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THE EFFECTS OF QARS ON SEVENTH GRADE STUDENTS' RESPONSE TO COMPREHENSION QUESTIONS

by

Janice Holmberg

A Thesis Submitted to the Faculty of the
DEPARTMENT OF READING
In Partial Fulfillment of the Requirement
For the Degree of
MASTER OF ARTS
in the Graduate College
THE UNIVERSITY OF ARIZONA

1987
STATEMENT BY AUTHOR

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This thesis has been approved on the date shown below:

J.N. Mitchell
Associate Professor of Reading

June 4, 1987
To Jesus Christ my Lord,
who is able to do exceedingly abundantly
beyond all that we ask or think.

To my parents who have given their
love, time, encouragement, and support.
ACKNOWLEDGMENTS

The author would like to express appreciation to all who helped to make this thesis possible.

To Dr. Judy Mitchell, thank you for giving your time, your wise advice, and for your ever-present encouragement and smile.

Thanks to Dr. Patti Anders for your expertise, support, and time.

To Dr. Allen who gave her support.

To Irma Renteria, a special thanks for your encouragement, your diligence, and for your friendship.

To those students in the graduate class goes a special thanks, who participated in rating, listened and gave me advice.

To Jan, Sharon, Jenny, Dan, and others, thank you for giving to me your time and your support.

Thank you Mom and Dad for loving me and believing in me.
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ABSTRACT

Question-Answer Relationships (QARs), is a metacognitive strategy which develops students ability to answer comprehension questions. This study was designed to assess the effects of QARs on subjects' comprehension and on retellings, and to investigate subjects' ability to transfer QARs to another content area.

The four seventh grade subjects in the study were of average ability according to previous test scores. The questions were developed from passages taken from typical seventh grade textbooks.

The procedures consisted of two pretests, followed by five days of training in QARs. A post test was given for assessment of QARs. A second test assessed transfer of QARs. AS a second measure, students were asked to retell text information after answering questions for pre, post, and transfer tests.

Results indicate training in QARs improved subjects' ability to answer comprehension questions, and to retell information from text. Subjects were able to transfer QARs to another content area.
CHAPTER 1

STATEMENT OF THE PROBLEM

The purpose of this chapter will be to present the (1) background of the study, (2) statement of the problem, (3) significance of the study, (4) assumptions underlying the study, (5) definition of terms, and (6) limitations of the study.

Background of the Study

An important part of schooling is the learning of content area concepts in social studies, science and other classes. The higher the students' grade level, the more time is devoted to learning from content area textbooks and less time to developing the reading skills required of each content area. According to Strahan & Herlihy (1985), textbooks are considered both the primary instructional source as well as a controlling influence on the content area curriculum.

Yet, even though content textbooks are important for instruction at all levels, many teachers assign students chapters to read independently as homework (Ratekin, Simpson, Alverman, Dishner, 1985), assuming that the material will be read and understood by them. However,
a study by Nicholson (1984) which incorporated student interviews while working, showed that while the surface structure of a classroom may appear as if content is being learned, there may be a maze of confusion in the minds of students about the topic being covered.

Some of the confusion and lack of understanding is due to the fact that each content area has its own discipline, its own set of "knowledge organized for instruction" (Vacca & Vacca, 1986, p.9) which requires a discernment of its particular structure in order for learning to take place.

Anderson & Armbruster (1984) contend that each discipline has its own set of:

1. words or phrases that explain relationships among ideas
2. thinking patterns typical of that discipline, and
3. features or attributes that are common for that discipline.

In other words, in order to learn from content materials it is not enough that a student just be able to decode the information from the text. In addition to adequate decoding, the student needs to know the implicit organization for that specific content area and be familiar with the characteristics that embody that content area.
assumptions that this ability is already developed in students and provide minimal assistance while reading the materials assigned in their courses (Herber & Herber, 1985).

Many studies have addressed the issue of the difficulty of content area textbooks and have provided strategies to facilitate comprehension in these areas (Taylor & Beach, 1984; Palincsar, 1984; Risko & Alvarez, 1986; Smith, 1985; Nicholson, 1984). Thematic organizers, concurrent interviewing, text structure, reciprocal teaching, semantic maps and numerous study guides are all examples of general instructional techniques that have been developed to improve students' comprehension of unfamiliar text.

Included with these techniques are several instructional strategies involving questioning (Manzo, 1985; Robinson, 1946; Shoop, 1986; Raphael, 1982). Questioning strategies have been a positive step toward improving comprehension (Martin, 1985; Hunkins, 1985; Wong 1985; Frase & Schwartz, 1975; Taylor & Getzels, 1976; Wixson, 1984; Andre and Anderson, 1978-1979), however, many of these strategies are teacher directed, and, "...teacher-posed questions, which only direct student thinking, are inadequate for development of comprehension in students" (Singer, 1978, p. 904).
Generally, the focus of comprehension instruction is on the specific text, rather than on the ability to comprehend texts in general (Johnston, 1985). The goal of instruction should be to develop a student's general ability to learn how to learn (Buswell, 1956).

In recent years, much questioning research has focused on instructional strategies that are more student-controlled or self-directed. A major area of research has focused on metacognition which refers to "the learners awareness of his/her cognitive resources and the compatibility between himself/herself and the demands of the reading situation; as well as the self regulation mechanisms, or control, used by the active reader in his/her efforts to understand what is read" (Brown, 1979).

Metacognitive strategies are used to improve comprehension ability, teach students to plan, monitor, and evaluate their own cognition while reading. One metacognitive strategy, Raphael's Question-Answer Relationships (QARs, 1982) was developed to improve students' ability to answer comprehension questions concerning the text they have read, by making them aware of sources of information for answering those questions. This strategy improves the ability to answer specific comprehension questions.
Two aspects of this strategy have yet to be studied. One is whether QARs enhances other aspects of comprehension besides answers to specific questions, i.e., recall, integration of information, and summarization. A second aspect is whether students, having learned the strategy in one content area, will be able to transfer the use of the strategy to another content area.

