy approaches (NRP, 2000; also see Block & Pressley, 2001; Pressley, 2000; Wood, Woloshyn, & Willoughby, 1995; see Fig. 7.1). Some popular study strategies, such as prediction and PQ4R (Preview, Question, Read, Reflect, Recite, Review), are notably absent from this list. The NRP concluded that programs teaching multiple strategies seem to have more promise than those that teach only one strategy, strategies should be taught in an integrated way with class content, and both teacher modeling and student independent practice seem

[1]A committee of reading researchers commissioned by the U.S. Department of Education to review quantitative, experimental, published, peer-reviewed research about reading interventions in K–12 students, including basic reading, vocabulary, reading comprehension, the use of computers in reading instruction, and teacher professional development in reading instruction.

1. Question generation: Students learn to make up their own main-idea questions about what they read, such as "Why do fish have gills?"
2. Comprehension monitoring: Students are taught to notice whether they understood what they read, usually by asking themselves questions such as "Could I explain to a classmate what I just read?"
3. Summarizing: Students learn how to summarize what they just read in a few sentences, deleting unnecessary detail and condensing important information.
4. Question answering: Students are taught about different types of questions (e.g., literal questions, application questions) and how to answer them (e.g., think of synonyms for words in the question, then look for those synonyms in the text).
5. Graphic organizers, such as diagrams or concept maps (bubble diagrams): Students either get a diagram from the teacher or make one themselves. They learn how to use the diagram to better understand what they read.
6. Multiple strategy approaches: Students learn more than one strategy, such as summarizing and graphic organizers.

FIG. 7.1. Six NRP-recommended comprehension strategies.

to be important ingredients in improving monitoring and comprehension (also see Rosenshine & Meister, 1997).

Single Strategies

Much strategy instruction research has considered a single strategy. For example, Armbruster, Anderson, and Ostertag (1987) compared 5th-grade students who were specifically taught how to summarize social studies text (treatment students) to students who received conventional question/discussion instruction (control students). Treatment students scored significantly better than control students on a short essay post-test and on written recalls, and the treatment was more beneficial for high-comprehending students than for low-comprehending ones.

Strategy instruction research has rarely been done with low-literate adults. Meyer, Talbot, Poon, and Johnson (2001) studied retired, low-literate African American adults with low reading comprehension who volunteered for a reading comprehension class. The adults were taught how to use text structure (e.g., compare-and-contrast, cause-and-effect) to better understand and remember what they read. Participants with low reading skills but normal memory significantly improved their comprehension.

Multiple Strategies

In addition to single-strategy programs, many researchers have tried teaching several strategies together. One well-known multiple-strategy program is Reciprocal Teaching (Palincsar & Brown, 1984). Middle-school students worked in small groups, first with teacher support and later without a teacher. They learned to ask and answer questions, summarize, make predictions about the text, and clarify anything they did not understand. In the beginning, the teacher modeled how to use each strategy and coached (scaffolded) students as they learned to use it. Eventually, students were able to use the strategies on their own, and they rotated being "the teacher" for their small group. In general, students exposed to Reciprocal Teaching became much better at questioning, summarizing, predicting, and clarifying, but did not show impressive gains on standardized reading tests (Rosenshine & Meister, 1994). Alfassi (1998) found similar results with 9th-grade students.

Another multiple-strategy program is Concept-Oriented Reading Instruction (CORI), which combines cognitive strategies with motivating activities and teacher support for 3rd to 5th grade students (Guthrie, VanMeter, Hancock, Alao, Anderson, & McCann, 1998). In CORI, reading engagement is nurtured by a combination of real-world interactions (e.g., hands-on science activities), student choices, direct instruction in reading strategies using trade books, peer collaboration, and student self-expression (e.g., class projects and presentations) delivered in a coherent manner around a unifying science theme. CORI students have shown improvement on both standardized and researcher-designed reading comprehension tests (Guthrie, Anderson, Alao, & Rinehart, 1999; Guthrie et al., 1996).

Butler (1998) has developed a multiple-strategy intervention called the Strategic Content Learning (SCL) approach. She has worked with low-performing college students to set goals for their learning; use, monitor, and adjust various strategies; and evaluate their performance. Students show impressive gains in metacognitive monitoring, strategy use, and motivation; reading comprehension was not measured.

