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ABSTRACT

Metacognition has received recent attention by researchers and teachers alike because of the possibilities for successful instruction and intervention for readers at all levels. This paper explores the area of metacognition as it relates specifically to reading comprehension. The paper addresses six areas: (1) the definitions of metacognition, metacomprehension and metalinguistic awareness; (2) the significance of metacognition in the cognitive processing of written text by good and poor readers; (3) the teacher's role in developing metacognitive abilities; (4) specific strategies that have successfully increased metacognitive skills; (5) ideas for assessing metacognitive abilities both for research and instruction purposes; and (6) recommendations for future study of the role metacognition plays within the reading process. Contains 87 references. (RS)

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Northern Illinois University 

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**THE ROLE OF METACOGNITION
IN READING COMPREHENSION:
IMPLICATIONS FOR INSTRUCTION**

Barbara Abromitis

June 1994

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**THE ROLE OF METACOGNITION
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The Role of Metacognition in Reading Comprehension: Implications for Instruction

The most obvious goal of reading instruction is comprehension. Truly, "reading" has not occurred until text has been processed and understood. However, many variables may influence a reader's ability to comprehend written text. One of these variables, metacognition, has received recent attention by researchers and teachers alike because of the possibilities for successful instruction and intervention for readers at all levels.

The purpose here is to explore the area of metacognition as it relates specifically to reading comprehension. Six aspects will be addressed: 1) the definitions of metacognition, metacomprehension and metalinguistic awareness; 2) the significance of metacognition in the cognitive processing of written text by good and poor readers; 3) the teacher's role in developing metacognitive abilities; 4) specific strategies that have successfully increased metacognitive skills; 5) ideas for assessing metacognitive abilities both for research and instructional purposes; and 6) recommendations for future study of the role metacognition plays within the reading process.

Definitions of Terms

Metacognition is often simply defined as "thinking about thinking," or people's awareness of the knowledge they possess (Stewart & Tei, 1983). Researchers have sought to develop more specific definitions of the term, however, in order to more readily focus on particular aspects of the process.

Brown (1985) has discussed two facets of metacognition: 1) knowledge about cognition, and 2) the regulation of cognition. She defines the first aspect as "the knowledge readers have about their own cognitive resources and the compatibility between themselves as readers and the demands of a variety of reading situations" (p. 501). She warns that this knowledge is a late-developing skill and may be erroneous; that is, students may possess "knowledge" that is untrue.

The second aspect of metacognition, the regulation of one's thought processes, raises the issue of a reader's control over strategies and actions used to identify and overcome difficulties with text (Brown, Armbruster & Baker, 1986). Brown (1985) explains that this regulation is usually unstable and is often dependent not on age, but on the strategies available to readers, their metacognitive levels, and their knowledge of the content that is being read.

Two of these factors, the strategies available to the reader and the reader's knowledge of the content, have important implications for teachers because they are aspects of metacognitive control that may be directly influenced by instruction.

Other definitions of metacognition (Fitzgerald, 1983) expand to include four separate perspectives: 1) readers know when they know and when they don't know, 2) readers know what they know, 3) readers know what they need to know, and 4) readers know the usefulness of intervention strategies. Otto (1985) mentions the "orchestration" of the thought processes, implying the importance of the regulatory functions of metacognition to the successful performance of a reading task.

Paris, Lipson and Wixson (1983) define the knowledge of cognition as *declarative* (readers know that a particular strategy is useful and they are able to talk about it); *conditional* (readers know when a strategy is needed and why it will help); and *procedural* (readers know how to use comprehension strategies effectively). Finally, Flavell (1981) differentiates between metacognitive knowledge, experience and strategy use. Metacognitive knowledge and strategy use coincide with the previously mentioned declarative and procedural knowledge. Metacognitive experience, however, refers to an awareness by the learner of cognitive success or failure.

Though metacognition has been defined with different terms, researchers essentially agree on a knowledge of thought processes and the purposeful use of strategies as two necessary components of metacognitive ability. But how and why does metacognition differ from other cognitive processes?

Metacognition occurs in the neocortex of the brain and is thought by some neurologists to be an uniquely human function. While inner language, which begins around the age of five, is thought to be a prerequisite to metacognition, actual metacognitive ability is a central component of formal thought which is usually achieved by age eleven (Costa, 1991).