Statement of the Problem

This study is designed to assess the effects of a metacognitive strategy, specifically QARs, on students' comprehension of science text as measured by recall.

Specifically, the purpose of this study is to investigate the following research questions:

1. Does the use of QARs improve students' ability to answer comprehension questions?
2. Does the use of QARs improve students' retelling of content area text?
3. Will the student be able to independently transfer the strategy from one content area to another content area, specifically from science to social studies?

Significance of the Study

In order for students to be effective in finding answers to questions, they need to know what the questions
are asking (Pearson & Johnson, 1978). Question-Answer Relationships (QARs) is a strategy which provides students with a procedure to understand the task demands of a question. Teaching students how to analyze questions using Raphael's strategy enhances their performance in answering questions. This is relevant since teachers traditionally use end-of-chapter questions in content area instruction.

The majority of the research on Question-Answer Relationships has been conducted by Raphael. These studies have investigated the following factors:

1. age - third grade through eighth grade
2. reading ability - high, average, and low
3. training - differences in length of student training and teacher training.

Although Raphael has explored the above areas, several variables using QARs remain to be considered. This study investigates two additional factors:

1. transferability - students' ability to transfer the use of QARs from one content area to another content area.
2. retelling - students' improvement in quality of retelling as a measure of comprehension after training in QARs.

When students apply a previously learned skill to a new task, transfer occurs. For example, learning to count
by fives is a prerequisite to counting nickels as well as learning to tell time.

This notion of transfer also applies to instructional strategies. According to Johnston (1985), the intent of a learning strategy is to have students "a) recognize a strategy, b) find it effective in attaining a desired goal, c) adopt the strategy for their own use, and d) generalize it to other situations" (p. 639).

Transfer is essential to learning. An effective strategy is one that can be learned in one content area and applied to another content area. This study tests the transferability of QARs from science to social studies.

Researchers have used retelling to gather data about reading comprehension (Thorndike, 1977; Mandler & Johnson, 1977; among others). As a holistic measure, retelling provides insight into the subjects' understanding of the text. As Bondy (1984) suggests, "A student who summarizes the chapter he has just read exercises cognitive skills" (p. 234).

Retelling gives an indication of the reader's metacognitive awareness and interaction with the text. It also reflects the reader's use of language (Irwin & Mitchell, 1986). Retelling is used in this study to enrich the pre, post, and transfer tests results.
Assumptions Underlying the Study

1. All the passages used in this study were on appropriate topics for the subjects.
2. All the subjects were able to sufficiently decode the passages.
3. Retelling is a valid assessment of general comprehension.
4. The profile used for scoring the retellings is an appropriate instrument for measuring comprehension.

Definitions of Terms

To clarify the use of terms to be used in this study, the following list is provided:

1. General comprehension - The understanding of a written passage through the process of combining one's knowledge with the author's intended meaning.
2. Recall/Retell - Activity in which students tell or write everything they can remember after reading a passage.
4. Metacognitive strategy - An instructional activity to teach students how to become aware
of their existing knowledge and how to integrate it with new knowledge while reading.

5. **Transfer** - Application of strategies applied independently to new situations and tasks.

6. **Question-Answer Relations (QARs)** - A procedure to help students become aware of question-answer relationships by giving them a means to analyze the type of question and sources of information to answer them.

**Limitations of the Study**

This study had the following limitations:

1) Subjects in this study included only seventh grade students.

2) The selection of subjects were limited to one school.

3) The passages used were limited to science and social studies text.

4) Sample size was limited to four subjects.

5) The study was not part of a school activity during regular class time.

6) Because the retelling was measured in written form, writing ability might have affected students' response to the task.
CHAPTER 2

REVIEW OF THE LITERATURE

Recently, the focus of comprehension strategies has shifted from being teacher-directed to student-directed, that is, students self-monitoring of their own cognitive processes. Comprehension in content areas is generally assessed through comprehension questions. Thus, many of the existing strategies focus on questioning techniques. Since the ability to answer questions relies heavily on the ability to find the answer in the information sources, Taffy S. Raphael has developed a procedure called Question-Answer Relationships (QARs). This procedure helps students analyze questions to determine the sources of information, and thereby find the answers.

Thus, the purpose of this chapter will be to review research which investigates metacognitive strategies, such as QARs, and their effects on comprehension. This review will discuss studies that have investigated (1) metacognition, (2) Question-Answer Relationships (QARs), and (3) retelling as an assessment of comprehension as this will be one of two measures of comprehension for the study.
The objective of teaching comprehension is to have students learn to ask their own questions and guide their own thinking so they become independent in the process of reading and learning from text (Singer, 1978). Students often perform tasks without wondering or questioning why they are doing what they are doing. They fail to question their own strategies for learning or to evaluate their own proficiency in accomplishing the task (Costa, 1984).

Students can be taught to view themselves as "active learners" in this process (Babbs and Moe, 1983; Stuart and Tei, 1983; Armbruster and Brown, 1984). When students become aware of their role as active learners, their ability to meet the needs of the reading task is improved (Sanacore, 1984).

This awareness has been termed "metacognition". Irwin (1986) defines metacognitive processes as those processes which students are cognizant of and to which students consciously apply strategies before, during or after reading. Flavell (1976) provides the following example:

I am engaging in metacognition if I notice that I am having more trouble learning A than B; if it strikes me that I should double-check C before accepting it as a fact;...if I sense that I had better make a note of D because I may forget it; if I think to ask someone about E to see if I have it right (p.232).
According to Anderson (1980) instruction in metacognitive skills teaches students to become aware of their own learning processes rather than depending on feedback from sources other than self:

Some forms of instruction such as teacher-directed instruction or computer-managed instruction (CMI) use other techniques as substitutes for the metacognitive aspects of instruction. For example, a student engaged in traditional CMI does not have to ask very often the question "do I know if I understand this material". The computer informs the student during each episode whether or not he or she understands the material (p.407).