Guidelines for Cognitive Strategy Instruction

Strategy instruction can have a big impact on student learning, but it also takes a long time to teach it and ensure that students have enough practice. A suggested sequence for effectively teaching strategies, in practice or research programs, based on the large body of K–12 research over the last

20 years, is presented below. Detailed discussions with numerous examples are found in Rosenshine and Meister (1997). Note that CSI is a much more interactive and involved process than previous approaches to teaching reading comprehension, such as "main idea" workbooks.

1. *Explain why using the strategy will improve learning.* Students need to know not only how to use the strategy, but also *why* it will be useful because they will put a lot of effort into learning it.

2. *Demonstrate how and when to use the strategy.* Teachers usually do this by "thinking out loud" while using the strategy. For example, while searching in an index, the teacher might say, "Now, I'm looking for Antietam, An . . . Hmm, I don't see it. Maybe it's under Battle of Antietam . . . Yes, there it is, Battle of . . . So, you see when I can't find something in the index I think of another way it could be listed in there." This can be hard for teachers to do because they have learned these strategies so well that they are automatic.

Some strategies are useful only in certain circumstances. For example, a summary is usually good for a research paper but not a detailed telephone message. Teachers need to explain *when* to use the strategy, as well as how to do it.

3. *Have students practice using the strategy.* Simply explaining how to generate questions does not mean students will learn how to do it. They need to actively practice, ideally using real texts for their classes.

4. *Support students while they learn the strategy.* Students need support, or scaffolding, while learning to use strategies. Scaffolding may include hints, questions, reminders, explanations, or other supports. Ideally, scaffolding should be as open-ended as possible, yet give students the support they need. For example, students learning a search strategy and using the phone book to find a pediatrician near their house may have trouble because pediatricians are listed under "Physicians—Pediatrics" instead of under "Doctors," where they expected to find it. Depending on the students' skills, the teacher might scaffold their learning by (a) asking students how they might figure out where the listings could be (use the index), (b) suggesting that students use the index in the back of the phone book, (c) opening to the index and asking students to think of another word for "Pediatrician," (d) telling students to look under "Doctor" in the index, (e) talking students through the entire process, from thinking of synonyms, to looking up the synonym in the index, then turning to the "Physicians—Pediatrics" section of the phone book. All of these approaches *scaffold* or support student learning.

5. *Let students explain what they understood from their reading.* This gives the teacher the opportunity to see how well students comprehend, and it shows students how the strategy was valuable to learn because it helped them understand better.

6. *Give students feedback on their answers.* Feedback is important information that can help students know whether they understand how to use the strategy effectively. Feedback should be very specific (e.g., "I like how you used the index to do your search") rather than just "Good answer." For summarizing, feedback might be, "I like how your summary was short, but it told me all of the important ideas," rather than "That's a nice summary." For question generation, feedback might include, "I like how your question asked about this important concept of how whales breathe. It wasn't just one picky detail, like 'How big is a killer whale?' " Feedback also needs to be tailored (e.g., private vs. public feedback) for adults and for the cultural context of the classroom.

7. *Debrief with students about how useful the strategy was to them.* This can help students make the connection between using the strategy and better comprehension.

CONCLUSION

Readers of all ages who do little metacognitive monitoring when faced with a particular text will have trouble understanding that text. Low levels of metacognitive monitoring can be caused by slow decoding skills, low background knowledge and/or vocabulary, low knowledge of comprehension strategies, having the strategies but not knowing how or when to use them, or a combination of these (Pressley, 2000).

Implications for Practice

Practitioners who want to help adult literacy students become more metacognitive when reading need to know what strategies are effective; proven methods for teaching strategies; and that instruction in fluency, background knowledge, and vocabulary may also be needed to improve comprehension. Teachers also need more research specifically with adult literacy students, to make sure that what works with K–12 students also works with adult literacy students. Teachers need training, planning time, and perhaps more instructional materials (e.g., to teach prediction, teachers need books that allow for prediction, for example, stories with characters who

act consistently, not history textbooks). Strategy instruction takes a lot of time and practice by students to be successful, but it is the only method of specifically teaching reading comprehension that has strong evidence to support it.

