The Comparative Effects of a Modified Self-Questioning Strategy and Story Mapping on the Reading Comprehension of Elementary Students with Learning Disabilities

Lorie K. Taylor,1 Sheila R. Alber,2,3 and David W. Walker2

An alternating treatments design was used to examine the effects of story mapping, a modified self-questioning strategy, and no intervention on literal and inferential reading comprehension of elementary students with learning disabilities. Immediate post-tests indicated that students attained significantly greater comprehension in the self-questioning and story mapping conditions over no intervention. Although students attained similarly high levels of overall comprehension when they used story mapping and self-questioning, students scored slightly higher on inferential comprehension questions in the self-questioning condition. Additionally, 4 out of the 5 students indicated a preference for the self-questioning strategy.

KEY WORDS: story mapping; self-questioning; reading comprehension; learning disabilities.

INTRODUCTION

The ability to read and comprehend written material is crucial for attaining success in school and adulthood. Unfortunately, most students with learning disabilities experience substantial reading deficits that become more pronounced as they progress through school and as reading requirements become more demanding (Carnine, Silbert, & Kameenui, 1997; Deshler, Ellis, & Lenz, 1996). Specifically,
students with learning disabilities have difficulty attending to the meaning of the text, using prior knowledge, making inferences, identifying the main idea, monitoring their comprehension, and remembering facts (Bos & Vaughn, 1994; Mercer & Mercer, 2001; Oakhill & Patel, 1991). Fortunately, direct instruction in specific reading strategies has been documented to improve reading comprehension (e.g., Collins, 1997; Ellis, 1994; Graham, Harris, MacArthur, & Schwartz, 1997; Pressley et al., 1995; Pressley et al., 1992).

Reading strategies promote students’ effective interaction with the text by enabling them to merge new information with their prior knowledge, monitor their comprehension as they read, and direct their own learning (Lerner, 1997). Students with learning disabilities, who typically have difficulty with reading tasks, can benefit from strategy training that enables them to actively respond to the written material. The two reading strategies we investigate in the study—self-questioning and story mapping—have been demonstrated to be effective for a wide range of learners. The purpose of this study is to examine the comparative effects of self-questioning and story mapping on the literal and inferential reading comprehension of students with learning disabilities. Determining the more effective approach has implications for special education practitioners planning and implementing best practices for improving their students’ reading skills. The following sections review the literature on story mapping and self-questioning.

**Story Mapping**

Story mapping is a reading comprehension intervention in which the student creates a visual representation of the story by writing the important elements (e.g., character, setting, problem, etc.) on a graphic organizer (Swanson & De La Paz, 1998). Students with reading disabilities tend to have a poorly developed understanding of text structure hindering their ability to make important connections (Lerner, 1997; Montague, Maddux, & Dereshiwski, 1990). Attending to structural elements of a narrative through story mapping helps students think about the story as they read resulting in increased reading comprehension (Mathes, Fuchs, & Fuchs, 1997). For example, an examination of the effects of story mapping instruction shows substantial gains on story grammar test performance of 6 middle school students with learning disabilities (Gardill & Jitendra, 1999). Over a period of 8 to 12 days, the use of modeling, guided practice, independent practice, and error correction procedures demonstrates increases in test item accuracy from the baseline condition to the independent condition (Baseline: \( M = 18\% \) to 53\%; Independent: \( M = 75\% \) to 93\%).

Story mapping has also been demonstrated to improve reading comprehension for first graders (Bauman & Bergeron, 1993); third, fourth, and fifth graders (Davis, 1994; Idol, 1987); elementary students with learning disabilities (Idol & Croll, 1987); middle school students with mild disabilities (Boyle, 1996; Vallecorsa &
Self-Questioning and Story Mapping

deBettencourt, 1997); and secondary students with learning disabilities or at risk for reading failure (Dimino, Gersten, Carnine, & Blake, 1990; Gurney, Gersten, Dimino, & Carnine, 1990). This body of research reveals that students ranging in grade and ability levels can attain improved literal and inferential comprehension as a result of direct instruction in text structure and organizational mapping. Much of the story mapping research documents positive effects for students with disabilities, however the self-questioning research tends to focus on students without disabilities.