Brown (1980) makes a distinction between knowing (or cognition, which implies having the skills) and knowing about knowing (or metacognition, which implies a reader's conscious control over the skills). She takes us a step further by breaking metacognition into four categories:

a) knowing when you know
b) knowing what you know
c) knowing what you need to know
d) knowing the utility of active intervention

(p. 458-461)

Children's metacognitive knowledge about reading develops over the grades (Moore, 1983) and as students get older they become better at selecting appropriate strategies to aid their learning (Brown, 1985). High-ability readers are more cognitively aware than low-ability readers (Moore, 1983). Otto (1985) points out that poor readers 1) do not
use skills such as rereading, 2) are unaware of a lack of understanding when reading, 3) do not realize the need to understand when reading directions, and 4) do not use reading versatilely for learning and pleasure.

**Question-Answer Relationships**

Research in metacognition has led educators to develop strategies that increase students' self-awareness and teach them control of their own learning. Many of the strategies that have been successful are questioning strategies (Palinscar, 1984; Manzo, 1985; Marshall, 1983; Andre and Anderson, 1978; Adams, Carnine and Gerstein, 1982).

One of the strategies that has been successful in improving students' metacognitive awareness has been Question-Answer Relationships (QARs) developed by Taffy Raphael (1982). QARs is a strategy that teaches students how to analyze the task demands of the questions before answering them. Results of these studies have shown training in QARs to be successful in enhancing student's ability to answer comprehension questions.

Students are taught to identify questions as one of three categories: a) RIGHT THERE, b) THINK AND SEARCH, and c) ON MY OWN. In the category RIGHT THERE, the answer to the question is in the text and is easy to find. The
words used to make up the question will also be found in the sentence containing the answer. In the THINK AND SEARCH category, the answer is in the text but will be a little harder to find. That is, the answer is found in information from more than one sentence in the text. The ON MY OWN category requires the student to use his own prior knowledge to answer the question. The answer will not be found in the text. Raphael as cited in Tierney (1985) provides the following example:

Passage

Albert was afraid that Susan would beat him in the tennis match. The night before the match, Albert broke both of Susan's racquets.

RIGHT THERE

When did Albert break both of Susan's racquets? (The night before the match.)

THINK AND SEARCH

Why did Albert break both of Susan's racquets? (He was afraid that Susan would beat him.)

ON MY OWN

Why was Albert afraid that Susan would beat him? (He knew she had practiced more.) (The other students might laugh.) (p.54)

Raphael and Pearson (1982) and Raphael and Wonnacott (1981), as cited in Raphael (1982), found that students who had been instructed to use QARs were more
successful in answering questions than students who had not been taught how to use the strategy. Raphael and Wonnacott (1985), in a study with fourth grade students found: a) that high ability students' performance was superior compared to average ability students and both were superior to low ability students, b) students performed better on text-based questions (Right There and Think and Search categories) than on knowledge-based questions (On My Own), and c) the quality of responses was generally superior for trained students compared to students in the control group.

Results from studies using sixth grade students conducted by Raphael and Pearson (1985) showed that students' quality of responses improved after training in QARs, and that greatest improvement after training was demonstrated by average and low ability students. High ability students were more accurate in identifying the QARs categories than average ability students, and average ability students identified the QARs category more accurately than low ability students. A similar pattern was seen in the consistency of QARs identification and quality of answers given. Average ability students in the training group performed at the same level as the high ability students in the control group in terms of the quality of answers. On text-based questions, the low ability students in the training group performed at the same level as the
average ability students of the control group. Students of
der higher ability levels presumably already apply their
knowledge of strategies and tasks successfully and,
therefore, do not demonstrate as much improvement after
training. Similar results were found by Raphael (1984) in
four studies with fourth through eighth grade
students and by Raphael and McKinney (1983) with fifth and
eighth graders.

Retelling

Steinruck (1978) states that comprehension
questions usually asked in standardized reading tests
provide only limited information concerning children's
reading comprehension. These questions are not usually
open-ended and they tend to measure literal understanding of
the text and not critical thinking skills.

A technique which is becoming more widely used as
an in-depth measure of comprehension is known as Retelling.
Retelling is a technique in which students read a text, and
then retell as much as possible to an evaluator. Retellings
can give insight into a student's processes of generating
texts (Morrow, Gambrell, Kapinus, Koskinen, Marshall &
Mitchell, 1986). "The basic assumption among researchers is
that retelling indicates something about the reader's
assimilation and reconstruction of text information and,
therefore, reflects comprehension" (Gambrell, Pheiffer & Wilson, 1985, p.216).

Dungan (1978) and Pronger (1985) in studies with first graders found that students' retellings improve with repeated exposures to text. Pronger also found that well-structured stories resulted in well-structured retellings. Stories were better recalled by second graders when visuals were provided with the story (Hay & Froese, 1984).

Pellegrini (1983) in a study with Kindergarten through second grade children found that students' retellings were more complete when retold to a naive listener as compared to an informed listener.

Studies have also shown that type of text can affect comprehension. Narrative text is more readily recalled than expository text; however, as children get older, recall of expository text increases (Dixon, 1978). Recall of familiar text has been shown to be superior to recall of unfamiliar text (Taylor, 1979).

One concern about retelling as an assessment is the difficulty in analyzing the results. Several instruments have been developed to measure retellings ranging from checklist and/or point systems (Wood, 1985; Marshall, 1983) to holistic scoring (Irwin & Mitchell, 1983).
CHAPTER 3

DESIGN OF THE STUDY

The purpose of this chapter is to describe the (1) subjects, (2) materials, (3) procedure of the study, (4) procedure of scoring the data, and (5) analysis of the data.