Implications for Research

Researchers in adult literacy face much uncharted territory when it comes to metacognitive monitoring, especially regarding strategy instruction. Researchers should be familiar with the K–12 research base in these areas, as well as with the adult literacy research base (see the annotated bibliography that follows). Strategy instruction holds much potential for improving the reading comprehension of adult literacy students, but that potential is largely untapped; this area is ripe for investigation. Beyond the basic questions of whether the K–12 strategies are effective with adults, we do not know which adults, and at which stages of literacy development, will benefit most from strategy instruction. We need to know how much training and mentoring practitioners need, and how much strategy instruction adults need to improve their comprehension. We also need to identify combinations of strategy instruction and other reading instruction (e.g., building background knowledge and teaching summarizing) that are optimal for adults at various stages of learning. Researchers should also be aware of the methodological pitfalls in strategy research (see Lysynchuk, Pressley, d'Ailly, Smith, & Cake, 1989) so that they can conduct research that meets the highest standards.

Implications for Policy

Policymakers need to address both the practitioner training and research aspects of metacognition and strategy instruction. Funding is needed to provide practitioners with training in what metacognitive monitoring is, and how to do strategy instruction, from knowledgeable and experienced professionals. This training should be based on the K–12 research base until more research is conducted specifically with adult literacy students. Funding is also needed for release time for practitioners so they can attend training and plan new lessons. Policymakers also need to fund high-quality research in metacognition and strategy instruction for adult literacy students, so that adult literacy efforts have the most impact in helping students reach their goal of fuller participation in a literate society.

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Resources on Metacognition, Cognitive Strategy Instruction, and Reading in Adult Literacy

Jennifer G. Cromley

These are recent research-based publications about metacognition and cognitive strategy instruction in reading, with a focus on adults. Empirical, quantitative research studies and reviews of such studies were selected because these are most generalizable to adult literacy students as a whole. As there is so little published research on adult literacy students, this bibliography also includes studies on other adult populations that are not in the adult literacy system but share certain characteristics with adult literacy students, such as older adults, low-literate adults who are not in adult literacy programs, and community college students who struggle with reading. Most of the citations are from the last 10 years; references to earlier work can be found in the bibliographies of these sources. This bibliography is arranged in two main sections, Metacognition and Strategy Instruction, to

parallel chapter 7. Within each section, references are arranged by type of publication (books and book chapters, journal articles, and other documents) and listed chronologically. As many of the studies use technical terminology, a short glossary is provided at the end of this bibliography.

METACOGNITION

The sources listed here reviewed the research with children, suggested implications for teaching adults, and in a few cases studied adult literacy students or other adults.

Books and Book Chapters

Hertzog, C., & Hultsch, D. F. (2000). Metacognition in adulthood and old age. In F. I. M. Craik & T. A. Salthouse (Eds.), *The handbook of aging and cognition* (pp. 417–466). Mahwah, NJ: Lawrence Erlbaum Associates.

Focus: Whether metacognition declines with age.

Audience: Researchers.

Level of background knowledge required: High.

This is a detailed review of metacognition from psychology and education, and whether metacognition might be a cause of declining memory and problem solving in old age. In general, metacognition does not decrease in old age, although speed of accessing information from memory declines.

Sabatini, J. (1999). Adult reading acquisition. In D. A. Wagner, R. L. Venezky, & B. V. Street (Eds.), *Literacy: An international handbook* (pp. 49–53). Boulder, CO: Westview Press.

Focus: Decoding problems as a source of low reading comprehension.

Audience: Researchers and teachers.

Level of background knowledge required: High.

This chapter reports on decoding, word reading, and passage reading tests done on 101 adults with low- through college-level reading skills. Adults show the same patterns as children—low phonemic awareness relates to low decoding and low reading comprehension. Adults who have trouble decoding words also know fewer sight words (decoding allows people to learn them by sight). Decoding is

one source of reading comprehension difficulty, among such others as vocabulary and background knowledge. See also the special 2002 issue of *Scientific Studies of Reading, 6*(3) on reading development in adults.

Hacker, D. J., Dunlosky, J., & Graesser, A. C. (1998). (Eds.), *Metacognition in educational theory and practice.* Mahwah, NJ: Lawrence Erlbaum Associates.

Focus: Metacognition in many aspects of learning.

Audience: Researchers and teachers.

Level of background knowledge required: High.