Robeck and Wallace (1990) discuss the developmental aspects of metacognition in relation to three levels of learning:

Level One—Association or the ability to understand text literally;

Level Two—Conceptualization or the ability to generalize, categorize, synthesize and summarize; and

Level Three—Creative Self-Direction or the blending of motivation and a sense of needing to know more.

Metacognition is necessary to Level Three learning. Metacognition has also been closely tied to the notion of giftedness. Sternberg (1984) has developed a theory of intelligence that includes "metacomponents," executive processes used in planning, monitoring and evaluating informational processing. Students may be considered gifted when they are able to cope with novel situations using these metacomponents in concert with their performance and knowledge-acquisition abilities (Shore & Dover, 1987).

One form of metacognition that is consistently mentioned in reference to reading comprehension is metacomprehension, which refers to the ability of readers to adjust their thinking to achieve greater understanding of text (Robeck & Wallace, 1990). Brown (1985) also describes metacomprehension as a person's awareness of the mental processes used while reading, studying or solving a problem.

Standiford (1984) discusses the differences between comprehension and metacomprehension. She defines four combinations of metacomprehension and comprehension which may occur during reading:

High Metacomprehension - High Comprehension: Readers know and are aware they know;

High Metacomprehension - Low Comprehension: Readers do not know and realize they do not know;

Low Metacomprehension - High Comprehension: Readers know but think they don't know;

Low Metacomprehension - Low Comprehension: Readers do not know but think they do know.

One last term that appears, particularly in discussions of younger readers, is metalinguistic awareness. Metalinguistic awareness has been defined as the ability to think about language, to talk about it, to produce and manipulate it, and to comprehend it (McAllister, 1989). Children who possess metalinguistic awareness are able to view language as an object, a formal communication system separate from its meaning (Mattingly, 1972; McGee, Charlesworth, Cheek, & Cheek, 1982). This objectification of language may occur on four levels: phonemic awareness, word awareness, form awareness, and pragmatic awareness (Sulzby & Teale, 1991). Mason (1984) also examines metalinguistic awareness from the perspectives of the function, form, and conventions of print. Fischer (1980) cautions, however, that an oral ability to follow the rules of language is not the equivalent of the knowledge of the rules, or the metalinguistic awareness, that is necessary for reading.

Though the terms differ, one point is certain: metacognitive abilities play a significant part in the comprehension of written text.

The Significance of Metacognition

Metacognitive abilities, by definition, help students be more consciously aware of what they learn, situations where that knowledge may be used and the procedures for using it. These skills are critical to efficient reading (Wixson & Peters, 1987).

When readers begin a literacy task, they bring to it an existing framework of knowledge to which the new information may be assimilated (Carpenter & Just, 1986). A metacognitive analysis of the task puts the reader in control of the situation; it encourages flexible and adaptive thinking, and if necessary, modification of the reading process to fit the known purpose for reading (Otto, 1985; Shore & Dover, 1987; Stewart & Tei, 1983). Because the three subsystems of reading (the visual processes used in decoding, the identification and recognition of words, and the understanding of word and text meaning) must be coordinated to be successfully implemented, students with inadequate metacognitive ability may be unable to read, though they are able to master the subskills (Posner, Lewis, & Conrad, 1972).

Two crucial components of metacognitive control are comprehension monitoring, or the ability to notice when comprehension failure occurs; and corrective strategy use, or the ability to take action to correct a comprehension failure once it has been noticed (Anderson, Hiebert, Scott, & Wilkinson, 1985; Otto, 1985). In order to monitor comprehension, however, students must develop a basic understanding of their own characteristics as learners, the characteristics of different forms of text, and the strategies that are available to them for corrective action (Brown, 1985). This knowledge is usually late-developing, and significant differences are seen between beginning and mature readers, and good and poor readers at all stages.

Beginning readers usually possess metalinguistic awareness, rather than full-fledged metacognitive ability. For them, an awareness of words seems to come first and easily, but phonemic awareness may be more slowly acquired (Adams, 1990a). Pre-readers and early readers spend much of their time learning about print. They learn that print is different from other types of visual patterns, that print remains constant across a variety of media, and that print may be produced by anyone. This awareness of print is a leading indicator of reading readiness (Adams, 1990a). In fact, Spoelders and Van Damme (1989) found a correlation (.51-.60) between reading scores and total

language awareness scores for a sample of Dutch kindergartners; and in a study of first graders, Johns (1980) found that above average readers know much more about print, and can more readily use the vocabulary of reading instruction, than below average readers.