Subjects

Four students in seventh grade classes at a private junior high school in Tucson, Arizona were selected for the sample population. Subjects were selected according to the following criteria:

1) The subjects were able to independently read material at their grade level.
2) The subjects had reading and testing scores available in school records.
3) The subjects were within average range in reading scores according to standardized test scores.

The seventh grade teacher was asked to recommend the subjects. Subjects' scores from the Stanford Achievement Test given the previous year were used to fulfill the above criteria and to confirm teachers' recommendations.
Materials

Passages

Nine passages were selected from a seventh grade science textbook and two passages were selected from a seventh grade social studies textbook. The textbooks from which the passages were selected were ones that had not been used previously by the subjects but that were comparable to typical seventh grade textbooks.

The following criteria was used to select the passages:

1) The topics chosen for the passages were of approximately the same degree of familiarity to the subjects as indicated by teacher opinion.

2) Each passage contained approximately the same number of words within a range of 300 to 600 words.

3) Each passage contained approximately the same number of illustrations.

4) For each passage, six comprehension questions were developed, two of each QAR type.

Questions

Six questions were developed for each passage including two for each QARs category. Students in a Reading graduate
class were asked to assist the researcher in developing the questions. The following procedure was used:

1. Students received a brief training which involved instruction in identifying each QARs type, followed by a discussion for the purpose of clarification.

2. For two passages, students independently developed questions, along with the answers, and identified the QARS category for each question. The researcher followed the same procedure for developing questions for the remaining seven passages.

3. The same graduate class at a subsequent session was asked, after a brief review, to verify the quality of the remaining seven passages and questions which had been prepared by the researcher. The passages were evaluated on the basis of their appropriateness for the grade level of the subjects. Each question was evaluated to verify the quality and proper QARs category identification.

4. Each passage and its questions were evaluated by two readers. If disagreement occurred, a
third reader was assigned to rate the passage and its questions.

5. Passages evaluated as inappropriate were eliminated. Questions of poor quality were re-written and re-evaluated.

**Procedures**

Each lesson was conducted with all four subjects participating as a group.

**Days 1 and 2** - To establish two baseline retelling scores, subjects silently read a passage and wrote the answers to six questions. Each subject was then asked to write as much as he could remember about the passage read.

**Day 3** - Procedures for conducting QARs training are outlined in Tierney, Readence, and Dishner (1985). During the first lesson subjects were introduced to the three QARs type questions: Right There, Think and Search, and On Your Own. Further, subjects practiced identifying the task demands to answer each type of question. Subjects were asked to read a science passage silently. The group then discussed the type of QARs each question represented as well as the answer to each question.

**Day 4** - This lesson began by reviewing each QARs category. Subjects were then asked to read a science passage
silently. After reading, the group read each question and discussed which type of QARs each question represented. Students justified their answer to the question and their choice of QARs.

Day 5 - Same procedure as Day 4.
Day 6 - Same procedure as Day 4.
Day 7 - In this lesson, subjects read a passage silently. They wrote down the QARs type of six questions and the answers to the questions. The group and the researcher then discussed these questions and answers.

Day 8 - To establish a maintenance score, subjects silently read a passage, and wrote the answers to six questions. Each subject was then asked to write as much as he could remember about the passage read.

Day 9 - To establish a transfer score, procedures for day 8 was followed with the exception that a social studies passage was used instead of a science passage.

Summary of Treatments and Data Collection
The following is a summary of the training and data collection:

Pre Test
Days 1-2 .... Silent reading of science passages; answer comprehension questions; retell
Intervention

Days 3-7 .... Silent reading of science passages; read questions and discuss QARs categories; answer comprehension questions.

Post Test

Day 8 ........ Silent reading of science passage; answer comprehension questions; retell

Transfer Test

Day 9 ........ Silent reading of social studies passage: answer comprehension questions; retell

Scoring of the Data

Scoring of the data was divided into two phases:

1) Scoring of the comprehension questions.

Each passage had six questions. Each correct answer was assigned one point. The total score possible for each passage was six points. To establish reliability of the results, two raters participated in the scoring of each passage. Both raters independently scored the question responses. Discussion between the raters resolved any
disagreement about the score. The following data was scored:

a) Total number correct answers on the pre-test.

b) Total number correct answers on the post-test.

c) Total number correct answers on the transfer post-test.

2) Scoring of the written retellings

The profile by Irwin and Mitchell (1986) was used to score each retelling. Two raters scored each retelling in order to establish reliability of the results. Points were assigned to each level of rating. A high rating was given three points, a moderate rating received two points; and one point was given to a low rating. The total score possible for each retelling was 36 points. The following data was scored:

a) Total score on pre-test.

b) Total score on post-test.

c) Total score on transfer post-test.

Analysis of the Data

A descriptive analysis was used to interpret the following data for each subject:

Questions

1. Total number correct on the pre-test vs Total number correct on the post-test
2. Total number correct on the post test
   vs
   Total number correct on the transfer test

Retellings
1. Total number correct on the pre test
   vs
   Total number correct on the post test
2. Total number correct on the post test
   vs
   Total number correct on the transfer test

The data were analyzed by comparing group mean
scores for each of the following:
1. Total scores of the comprehension questions
2. Scores for each of three question types: Right
   There, Think and Search, and On My Own
3. Total scores of the retellings
4. Scores for each of three retelling
   classifications: Text Comprehension,
   Reader Response, and Language Use.

Individual scores were reported but were used only
to further interpret the mean scores.
CHAPTER 4

RESULTS AND DISCUSSION

The purpose of this chapter will be to present results of the study. These findings will be discussed both quantitatively and qualitatively for each question. They will be presented under the headings: 1) results related to research question one, 2) results related to research question two, and 3) results related to research question three.