Fourteen chapters review many aspects of metacognition in education, including reading, writing, problem solving, and studying. This book combines what is known about metacognition from both psychology and education. Chapter 8 focuses on reading and the interaction between metacognitive strategies and cognitive strategies in reading.

Schraw, G. (1998). On the development of adult metacognition. In M. C. Smith & T. Pourchot (Eds.), *Adult learning and development: Perspectives from educational psychology* (pp. 89–106). Mahwah, NJ: Lawrence Erlbaum Associates.

Focus: Extending research with children to adult metacognition.

Audience: Researchers.

Level of background knowledge required: High.

This chapter reviews the research on children's metacognition and suggests how it can be extended to adults generally. It discusses the relationship between knowledge of a subject (a domain) and metacognition in that domain. Reviews several examples of strategy instruction programs that have improved metacognition.

Garner, R. (1993). "Seductive details" and adults' learning from text. In S. R. Yussen & M. C. Smith (Eds.), *Reading across the lifespan* (pp. 215–222). New York: Springer-Verlag.

Focus: How interesting but unimportant details affect reading comprehension.

Audience: Researchers.

Level of background knowledge required: High.

Children can have trouble remembering important ideas when a text contains interesting but unimportant details (called "seductive details"). A high level of metacognitive monitoring is required to separate out and remember important information. Are adults also affected by seductive details? Garner and colleagues found that the almost 300 undergraduates who participated in a series of studies in which they read texts and later recalled as much as they could remembered what interested them, not what was important, in the texts. She points out that the less students know, the harder it is for them to know what is important rather than interesting (that is, without background knowledge, it is difficult to be metacognitive). However, if text is both interesting and informative, the problems are avoidable. This has implications for the reading materials chosen for students in adult education; if they contain interesting details, these details need to be relevant to the ideas in the text.

Journal Articles

Campbell, P., & Malicky, G. (2002). The reading strategies of adult basic education students. *Adult Basic Education, 12*(1), 3–19.

Focus: Strategies adult literacy students use to recall text.

Audience: Researchers and teachers.

Level of background knowledge required: High.

This study asked 36 to 40 adults at each of nine reading levels to read out loud and recall what they read. Each student read two texts at an appropriate reading level, based on teacher recommendations and answers to comprehension questions. The research analyzed oral reading errors and recall strategies, using an interactive model of reading. Students used verbatim recall from text, summarizing, synthesis, inferences, personal experience, and erroneous information equally across reading levels. This finding is very similar to what has been found with children when they read text at an independent reading level (but not with more difficult texts). The authors suggest that because readers at all levels used the same reading strategies equally well, materials should change as students progress in their reading, and strategy instruction should be the same across all levels of reading. However, this contradicts the large body of research showing

that poor comprehenders lack strategies and that strategy instruction helps these students comprehend better.

Commander, N. E., & Stanwyck, D. J. (1997). Illusion of knowing in adult readers: Effects of reading skills and passage length. *Contemporary Educational Psychology, 22,* 39–52.

Focus: Relationship between level of comprehension and accuracy of monitoring comprehension.

Audience: Researchers.

Level of background knowledge required: High.

Children who are good readers are more accurate in their metacognitive monitoring, and poor readers are less accurate. But is this true for older readers? In this study, 60 low-skill, younger, and less-educated adults and 76 average-skill, older, and more-educated undergraduate- and graduate-level college readers (average age 30) were tested for their level of awareness of whether they understood a reading passage (accurate metacognitive monitoring). Among this group of college students, there was no relationship between the reading skill groups and their accuracy of monitoring. Many low-skill readers were good at monitoring, and many high-skill readers were poor at it. There were, however, differences across types of text. Students who read a shorter, less detailed passage were more likely to believe they understood than did students who read a longer, more detailed passage. Students who read the shorter passage also remembered less of the passage, which is consistent with much previous research. The authors suggest teaching college students to ask themselves whether they have understood what they read, using a method such as Palincsar and Brown's Reciprocal Teaching. These findings suggest that older adult literacy students may also have metacognitive monitoring problems when reading academic material, even if they can monitor well in other aspects of their lives.

Devolder, P. A., & Pressley, M. (1992). Causal attributions and strategy use in relation to memory performance in younger and older adults. *Applied Cognitive Psychology, 6,* 629–642.