Age plays a role in metacognitive development, which of course, limits younger children in their use of these skills. Yaden, Smolkin, and Conlin (1989) found that during read alouds, pre-readers will ask the most questions about pictures, story meaning, and word meaning. However, they will rarely ask questions about word form, a finding which may indicate a lack of metalinguistic awareness. Kreutzer, Leonard and Flavell (1975, in Garner, 1992) found that younger children are usually more able to remember information at a verbatim level, while older children will more likely remember the essence of text. Younger children also tend to focus more on the decoding aspects of reading rather than the cognitive processes involved (Myers & Paris, 1978). They are also less able to distinguish "study" reading from "fun" reading (Forrest & Waller, 1980), and are especially susceptible to a false sense of understanding (Baker & Brown, 1980).

Brown et al. (1986) explain that beginning readers may have trouble reading intelligently because they don't have a full understanding of what reading is. They discuss four variables that may influence a young reader's awareness: text (the vocabulary, syntax, style, clarity, structure and topic of the written material); task (entertainment, information-gathering, or other purpose); strategies that are available to the reader; and learning characteristics of the reader.

Early metalinguistic awareness is important to the achievement of high literacy levels in the later elementary years (McAllister, 1989). But teachers and students may not have much influence over its development. In a study of 118 children from the beginning of first grade to the end of second grade, Tunmer, Herriman and Nesdale (1988) found that metalinguistic awareness may depend on a child's level of operativity or cognitive development. This finding supports the previously-mentioned ideas from Brown (1985) and Costa (1991) that metacognition is closely related to formal

thought and is a late-developing skill. Kamberelis (1990) found in a study of transitional knowledge during literacy development that two "out-of-sync" combinations with written language may occur: high reading-low writing and low reading-high writing. These discrepancies may suggest that there is a time in development when a greater than average amount of cognitive reorganization occurs that ultimately will integrate the production and comprehension of written language, and facilitate conventional literacy. However, Otto (1985) reminds educators that beginning learners, regardless of age, are always less able to manage their attempts to learn and their actual performance of a learning task. For most learners, experience provides the increased ability to monitor and control the learning situation.

But not all learners achieve this ability. Significant differences also remain between good and poor readers at all levels. For successful readers, metacognitive development seems to parallel their cognitive development in reading, where poor readers' metacognitive development falls behind their cognitive development (Otto, 1985). This difference in development is evident in the types of errors that are made.

Garner (1992) finds that less skilled readers will most often detect lexical errors in text before they will find inconsistencies in meaning. They are more often unaware of poor reading practices such as allowing the mind to wander or the distraction of TV when reading (Paris & Myers, 1981, in Garner, 1992). Poor readers also use less self-questioning to monitor comprehension (Andre & Anderson, 1978-79).

Good readers are much more in control of their reading. They match their reading to the structure of the text, and are consequently, able to recall significantly more than those that do not use this strategy (Pearson & Camperell, 1985). Good readers have been shown to acknowledge different purposes for reading, to assess their own knowledge as related to the task, to monitor their own comprehension and to implement corrective strategies when needed (Anderson et al. 1985).

Again, maturity and reading experience play a role in the development of good readers. Myers and Paris (1978) asked second and sixth graders questions about their ability to read. They found that sixth graders knew more about reading as a cognitive process and were more able to discuss various aspects of the process than were the second graders. Brown and Smiley (1977) also found that experienced readers are more likely to identify important segments of text, and that this ability develops slowly and late.

Failures in metacomprehension may occur at the word, sentence or paragraph level (Robeck & Wallace, 1990). Baker and Brown (1980) have identified three main reasons for comprehension failure: 1) the learner does not have enough information about the topic to understand the text; 2) the learner has the prior knowledge, but the text does not provide enough clues to activate the knowledge; and 3) the learner understands the text consistently, but what is understood is not the author's intended message. Collins and Smith (1982) say misunderstanding may occur when readers ignore the words that are the source of difficulty, and keep reading in the hope that the misunderstanding will be clarified later in the passage.