Comprehension was the most important factor analyzed rather than the ability to identify each question by it's correct QARs category. Therefore, during the pre, post and transfer testing, subjects were not asked to label each question as Right There, Think and Search or On My Own. The following tables indicate the number of questions answered correctly. Several of these tables also show the number of correctly answered questions within each QARs category.

Although individual as well as group scores are presented, the focus is on group performance since that was the instructional setting. Individual scores will be further discussed only when they help to interpret the group scores.
Results Related to Research Question One

Question one asked: Does the use of QARs improve subjects' ability to answer comprehension questions?

Scores from subject's pre and post tests were compared. Each test included six questions. The highest score possible for each test was six points with each of the six questions worth one point.

Table 1: Individual and mean comprehension scores for pre and post tests

| SUBJECT 1 | PRE | 3 | POST | 6 |
| SUBJECT 2 | 4.5 | 6 |
| SUBJECT 3 | 4.5 | 4 |
| SUBJECT 4 | 5 | 5 |
| MEAN | 4.25 | 5.2 |

The mean score results in Table 1 indicate a slight gain from pre to post test. The score of two subjects increased, one score remained the same and one score decreased by .5. These findings suggest that training in QARs has a positive effect on the ability to answer comprehension questions.

Comprehension questions were further analyzed according to the QARs categories: Right There, Think and Search and On My Own. Table 2 provides individual and mean scores for each category.
Table 2: Individual and mean scores of QARs categories for pre and posts

<table>
<thead>
<tr>
<th></th>
<th>RT</th>
<th>T/S</th>
<th>OMO</th>
<th></th>
<th>RT</th>
<th>T/S</th>
<th>OMO</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>1.5</td>
<td>1</td>
<td>.5</td>
<td>POST</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>SUBJ1</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>SUBJ2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>SUBJ3</td>
<td>2</td>
<td>2</td>
<td>1.5</td>
<td>SUBJ4</td>
<td>1.5</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>MEAN</td>
<td>1.62</td>
<td>1.62</td>
<td>1</td>
<td></td>
<td>1.75</td>
<td>1.5</td>
<td>2</td>
</tr>
</tbody>
</table>

Mean scores for Right There questions made slight gains from pre to post test. Think and Search mean scores regressed from pre to post test. The largest gain of the three categories was made in the On My Own category, from a mean score of 1.0 on the pre test to 2.0 on the post test. Two subjects gained in all three categories, one student gained in two of three, and the remaining subject showed gained in one out of three categories. These findings suggest training in QARs does improve the subjects' ability to answer two of three types of comprehension questions.

Although the subjects who participated in this study were considered to be of average reading ability according to achievement test scores and teacher recommendations, all four subjects performed at a high level on the pretest. Pre test performance may mean that these subjects' question answering abilities were already well developed to begin with or that they were familiar with the particular topic, and therefore...
the study may not have afforded these students much opportunity for improvement in answering questions.

The subject with the lowest score on the pre test made the largest gain from pre to post test. This may support Raphael's claim that lower ability students made the most gains after training in QARs.

The subjects seemed to have difficulty with Think and Search type questions. It is interesting to note that the researcher and the graduate students who assisted in developing the questions also had a difficult time creating Think and Search questions. It may be that questions which ask students to integrate information are more difficult than questions which ask students to recall information.

The largest gain was made in the On My Own category. All subjects improved in this category. This finding may indicate that subjects improve in performance in textually implicit questions when they are made aware of resources that are available for answering questions other than the text.

During the intervention, subjects were asked to label questions according to their QARs category while answering them. Some subjects continued this labeling on the post test without being asked. While analyzing subject responses, the researcher noted that questions that were mislabeled for the QARs category were also incorrectly
answered. It is probable that asking subjects to identify the information source along with answering the question, would have provided further insight into subjects' growth in their ability to analyze the task demands of each question.

One precaution to be noted is that students may become overconfident in their ability to analyze the QARs type of questions. For example, during the post test one subject read a Think and Search question and said that he knew the question was an On My Own QARs. He proceeded to answer the question incorrectly without checking the text.

Another observation that was noted during the intervention was that some of the subjects underlined the answers to the questions in the text. This helped them to decide the category to which the question belonged. This activity may not be practical for students using non-consumable textbooks.

While correcting the answers to the comprehension questions, the researcher and the raters realized that some of the questions may have differed in clarity. This may have caused some students to give incomplete or incorrect answers to these specific questions. Piloting the questions could have alleviated this problem.

In summary, training in QARs improved subjects' mean comprehension scores for two of the three question categories. The largest gain was made in the On My Own
category. Students who labeled questions as to the appropriate QARs category provided insight about their reasoning processes.

Results Related to Question Two

Question two asked: Does the use of QARs improve subjects' written retellings of content area text?

Written retellings were collected for pre and post tests (days 1-2 and 8-9). The retellings were then scored by two raters using Irwin and Mitchell's (1986) Retelling Profile. For an example of the Retelling Profile see Appendix C. In order to report the data, points were assigned to each level. A high rating was given three points; a moderate rating received two points; and one point was given to a low rating. The total score possible for each retelling was 36 points.

For qualitative purposes, the twelve items on the profile were grouped into three classifications: Text Comprehension, Reader Response, and Language Use.

Table 3: Individual and mean score for pre and post test retellings

<table>
<thead>
<tr>
<th>SUBJECT 1</th>
<th>PRE</th>
<th>POST</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBJECT 2</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>SUBJECT 3</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>SUBJECT 4</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>MEAN</td>
<td>13.12</td>
<td>17.5</td>
</tr>
</tbody>
</table>
The mean score on Table 3 indicates a gain from 13.12 on the pre test to 17.5 on the post test. Individual scores all show gains from pre to post test. These findings suggest that training in QARs has a positive effect on subjects' retelling of content area text.

Retellings were further analyzed according to the three classifications: Test comprehension, Reader Response, and Language Use. Table 4 provides individual and mean scores for pre and post tests according to each category. A score of twelve points was possible within each classification.