Focus: Beliefs about memory/learning and use of strategies.

Audience: Researchers.

Level of background knowledge required: High.

Children who believe they have control over learning (that is, if they work harder and use good learning strategies, they will learn more), actually learn more and use better strategies than children who feel they have no control (that is, they feel "either you're born smart or you're not"). To see whether this is also true for adults, the researchers tested 48 older adults (average age 69) and 48 younger adults (average age 28). They found that people who believed in putting effort into remembering and using memory aids (for example, associating the name in a photograph to the background or to someone they knew), remembered better, whether they were young or old. Therefore, beliefs about memory affect the young and old alike. However, many of the older people thought it was "cheating" to use memory aids and to put effort into remembering. They thought that what memory really involved was "imprinting on the mind" or "absorbing material" (p. 639). Many older adults also believed they could not remember, so they did not try to remember. Tasks in the study included learning a list of words, learning the names of people in photographs, and remembering to make phone calls at scheduled times. The younger adults remembered words and names better than the older ones but did not perform better in remembering to make phone calls at scheduled times. (The older group did not perform this task better simply because they had more free time—all participants were occupied during the day and had the same amount of free time.) The younger group tried to "remember" when to make the calls, did not use any memory strategy, and failed to remember; the older group used notes to remember when to call and did remember. These results may be useful in comprehension strategy instruction with adult literacy students, although teachers may need to reassure students that these strategies are not "cheating."

Garner, R. (1990). When children and adults do not use learning strategies: Toward a theory of settings. *Review of Educational Research, 60*(4), 517–529.

Focus: Why adults may have reading strategies but do not use them.

Audience: Researchers.

Level of background knowledge required: High.

This article points out that people can have reading strategies but not use them (also see Pintrich & Schrauben, 1992). The authors argue

that five reasons for failing to use strategies are (a) poor metacognitive monitoring, (b) nonproductive problem-solving habits (e.g., copying verbatim to summarize a text), (c) low background knowledge, (d) believing that failure results from low ability, not low strategy use, and (e) lack of transfer of a skill from one subject or area to another. Garner notes that classroom environments can contribute to all of these problems by not teaching when strategies are useful (e.g., searching is not useful as the only strategy to study for a test), not clearly defining tasks (e.g., not specifying that composition is as important as mechanics in writing), by setting up individual competition (leading students to attribute failure to low ability), emphasizing test scores over understanding, and practicing skills using a narrow range of problems (e.g., practicing adding decimals, but not adding money).

Baker, L. (1989). Metacognition, comprehension monitoring, and the adult reader. *Educational Psychology Review, 1*(1), 3–38.

Focus: Metacognitive monitoring and strategy use research.

Audience: Researchers.

Level of background knowledge required: High.

This article reviews dozens of studies published from 1984 to 1989 on college students' awareness of their reading comprehension. In general, adults who read well had the characteristics of children who read well: They knew a lot about the subject and used many effective reading strategies, such as relating what they read to what they knew, rereading some parts of the text, and forming opinions about what they read. Adult college students who read poorly, like children who are poor readers, used few strategies (they either gave up or reread the entire text over and over again without understanding) and were less aware than good readers of their lack of understanding of what they read. Adults who were poor readers focused on details rather than main ideas and on their own, not the author's, ideas. They also blamed themselves when they had trouble understanding (instead of recognizing that what they were reading was hard to understand) and focused on words they did not understand (especially familiar words used in specialized ways, such as "regarding" meaning "in reference to" rather than "looking at"). The article points out that this research contradicts previous research that assumed all adults have

fully developed reading skills and that children are aiming for a level all adults have reached. Even college students are at many different reading levels. The article notes that many teaching methods that worked with adults in these studies had been proven on children first (teachers demonstrating problem solving by thinking out loud; group learning; questioning, summarizing, and predicting [Reciprocal Teaching]; and learning the usefulness of reading strategies). Many of the college students in the studies were remedial (usually called developmental) students, but some were not, and both groups benefited from these research-based teaching methods.

Mikulecky, L., & Ehlinger, J. (1986). The influence of metacognitive aspects of literacy on job performance of electronics technicians. *Journal of Reading Behavior, 18*(1), 41–62.

Focus: Testing the text structure strategy with low-literate adults.

Audience: Researchers.