Poor readers may be helped in their development of metacognitive abilities and strategy use. Many times, good and poor readers are aware of the same strategies, but good readers use them more frequently and effectively (Hare & Smith, 1982; Olshavsky, 1976-77). Unfortunately, poor readers may attribute any success to "luck," and any failure to a lack of ability. They need to learn that effort and ingenuity can influence their success (Palinscar, 1986). Hansen and Hubbard (1984) also found that poor readers want to learn strategies that they can apply on their own, and that they can, with practice, learn to transfer these strategies from their small group work to other reading situations.

Meloth (1990), in a study of twenty third grade teachers and their low group readers, found that poor readers who began with a minimal knowledge of cognition increased by 60% their

declarative knowledge (their ability to discuss what they knew about reading): by 67% their procedural knowledge (their ability to use strategies effectively); and by 156% their conditional knowledge (their ability to know when and why a strategy will help). He found that this increased knowledge of cognition appears to contribute to a variety of comprehension abilities.

From poor readers, then, "metareaders"—those who plan for a reading task, use strategies for reading, monitor their understanding, and evaluate their learning—may be born (Spring, 1985). Obviously, the teacher will play an important role in this development.

The Role of the Teacher

For all readers, the home environment is the first influence in the development of metacognitive abilities. Parents, as the first teachers, may read frequently to their children to enhance comprehension (Yaden et al., 1989), engage in problem solving activities (Kontos, 1983), and model metacognitive strategies such as predicting consequences, monitoring activities, and testing reality in their own day-to-day living (Moss, 1990). Even saying "I don't know what you mean," a simple act that forces children to address communication failure, helps parents produce children whose understanding of that failure and its causes is advanced (Robinson & Robinson, 1982). Ideally, before formal schooling begins, children should have the opportunity to explore sound-letter relationships (Bradley & Bryant, 1983). They should know what print looks like; how printed material works; that basic meaningful units are specific, speakable words; that words are comprised of letters; that print can inform, entertain, communicate, and record; and what it means to read (Adams, 1990b).

Once schooling begins, however, the teacher plays an important role in the development of metacognitive ability because increased awareness and strategy use may be taught successfully to readers at all levels. In fact, Andre and Anderson (1978-79) found that low and middle ability students actually benefit more from training than high ability students.

Is this training common? Schmitt and Baumann (1990) found in their observation of ten elementary teachers, grades 1-6, that most comprehension instruction centered around building and activating prior knowledge, setting purposes for reading and assessing comprehension through questioning. A "metateacher" goes beyond those basics by planning for the reading task, setting a purpose, assessing what is known and unknown, using strategies for reading with students, monitoring their understanding and evaluating what has been learned—in essence, using metacognitive skills in teaching (Spring, 1985).

It may not be enough to show the value of metacognitive strategies by example, however. Otto (1985) suggests that students need to hear an explanation for why and how a particular strategy may be beneficial. Others (Costa, 1991; Anderson et al., 1985) say that instructional strategies that purposely develop children's metacognitive abilities must be integrated into teaching methods, staff development, and supervisory goals, as well as across the language arts and content areas.

Instruction of strategies should be direct, but will ideally include flexible teacher modeling, such as an explanation of the steps and possibilities in thought processes that lead to comprehension (Anderson et al., 1985), and should be presented within the context of real text (Duffy, Roehler & Hermann, 1988). Teachers may also model how they figure out an author's text structure and then allow time for student practice (Pearson & Camperell, 1985). Smith (1991) found that an adequate knowledge of good reading skills was not enough to influence reading behavior, though. In other words, it is not enough to know about reading strategies; rather, fairly extensive time for practice is needed for metacognitive strategies to become part of a student's repertoire (Brown et al., 1986; Otto, 1985; Sanacore, 1984).

The time spent on modeling and practicing strategies appears to pay off, especially for average and poor readers. Brown et al. (1986) report that many students have prior knowledge of a subject, but may not be using it. Through direct instruction in accessing prior knowledge and other

strategies, though, poor readers can be brought up to the average of their successful classmates.

Kirby and Pedwell (1991) concluded after their study of summarization skills that it was the approach the students chose that made a significant difference in their ability to summarize effectively.