Table 4: Individual and mean scores of retelling classifications for pre and post test

<table>
<thead>
<tr>
<th>SUBJECT 1</th>
<th>TEXT COMP</th>
<th></th>
<th>READ RESP</th>
<th></th>
<th>LANG USE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRE</td>
<td>POST</td>
<td>PRE</td>
<td>POST</td>
<td>PRE</td>
</tr>
<tr>
<td>SUBJECT 1</td>
<td>7.5</td>
<td>10</td>
<td>.5</td>
<td>2</td>
<td>9.5</td>
</tr>
<tr>
<td>SUBJECT 2</td>
<td>7.5</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>8.5</td>
</tr>
<tr>
<td>SUBJECT 3</td>
<td>4.8</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>SUBJECT 4</td>
<td>6.5</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>3.5</td>
</tr>
<tr>
<td>MEAN</td>
<td>6.4</td>
<td>9</td>
<td>.13</td>
<td>.5</td>
<td>6.6</td>
</tr>
</tbody>
</table>

These findings show gains or maintenance in each classification for all individual scores and for the mean score. Mean scores within Text Comprehension rose 2.6 points. Reader Response scores for one subject made a gain of 1.5. The remaining subjects received no points for any of the Reader Response categories on either the pre or post test.
test. The mean score for Language Use improved by 1.65 points. These results suggest that subjects' retellings are enhanced after training in QARs, specifically in the area of Text Awareness and Language Use.

All subjects improved from pre to post test in the text comprehension classification of the retelling. This might have been due to the fact that training in QARs increased the subjects' awareness of text information.

The retelling scores revealed evidence of a lack of reader response for all subjects. Three factors may account for this phenomenon. First, the subjects were not specifically asked to interact with or evaluate the text. They were told to recall everything they could remember. Secondly, these subjects are generally not asked by their teachers to interact with the text in content area classes. Thus, the subjects may have reacted to the text used for the study similarly to those used to their classroom situations. A third factor that may have led to low scores in the metacognitive awareness area could be due to limitations of written retellings. Writing a retelling is a more difficult and more time consuming task that giving a retelling orally, and the subjects may not have expressed their ideas as fully or as completely in writing.

In summary, training in QARs increased subject's retelling scores for all three classifications. Text
Comprehension and Language Use showed the largest gain. Subjects showed little evidence of use of Reader Response skills.

Results Related to Question Three

Question three asked: Will the subjects be able to transfer the strategy from one content area to another content area, specifically from science to social studies?

Results of pre, post an transfer scores were compared. The highest possible score for each test was six points with each of the six questions worth one point. Table 5 compares the three test scores for individuals and the group mean.

Table 5: Individual and mean comprehension scores for pre, post and transfer tests

<table>
<thead>
<tr>
<th></th>
<th>PRE</th>
<th>POST</th>
<th>TRANSFER</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBJECT 1</td>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>SUBJECT 2</td>
<td>4.5</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>SUBJECT 3</td>
<td>4.5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>SUBJECT 4</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>MEAN</td>
<td>4.25</td>
<td>5.2</td>
<td>5</td>
</tr>
</tbody>
</table>

Mean score results shown on Table 5 indicate a slight loss from post to transfer test, although the transfer score is higher that the pre test score. However, three subjects were able to maintain or improve from post to the transfer test. The transfer test score of one subject
regressed from post to transfer, although the transfer score was identical with that subject's pre test score. In general, these findings suggest that subjects can learn QARs in one content area and apply it in another content area.

Comprehension questions were also analyzed according to each QARs category: Right There, Think and Search, and On My Own. Table 6 provides individual and mean scores for pre, post, and transfer tests. Each category included two questions for each test. Therefore, the highest possible score was two points.

Table 6: Individual and mean scores of QARs categories for pre, post, and transfer tests

<table>
<thead>
<tr>
<th></th>
<th>RT PRE</th>
<th>T/S OMO</th>
<th>RT POST</th>
<th>T/S OMO</th>
<th>RT TRANSFER</th>
<th>T/S OMO</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBJ 1</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>SUBJ 2</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>SUBJ 3</td>
<td>2</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>SUBJ 4</td>
<td>1.5</td>
<td>2</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>MEAN</td>
<td>1.62</td>
<td>1.62</td>
<td>1.75</td>
<td>1.5</td>
<td>1.75</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Comparison of mean post to transfer test scores show maintenance for Right There and On My Own categories and regression in the Think and Search category. Individual scores show gain or maintenance for three subjects from post test to transfer and regression for the remaining subject. In general, these findings suggest that subjects are able to
transfer the ability to answer QAR questions to another content area text type.

Retelling scores were also compared for pre, post, and transfer tests. Total score possible for each retelling was 36 points.

Table 7: Individual and mean score for pre and post retellings

<table>
<thead>
<tr>
<th>SUBJECT 1</th>
<th>PRE</th>
<th>POST</th>
<th>TRANSFER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17.5</td>
<td>22</td>
<td>15</td>
</tr>
<tr>
<td>SUBJECT 2</td>
<td>16</td>
<td>18</td>
<td>21</td>
</tr>
<tr>
<td>SUBJECT 3</td>
<td>9</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>SUBJECT 4</td>
<td>10</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td>MEAN</td>
<td>13.12</td>
<td>17.5</td>
<td>18</td>
</tr>
</tbody>
</table>

These findings shown in Table 7 indicate a slight gain from post to transfer for the mean score. Individual scores show gains for two subjects and regression for the remaining two subjects. Therefore, the results regarding retelling transfer are inconclusive.