Level of background knowledge required: High.

Twenty-nine electronics technicians took reading tests, answered verbal questions, and were observed reading on the job. The research subjects included supervisors, experienced technicians, and technicians-in-training from a naval base, two electronics plants, and a technical school. Participants tested at 12th–14th grade reading level. They spent about 1 hour 40 minutes per day reading reports, blueprints, and manuals and about 30 minutes filling out forms or writing notes. The best technicians were better able to find main ideas when they read and explained what they had read, and they tended to underline or highlight important points as they read. The authors suggest that simple "read and comprehend" skills are rarely used on the job; instead, adults need the more complex skills involved in applying what they read to their work tasks.

Other Documents

Venezky, R. (1999). A bibliography on metacognition and reading. Retrieved May 14, 2002, from http://www.udel.edu/ETL/SARA/Bib_metacog.html

Focus: Resources on metacognition and reading.

Audience: Researchers.

Level of background knowledge required: Medium.

This bibliography was compiled in the mid-1990s and contains references to more than 45 articles and other sources about metacognition and reading from childhood to adulthood.

Paris, S., & Parecki, A. (1993). *Metacognitive aspects of adult literacy.* Philadelphia: National Center on Adult Literacy. (ERIC Document Reproduction Service No. ED363734)

Focus: Research on children, with suggestions for teaching adults.

Audience: Researchers and teachers.

Level of background knowledge required: Medium.

Paris, a well-known researcher in children's metacognition, was asked by ERIC to summarize what was known about metacognition and reading, and to suggest possible implications for adult literacy. The authors emphasize the importance of what adults believe reading is: Learners who believe reading is about pronouncing will not use comprehension monitoring or strategies. They emphasize metacognition as focused on meaning—a focus that can be lacking in adult literacy programs. They point out that there are many gaps in the research, especially for adult literacy students. They add that metacognition is not a panacea or the most-needed skill for all adult literacy students. This work has an extensive bibliography of pre-1993 sources, including unpublished reports.

Forlizzi, L. (1992). *Exploring the comprehension skills and strategies of ABE students.* University Park: Pennsylvania State University, Institute for the Study of Adult Literacy. (ERIC Document Reproduction Service No. ED 352527)

Focus: Adults' beliefs about reading and ability to detect errors in text.

Audience: Researchers.

Level of background knowledge required: High.

In this study, 47 native English–speaking ABE students reading at the 5th to 9th grade level were interviewed about their ideas about reading. When asked what makes a good reader, 53% said practice makes someone a good reader, 34% said understanding, and 30% said motivation (more than one answer was allowed for all questions). When asked how they would be aware of whether they were reading well,

students either said they would know because they understood the reading (45%) or did not know how they could be aware of reading well (17%). In terms of what makes something hard to read, 62% said words they could not read, 40% said subjects they either did not know or were not of interest to them, and 32% said small print or disorganized text. Between 34% and 53% of students said they would reread a sentence that did not make sense. Sixty-six percent of students noticed a scrambled sentence when given a passage to read, but only 35% noticed a sentence that contradicted the rest of the passage but was grammatically correct (e.g., the text said that someone providing first aid should talk to the victim but later said they should not talk). Students who noticed these sentences would reread and/or think back to the rest of the passage, but only 31% tried to make sense of the contradiction, and the rest ignored it. This suggests that programs should help students become more aware of whether or not they understand, and that methods that work with children are likely to work with adults.

COGNITIVE STRATEGY INSTRUCTION

Although summarizing, question generation, and other cognitive strategy instructions repeatedly have been found effective with children, there have been very few studies with adults. The vast literature on strategy instruction with children may be applicable to adult learning.

Books and Book Chapters

Meyer, B. J. F., Talbot, A. P., Poon, L. W., & Johnson, M. M. (2001). Effects of structure strategy instruction on text recall in older African American adults. In J. L. Harris, A. G. Kamhi, & K. E. Pollock (Eds.), *Literacy in African American communities* (pp. 233–263). Mahwah, NJ: Lawrence Erlbaum Associates.

Focus: Testing the text structure strategy with low-literate adults.

Audience: Researchers.

Level of background knowledge required: High.