Also, Cunningham (1990) found that ten weeks of explicit instruction in the application, value and utility of phonemic awareness resulted in the improvement of reading ability in first graders. Paris and Lipson (1982) found that third and fifth graders could make significant gains in comprehension over a control group when they were taught about the goals and obstacles to successful reading and had visual clues, such as signs and bulletin boards, to help them remember; and Adams, Carnine and Gersten (1982) found that training for metacognitive study strategies significantly improved the results of fifth grade students on delayed and short-term recall tests of content area text.

Obviously, instruction is important for the development of metacognitive abilities, but often less-skilled readers receive the wrong type of emphasized instruction (Garner, 1992). Stewart and Tei (1983) suggest that teachers instruct students about reading goals and purposes, text structure, strategies to use when comprehension fails and known obstacles to comprehension, such as unusual style or passage organization, unknown words and lack of prior knowledge.

Lipson (1983, in Monahan & Hinson, 1988) suggests teachers ask themselves if their lessons focus on reading for meaning, use real-life purposes and materials, and avoid instruction of isolated skills. Others (Paris, 1985; Paris, Wasik & Turner, 1991; Sanacore, 1984; Heller, 1986) recommend that teachers assist readers with direct explanation, cooperative and scaffolded learning, brief modeling and a focus on story and content area text structure.

Teachers may also help students with specific combinations of metacomprehension and comprehension skills. For those with low comprehension but high metacomprehension, teachers may ask questions and provide feedback to help students apply specific, appropriate strategies. For those

with high comprehension but low metacomprehension, teachers may provide consistent, positive verbal and written reinforcement to build the student's confidence. For students with low comprehension and low metacomprehension, teachers should ask questions that will bring out the contradictions in what a student thinks is true in order to raise metacomprehension first (Schallert & Kleiman, 1979).

For beginning readers, Adams (1990a) suggests instruction in phonemic awareness through linguistic games and activities, and an immersion of children in varied, functional and significant print. For all readers, Garner (1992) warns that strategy instruction must be more than a "bag of tricks;" instead, it must include a component of flexibility and success monitoring, and should be tied to the content areas as well as the language arts.

Clearly, direct instruction of strategies will increase metacognition and subsequently, comprehension. But which strategies have been proven effective and efficiently used in the classroom?

Strategies That Promote Metacognition

As teachers plan for metacognitive training, certain guidelines should be considered. First, strategies for reading have cognitive, metacognitive and affective components, and no matter how innovative they may be, students have to choose to use them (Garner, 1992). Second, strategies may either "fix-up" failed comprehension or be an aid to studying, and students need to know when and where each type is appropriate (Brown, 1985). Third, students should be taught the procedures of strategies, and also how to flexibly interact and apply the strategies to any learning situation (Garner, 1992; Palinscar, 1986).

Palinscar & Ransom (1988) recommend the instruction of strategies that are applicable to a variety of reading situations and that promote interaction between the reader and the text. For all readers, repetition of strategies is essential to their successful use, and teachers should plan for

rereading of text and extensive strategy practice (Martinez & Roser, 1985; Morrow, 1988).

In general, certain strategies will enhance metacognitive thinking across a variety of learning situations. These include planning, generating questions, choosing consequences for behaviors, evaluating, taking credit for actions, keeping journals, role-playing, and group processing (Costa, 1991; Shore & Dover, 1987). Some of these bear closer inspection because of their relevance to the reading act.

Storybook reading is a common lesson for emergent and beginning readers. It may be enhanced through social interaction while reading, the construction of meaning, and the use of highly predictable materials and "story language" (Sulzby & Teale, 1991). In fact, Martinez and Roser (1985) found that with repeated readings of familiar stories, children's responses became more meaningful and in-depth. Sulzby and Teale (1991) report that the key factor in storybook reading is how the adult mediates the interaction with the child; most adults raise the level of interaction with each repeated reading, and no two readings are alike due to the increased participation of the child.

Teachers of young children may also focus on critical listening, a lack of which may be related to reading difficulty (Ryan, 1980); vocabulary concepts through concrete experiences (Anglin, 1970); and sorting, group naming, and categorizing as a means of enhancing strategic memory (Lange & Pierce, 1992). Reading aloud, learning nursery and other rhymes, using crayons and magnetic letters, and playing letter and word games that promote language acquisition and understanding are all appropriate practices for emergent readers (Adams, 1990b; MacLean, Bryant & Bradley, 1987; Juel, 1991).