Retelling scores were further analyzed for pre, post, and transfer tests according to classification. Twelve points was the highest possible score.
Table 8: Individual and mean scores of retelling classifications for pre, post, and transfer tests

<table>
<thead>
<tr>
<th>TEXT COMP</th>
<th>PRE</th>
<th>POST</th>
<th>TRAN</th>
<th>READ RESP</th>
<th>PRE</th>
<th>POST</th>
<th>TRAN</th>
<th>LANG USE</th>
<th>PRE</th>
<th>POST</th>
<th>TRAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBJ 1</td>
<td>7.5</td>
<td>10</td>
<td>6</td>
<td>.5</td>
<td>2</td>
<td></td>
<td>0</td>
<td>9.5</td>
<td>10</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>SUBJ 2</td>
<td>7.5</td>
<td>9</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8.5</td>
<td>9</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>SUBJ 3</td>
<td>4</td>
<td>8</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>19</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>SUBJ 4</td>
<td>6.5</td>
<td>9</td>
<td>7.5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3.5</td>
<td>4</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>MEAN</td>
<td>6.4</td>
<td>9</td>
<td>7.5</td>
<td>.13</td>
<td>.5</td>
<td></td>
<td>0</td>
<td>6.6</td>
<td>8.25</td>
<td>10.5</td>
<td></td>
</tr>
</tbody>
</table>

Mean scores on Table 8 indicate regression in two classifications, Text Comprehension and Reader Response, from post to transfer test. A gain was made in Language Use from post to transfer test. These findings suggest that QARs had an effect on the transfer of subjects' language use but had no effect on the transfer of their text comprehension or reader response.

However, although the mean score slightly decreased from post to transfer test, a closer look at individual scores shows that three subjects maintained or improved on the transfer. The remaining subject was not able to transfer the strategy. This may be related to the fact that this subject had the lowest score on the pre test. Lower ability students may have more difficulty with transfer of this strategy.

Similarly, the total retelling score of this same subject was lower on the transfer retelling than the post
test retelling. Further, the results on this subject's QARs post test and transfer test parallel the post test and transfer test retelling scores in text comprehension. From this evidence, it appears that QARs responses and retelling text comprehension items address similar types and levels of reading comprehension.

Differences in the post test retelling and the transfer test retelling also indicated that the subjects scored at a higher level on social studies text than science text for language use. Perhaps the style and structure of the retellings may have been affected by the style and structure of the text. It could be that students have more experience with social studies texts than science texts or that they find the former text types easier than the latter. At any rate, the subjects seemed to be able to maintain or increase their language use from post test to transfer test.

In summary, subjects were able to transfer the use of QARs from science to social studies. Three of the four subjects were able to transfer in all of the QARs categories. Retellings for total comprehension and for the sub classification of Language Use maintained or increased during transfer. QARs responses and retelling text comprehension items may address similar areas of reading comprehension.
Summary of the Findings

The descriptive analysis of subjects' responses to comprehension questions indicates that the intervention of QARs did enhance comprehension in two levels of thinking required for answering some questions. The analysis also showed improvement in subjects' retelling in all classifications. The results of this study also gave indication that subjects are able to transfer QARs from science to social studies text.
CHAPTER 5

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

This chapter presents a restatement of the problem, design and procedures of the study, and findings, conclusions, implications, and suggestions for further research.

Restatement of the Problem

The purpose of the study was to assess the effects of QARs (Questions - Answer Relationships), a metacognitive strategy, on subjects' comprehension of content area text. QARs is a strategy designed to teach students how to analyze the task demands of the questions before answering them.

Studies investigating the effects of QARs have found that students trained in QARs were more successful in answering questions than those not trained in QARs. Other studies have compared students' answers before and after training in QARs. Results have shown that the quality of answers is superior after QARs training. Research has also found that average and low ability students show greater improvement with QARs instruction than high ability students.
The three research questions addressed in the study were:

1. **Does the use of QARs improve subjects' ability to answer comprehension questions?**

2. **Does the use of QARs improve subjects' retelling of content area text?**

3. **Will the subject be able to transfer the strategy from one content area to another content area, specifically from Science to Social Studies?**

### Design and Procedures

The subjects in the study were selected from a seventh grade class at a private school in Tucson Arizona. Subjects were average according to achievement tests and teacher recommendations.

All passages were selected from a seventh grade Science or Social Studies textbook. Six comprehension questions were developed from these passages including two of each QARs category. Students in a graduate class assisted the researcher in developing the questions and verifying the quality of both the passages and questions.

Procedures consisted of two days of pre tests followed by five days of training in QARs. To assess the effect of QARs on comprehension, a post test was then used.
To assess the subjects' ability to transfer the use of QARs to a different content area, a second post test was given the following day.

To support the pre, post, and transfer test results, students' retelling of the passages were analyzed as a second measure of comprehension.

**Scoring of the Data**

Scoring of the data was divided into two parts: scoring of answers to the comprehension questions and scoring of the retellings. Two raters independently scored each response. The following data were scored for answers to the questions:

1. total score and sub scores by specific QARs on the pre test
2. total score and sub scores by specific QARs on the post test
3. total score and sub scores by specific QARs on the transfer test

The following data were scored for retellings:

1. total score and sub score by classification on the pre test
2. total score and sub score by classification on the post test
3. total score and sub score by classification on the transfer test

Subjects were not assessed for their ability to identify each question according to QARs type but rather for correct answers to comprehension questions. Only completely correct responses to the questions received credit.

Retellings were analyzed according to twelve items grouped into three classifications: Text Comprehension, Reader Response, and Language Use.

Findings of the Study

The following findings are based on the results of the data analyses of the QARs results for pre test, post test and transfer test passages:

1. Between pre and post tests, subjects' comprehension mean score increased for total comprehension and for the sub categories of Right There and On My Own.

2. Between pre and post tests, subjects' retelling scores increased for total comprehension and for all sub classifications.

3. Between post and transfer tests, subjects' comprehension scores maintained or increased for total comprehension and for the sub
categories of Right There and Think and Search.
Between post and transfer tests, subjects' retelling scores maintained or increased for total comprehension and for the sub classification of Language Use.