Meyer and colleagues taught 22 urban and rural retired African American adults to use the structure of reading passages to better

understand and remember what they read. Participants learned about compare and contrast, cause and effect, and other text structures, and practiced recognizing and using them to remember short passages. They received six classes of 1.5 hours each over three weeks. Participants with low reading skills but normal memory were better able to understand and remember what they read.

National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction.* Washington, DC: National Institute for Child Health and Human Development.

Focus: Peer-reviewed experimental research in K–12 reading.

Audience: Researchers.

Level of background knowledge required: High.

This massive literature review of the peer-reviewed, published experimental research in K–12 reading summarizes 204 cognitive strategy instruction studies. The panel concluded that there is sufficient evidence to recommend six strategies: question generation, comprehension monitoring, summarizing, question answering, graphic organizers (diagrams, concept maps), and multiple strategy approaches. The panel felt that other popular strategies (e.g., predicting) did not have enough experimental support to recommend them.

Pressley, M. (2000). What should comprehension instruction be the instruction of? In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. 3, pp. 545–561). Mahwah, NJ: Lawrence Erlbaum Associates.

Focus: Different sources of reading comprehension problems and features of successful strategy instruction.

Audience: Researchers.

Level of background knowledge required: High.

This work begins by describing automatic word attack skills and vocabulary necessary for comprehension, then discusses the importance of cognitive strategies and how they have been successfully taught to students. It reviews the research on strategies that effective readers use, including activating prior knowledge, setting reading goals, paraphrasing, and other cognitive strategies. It also reviews the features of effective strategy instruction programs, including

direct teaching, modeling, guided practice, support, feedback, and reflection, using content-area books.

National Adult Literacy and Learning Disabilities Center. (1999). *Bridges to practice: Guidebook 4—The teaching/learning process.* Washington, DC: Academy for Educational Development.

Focus: Strategy instruction for learning disabled (LD) adults developed at the University of Kansas.

Audience: Teachers.

Level of background knowledge required: Low.

The authors recommend using research-based strategies that work with children with learning disabilities when teaching LD adults. University of Kansas researchers tried teaching strategies that had worked on children with learning disabilities and found they worked with low-level LD adults. They successfully taught phonemic awareness, sounding out, decoding, reading comprehension strategies, and the connection between strategies, effort, and progress.

Wood, E., Woloshyn, V., & Willoughby, T. (1995). (Eds.), *Cognitive strategy instruction for middle and high schools.* Cambridge, MA: Brookline.

Focus: Strategy instruction for high school students.

Audience: Teachers.

Level of background knowledge required: Low.

This teacher-friendly guidebook has chapters on proven strategies for different subject areas (e.g., reading, science, math). It offers many illustrations, checklists, and forms to help teachers deliver strategy instruction in the classroom. It includes many memory strategies, such as mnemonics, as well as reading comprehension strategies. This work cites studies done with middle- and high-school students.

Pressley, M., Woloshyn, V., & Associates. (1995). *Cognitive strategy instruction that really improves children's academic performance* (2nd ed.). Cambridge, MA: Brookline.

Focus: Strategy instruction for elementary school students.

Audience: Teachers.

Level of background knowledge required: Low.

Like the last book, this teacher-friendly guidebook has one chapter on each subject area, and includes illustrations, checklists, and forms. It cites studies done with elementary students.

Pintrich, P. R., & Schrauben, B. (1992). Students' motivational beliefs and their cognitive engagement in classroom academic tasks. In D. H. Schunk & J. L. Meese (Eds.), *Student perceptions in the classroom* (pp. 149–184). Hillsdale, NJ: Lawrence Erlbaum Associates.

Focus: Connections between motivation and strategy use.

Audience: Researchers.

Level of background knowledge required: High.

The authors reviewed a series of studies they conducted with more than 3,000 college and junior high school students, finding that students who had higher motivation (e.g., felt confident they could do the work in a particular subject) also reported using more reading strategies, such as connecting what they read and what they already know (called elaborating). The authors found that some students know how to use strategies (e.g., summarizing), but do not use them because they lack confidence, interest, or other aspects of motivation. Motivation did not improve achievement by itself, however; it increased strategy use, and the strategies increased achievement. These findings suggest that teaching strategies alone is not enough—teachers should create contexts that help students feel confident they can do the work, attribute success to their own efforts, and value learning tasks.