Writing stories that conform to typical story grammar (Thorndyke, 1977; Stein & Glenn, 1979), activating and webbing prior knowledge (Lee, 1990), using a multisensory approach to vocabulary and language development (Gaskins, Downer, Anderson, Cunningham, Gaskins, & Schommer, 1988), and using literature-based instruction (Freppon, 1989) are important strategies to

use with beginning readers.

As readers mature, comprehension monitoring becomes increasingly essential to effective reading. In a study of fourth grade students, Payne and Manning (1992) found that the experimental group, after receiving deliberate training of comprehension monitoring strategies, showed significant gains in reading comprehension; had better attitudes toward reading; demonstrated more knowledge of the benefits of evaluating, planning and regulating their own reading; and showed a potential for transfer of these metacognitive abilities to other academic areas. One frequently mentioned comprehension monitoring strategy is self-questioning.

Students may be taught to ask themselves questions about the text before reading to activate prior knowledge (Bransford, Stein, Arbitman-Smith, & Vye, 1985), predict, and set a purpose for reading. During reading, self-questioning can help students summarize, evaluate and predict, and relate the new information to what is already known. After reading, self-questioning can lead to better summarization, and evaluation of predictions and purpose (Schmitt & Baumann, 1986; Brown, 1985).

Self-questioning also forces students to pause frequently when reading, consider their own understanding or lack of it, and decide whether any corrective action is needed (Sanacore, 1984). When self-questioning is combined with specific direction in prediction, grades 6-8 students demonstrated greater comprehension at all reading levels, but particularly at the lowest level (Nolan, 1991). Self-questioning, in short, makes for more reflective and critical readers.

Summarizing may also be systematically taught. Brown (1985) uses a four-part plan that teaches students to delete trivial material from the text, delete redundant information, substitute superordinate terms for any lists of actions or objects, and develop or select a topic sentence.

Reciprocal teaching capitalizes on the benefits of cooperative lessons by helping students learn metacognition through reflection on their past and present performances. The first step in reciprocal

teaching involves teacher modeling of a four-step process used after reading: summarizing, generating questions, clarifying and predicting. A new "teacher" is chosen from among student group members for each portion of text. The teacher and other students provide corrective feedback throughout the process (Palinscar, 1986).

Students who recognize the patterns of text structure typically demonstrate higher comprehension than those who do not (Pearson & Camperell, 1985). One effective way to help students internalize various types of text structure is through the use of graphic organizers. For tenth grade students who were taught to use graphic organizers instead of traditional outlining, the training demonstrated the benefits of positive attitudes about the strategy, better written recall of text and a suggestion of permanent changes in their study habits (Bean, Singer, Sorter and Frazee, 1986).

Using context to correct faulty word comprehension is another type of strategy. Although students must be taught why context is useful, and when it is most appropriately used, Blackowicz and Zabroske (1990) suggest a strategy in which students systematically follow this procedure: *Look* before, at, and after the word, *Reason* to connect what they know to the word, *Predict* a possible meaning and *Resolve* to accept the meaning or redo the process.

Thinking aloud through the reading process is helpful, as readers may use contextual and semantic clues as if they were reporters searching for meaning (Baumann, Jones and Seifert-Kessell, 1993). Students may also be taught to ask themselves whether answers to comprehension questions are stated directly (textually explicit), indirectly (textually implicit), or whether they are based on prior knowledge (scriptally implicit) (Poindexter & Prescott, 1986). This particular strategy may also be introduced with pictures rather than text, making it ideal for younger children or very poor readers. It is also similar to Raphael's (1982) QAR (Question-Answer-Relationship) strategy where students find information in the text, think and search for textual clues, develop an answer with the author, or arrive at a conclusion on their own.

Lastly, imaging may improve comprehension by helping students visualize what is occurring in the text. Certain guidelines are appropriate for imaging activities and are important for teachers to remember: 1) every student's image will be different and based on prior experiences; 2) no image is right or wrong, but reformulation of an image may be necessary to bring it in line with the text; 3) time is necessary to develop an image before a discussion can take place; 4) adequate time should be reserved for discussion of images; and 5) images may be stimulated through open-ended questions related to the text (Fredericks, 1986).