Conclusions

The following conclusions are based on the findings of this study and are not meant to be generalized to a larger population due to the small sample size. The conclusions are also limited to passages derived from similar texts, and to comprehension instruments similar to those used in this study.

1. Training in QARs does improve subjects' ability to answer comprehension questions.
2. Training in QARs does improve retellings of content area texts.
3. Subjects are able to transfer the use of QARs from one content area to another.

Implications

The following implications for research are suggested by the conclusions of this study:

Extending the instructions in QARs may have a
greater effect on the improvement of comprehension and/or the ability to answer comprehension questions.

Style and structure of retellings may be affected not only by training in QARs, but also by the style and structure of the text.

Extending training in QARs may improve subjects' ability to identify questions according to their QARs category.

The following implications for instruction are suggested by the conclusions of the study:

Implementing QARs in content area instruction may enhance subjects' comprehension of text.

Providing classroom instruction on the use of QARs may enable subjects to use the strategy independently while completing assignments.

Training in QARs for instructors may enhance their ability to analyze passages and the accompanying questions found in textbooks.

Use of QARs may help teachers increase their ability to develop and to instruct students in questions that assess different levels of comprehension within their content area of instruction.

Performance on Think and Search type questions may be affected by characteristics of the text (cause and effect, temporal, descriptive, etc.).
Suggestions for Further Research

1. Replication of this study early in the year with a longer period of training, and opportunities to observe student's independent use of QARs.

2. Replication of the study with a delay test of at least three weeks after training in QARs.

3. Replication of this study with more subjects.

4. Replication of this study with passages from other content areas.

5. Replication of this study with comparisons of oral and written retellings.

6. Replication of this study with transfer from social studies to science.

7. Replication of this study including identification of QARs categories on the post test.

8. Replication of this study within a classroom setting during regular school hours.
Vitamins

The body can often change one nutrient into another. For instance, proteins can be changed into sugars. Sugars can be changed into some fats. There are a few nutrients, though, that the body must always obtain directly from food. The body must have a steady supply of these nutrients to work properly. These nutrients are called vitamins.

Early scientists found vitamins in foods difficult to identify. At first, vitamins were identified by letters. Now that the chemical structures of vitamins are known, they have been given chemical names.

There are two groups of vitamins. In one group, there are vitamins that dissolve in fats. In the other group, there vitamins that dissolve in water. Vitamins A, D, E, and K dissolve in fat. Vitamins B and C dissolve in water. Vitamins can be lost when food is cooked in water. Vitamins that dissolve in water are lost when water is drained from food and thrown away.

You are probably familiar with vitamins C and D. Vitamin C is found in oranges, lemons, and other citrus fruits. Vitamin C is needed for healthy connective tissue. Vitamin D is found in butter. The body can produce some vitamin D with the help of sunlight.

Vitamin A is necessary for healthy epithelial tissue. The skin is often the first area to show a lack of vitamin A. Good sources of vitamin A are green and yellow vegetables. The B–complex vitamins are needed for a healthy nervous system.

Getting the full value from vitamins in foods is important. Overweight people might reduce the amount of food they eat. That practice can be dangerous. They might not eat enough of the foods that are rich in vitamins. A lack of vitamins in the diet results in a vitamin deficiency. The Japanese were the first to identify a vitamin deficiency. A disease known as beriberi often affected Japanese sailors. The sailors' main food was rice with the seed coat removed. When whole-grain rice was added to their diets, the disease disappeared. It was later discovered that vitamin B1 prevented berberi. Whole-grain rice contains this vitamin. Scurvy is a disease that attacks teeth and gums, and can lead to death. The British found
teeth and gums, and can lead to death. The British found that limes could prevent scurvy.

Besides vitamins, your body needs minerals. Minerals are chemical elements that are needed for body functions. A normal healthy life depends on obtaining enough vitamins and minerals. However, taking too much of a vitamin can also cause health problems.
APPENDIX B

QUESTIONS FOR SCIENCE PASSAGE

1. What is a vitamin deficiency?

2. What diseases are caused by a vitamin deficiency?

3. How can you find out the right amount of vitamins you should be taking?

4. What kinds of health problems might be caused from taking too much of a vitamin?

5. Why is vitamin A necessary in our diet?

6. Why might it be dangerous for overweight people to reduce the amount of food they eat?
APPENDIX C

RETELLING PROFILE

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>None</th>
<th>Low</th>
<th>Mod</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Retelling includes information directly stated in text.</td>
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<td></td>
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</tr>
<tr>
<td>2.</td>
<td>Retelling includes information inferred directly or indirectly from text.</td>
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<tr>
<td>3.</td>
<td>Retelling includes what is important to remember from the text.</td>
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<td>4.</td>
<td>Retelling provides text-appropriate content and concepts.</td>
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<td>5.</td>
<td>Retelling reflects reader's background knowledge relative to text information.</td>
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<td>6.</td>
<td>Retelling includes summary statements or generalizations which can be applied to the real world.</td>
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<td>7.</td>
<td>Retelling contains highly individualistic and creative impressions or reactions to text.</td>
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<td>8.</td>
<td>Retelling indicates affective involvement with the text on the part of the reader.</td>
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<td>9.</td>
<td>Retelling demonstrates appropriate use of language (vocabulary, sentence structure, language conventions).</td>
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<tr>
<td>10.</td>
<td>Retelling indicates reader's ability to organize or compose the structure of the response.</td>
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<tr>
<td>11.</td>
<td>Retelling demonstrates the reader's sense of audience or purpose.</td>
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<tr>
<td>12.</td>
<td>Retelling indicates reader's control of the mechanics of speaking or writing.</td>
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</tbody>
</table>

**Interpretation:** Items 1-4 indicate text comprehension; Items 5-8 indicate reader's response; Items 9-12 indicate language use.
REFERENCES