Journal Articles

Guthrie, J. T., Anderson, E., Alao, S., & Rinehart, J. (1999). Influences of concept-oriented reading instruction on strategy use and conceptual learning from text. *Elementary School Journal, 99,* 343–366.

Focus: Results of the Concept-Oriented Reading Instruction strategy program.

Audience: Middle school researchers and practitioners.

Level of background knowledge required: Medium.

Guthrie and colleagues designed a multiple-strategy instruction program for 3rd and 5th grade students. This program included direct instruction in activating prior knowledge, searching, and self-

monitoring; reading science trade books (not textbooks) that teachers helped students select; hands-on science experiences; group work; and final presentations. The purpose of this combined cognitive and motivational program was to increase students' deep conceptual knowledge of science, motivation to read, and reading comprehension. One hundred twenty students in CORI classrooms significantly outperformed control group students in traditional classrooms on these measures.

Mikulecky, L., & Lloyd, P. (1997). Evaluation of workplace literacy programs: A profile of effective instructional practices. *Journal of Literacy Research, 29*(4), 555–585.

Focus: Characteristics of successful workplace literacy programs.

Audience: Researchers.

Level of background knowledge required: High.

The authors examined which classroom methods predicted the best progress of 180 participants in workplace literacy programs at six industry sites (auto manufacturing, prison, insurance, hospital, gaskets, and electric motors). Students had better reading at the end of the program if the classes (a) spent a lot of class time (70%) reading and writing, (b) used a lot of workplace reading and writing materials instead of textbooks, (c) had discussions about how to be a good reader (that is, taught comprehension strategies—e.g., "Did you understand what you just read? Can you explain it to me in your own words?"), and (d) had discussions about how well students were reading (that is, as students learned more strategies and got better at reading, teachers told them they were getting better, which motivated them to keep working). This type of evaluation study is limited because it is a snapshot of what is being done, not what is likely to work best.

Weinstein, C., Ridley, D. S., Dahl, T., & Weber, E. S. (1989). Helping students develop strategies for effective learning. *Educational Leadership, 46*(4), 17–19.

Focus: A brief introduction to research-based strategy instruction.

Audience: Teachers.

Level of background knowledge required: Low.

This provides a brief overview of reasons for strategy instruction and focuses on student self-questioning. It includes examples of ques-

tions (e.g., "If I lived during this period, how would I feel about my life?" p. 18) and a description of teacher training workshops the authors have conducted.

Chall, J. S. (1987). Reading development in adults. *Annals of Dyslexia, 37,* 240–251.

Focus: A model of what is needed for adults to develop reading comprehension.

Audience: Researchers.

Level of background knowledge required: High.

This work argues that the author's six stages of reading development are the same in adults and children (that is, reading skills progress in a consistent way, and adults cannot skip steps or do them in a different order). Educators of adults often assume that adults have a problem with motivation, not their ability to decode without a lot of effort. Chall points out that if reading develops "naturally" from vocabulary and exposure to written materials, adults would have figured out how to read. At about a 4th-grade reading level, reading moves from using conversational words and sentence structure to a larger vocabulary and more complex sentences. The author argues that many adult low-level readers fell behind in reading/decoding as children and are stuck in their stage of reading. As children, they did not get the reading skills to learn new information from what they read (i.e., metacognitive and cognitive reading strategies), so they fell behind in vocabulary and knowledge. This piece points out that there are not many interesting reading materials appropriate for low-level adult readers and that it takes much "more than a few weeks or months of intensive instruction in decoding" to reach literacy levels demanded by our society. The author suggests conducting more research on reading skills beyond decoding for adults and whether methods that work with children also work with adults.

GLOSSARY

Decoding—sounding out words.

Morphological knowledge—knowledge of prefixes and suffixes and what they mean; knowledge of how words can be put together.

Orthographic knowledge—knowledge about spelling patterns (e.g., rough, tough, enough vs. scuff, buff, duff).

Word attack—strategies for figuring out word pronunciation, including decoding, morphological, and orthographic strategies.

Phonemic awareness—ability to separate words into sounds (e.g., "dog" is made up of three sounds: "d," "aw," and "g"); a precursor to decoding.

Phonological awareness—knowledge about the sounds in language (e.g., phonemic awareness, rhyme, word families, and counting syllables).

Sight words—words that are recognized immediately and do not need to be decoded.