When strategy instruction has been implemented, it is often necessary and desirable to assess the metacognitive levels of students and to evaluate the instructional processes.

Assessment and Evaluation of Metacognitive Skills

While assessment of metacognitive skills is important for both teachers and researchers, the process is not a simple one. Often students' awareness depends greatly on the means used to measure that awareness (Brown, 1985). Also, because metacognition is closely tied to other cognitive abilities and processes, a question of the accessibility to automatic processes exists. Researchers and teachers must also guard against their students' possible memory failure by asking questions immediately after the learning task, and against inadvertent cuing through the use of open-ended questions (Garner, 1992).

Those assessing metacognition must also carefully consider what separates an actual learning strategy from other cognitive processes, and whether differences between strategies (deliberate actions) and skills (thought to be strategies that have become automatic) will influence assessment outcomes (Paris et al., 1991).

Many research studies involve students with text that has been rigged with inconsistencies or errors to determine whether students can detect the problems (Garner, 1992; Stewart & Tei, 1983). Garner (1992) speculates that errors may not be detected due to the students forgetting the material,

changing their thought paradigm to make sense of the text, refusing to admit comprehension failure, or genuinely failing to monitor their comprehension.

Other methods of assessment include interviews of students about their state of knowledge and their understanding of task features that influence their performance (Shore & Dover, 1987). Gelman (1979) found that, in preschoolers, though, the verbal measures of performance tend to underestimate a child's true competence, so the measure of strategic awareness may be a conservative one. Some researchers and teachers also use text structure studies to determine a reader's familiarity with text format (Gray, 1987).

Students who demonstrate good metacognitive ability are able to describe their thought processes. They may list the steps in their learning process, and indicate where they are in that process. When problem-solving, they are able to trace the paths they took to arrive at a solution, and they demonstrate greater perseverance than those without metacognitive ability (Costa, 1991). Stewart and Tei (1983) reiterate that the use of strategies and the ability to verbalize that use are both strong indicators of metacognitive ability.

Metalinguistic awareness, in particular, may be examined at three levels: the grapho-phonetic level (letters and sounds), word syntactic level, and discourse level (whole passage) (McGee et al., 1982). Testing of this awareness could be performed through rhyming tasks, studying children's developing language patterns and their attempts to participate in reading tasks (Mason, 1984). Rozin, Bressman, & Taft (1974) also used the "Mow-Motorcycle Test" during which children had to use their phonemic awareness to choose a given word by its appearance or length.

Assessment of metacognition in relation to reading comprehension, the process of reading itself, and the evaluation of current instructional practices may lead to more questions than answers. The following section addresses some future research considerations.

Future Research

Certain questions will continue to appear as educators make sense of the role of metacognition in reading: What do readers know about reading? How do readers regulate their thinking? and What instructional interventions help readers? (Paris et al., 1991) Research on the origins of metacognition must also address the influences of the interpsychological plane (interactions between adult and child) and the intrapsychological plane (how children solve problems on their own) before formal schooling begins (Kontos, 1983).

Metacognition has clearly been related to reading and problem-solving performances, and seems to be very useful for those who demonstrate learning problems (Brown et al., 1986), but its actual distinction from general aptitude or intelligence remains unclear. Another important question for researchers to investigate is whether students with low aptitude can be taught metacognitive skills to compensate for their low ability (Swanson, 1990).

Also, because strategy training seems to benefit low and average readers more, does that imply an automatic metacognitive ability for good readers? If so, are there other means of helping good readers continue to grow metacognitively?

Particularly for studies of strategy training effects, Brown et al. (1986) have set forth the following criteria for judging the success of the strategy: 1) the study should indicate clear and substantial improvement as a result of the strategy; 2) individuals should show evidence of process change as a result of the training; 3) the effect of the training should be reliable and durable; 4) application of the strategy should transfer to other situations; and 5) the training should be instructionally feasible.

In conclusion, metacognitive abilities play an important, even vital, role in the process of reading comprehension. In light of this importance, the following comments by Pearson and Camperell (1985) seem especially pertinent:

The point is simple: when we identify a variable...that looks like it might make a difference in comprehension, we ought to adopt a frontal assault strategy when considering its instructional power—teach about it systematically and make certain students have a chance to practice it (p. 339).

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