Self-Questioning

Self-questioning is a procedure in which students stop periodically while reading to ask and answer questions related to the text. Actively responding to the reading passage in the form of self-questioning is effective for monitoring and increasing comprehension of written material (e.g., Chan, 1991; Davey & McBride, 1986; Graves & Levin, 1989; Nolte & Singer, 1985). Additionally, various forms of self-questioning strategies improve literal and inferential comprehension for students ranging in age and ability levels. For example, in an examination of the effects of self-questioning on middle school students with below-grade-level reading comprehension skills, Nolan (1991) demonstrates that a self-questioning plus prediction treatment is more effective than a control vocabulary treatment and a self-questioning only treatment for answering comprehension questions accurately.

Self-questioning has also been demonstrated to be effective for improving the reading comprehension of elementary school students (Chan, 1991; Davey & McBride, 1986; Graves & Levin, 1989; Nolte & Singer, 1985); middle school students (Graves & Levin, 1989; Malone & Mastropieri, 1992; Wong & Jones, 1982); college students (King, 1992); and preservice teachers (King, 1991). Common components of each of the self-questioning studies include direct instruction, guided and independent practice, and corrective feedback. Much of the research examining self-questioning requires the students to create their own questions to monitor their reading comprehension. However many students with disabilities are functioning at a level which may preclude their ability to create their own questions. In this study we examine a modified self-questioning procedure in which students are provided with a list of generic questions, prompts indicating when they should self question, and tape recorders which allow them to review their responses.

Although there have been several studies that investigate the outcomes of story mapping and self-questioning training, we can find no research indicating which of these strategies is more effective for increasing literal and inferential reading comprehension of students with learning disabilities. This following research questions are addressed in this study: What are the effects of story mapping
training on the accuracy with which students with learning disabilities complete story maps? What are the effects of self-questioning strategy training on the accuracy with which students with learning disabilities answer self-questions? What are the comparative effects of story mapping, self-questioning, and no intervention on the literal and inferential reading comprehension of elementary students with learning disabilities as measured by immediate post-tests? What are the students’ opinions of the story mapping and self-questioning strategies?

**METHOD**

**Participants**

Five third through sixth graders with learning disabilities (4 boys, 1 girl, ages 9–12) enrolled in a small town Mississippi public elementary school participated in this study. Michele, Leroy, and Michael were receiving special education services in a resource room one period per day for reading and spent the rest of the day in general education classrooms. Justin and Joseph attended general education classes for all subjects, and received assistance from the special education teacher for one period per day in the regular classroom. The students were selected for this study because they exhibited substantial deficiencies in reading comprehension. Table I shows demographic information for each student. Table I also includes standard scores obtained on the basic reading and reading comprehension subtests of the Wechsler Individual Achievement Test. The basic reading subtest assesses decoding and sight reading, and the reading comprehension subtest assesses comprehension of detail, sequencing, cause-and-effect relationships, and inference. This study began after approval was received from The University of Southern Mississippi Human Subjects Review Board.

**Setting**

This investigation was conducted in the students’ special education resource room. The special education teacher provided the students with training in the story

<table>
<thead>
<tr>
<th>Student</th>
<th>Gender</th>
<th>Age</th>
<th>Ethnicity</th>
<th>Yrs. in special Ed.</th>
<th>Basic reading</th>
<th>Reading Comp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Justin</td>
<td>Male</td>
<td>9.7</td>
<td>Caucasian</td>
<td>3</td>
<td>24</td>
<td>15</td>
</tr>
<tr>
<td>Michael</td>
<td>Male</td>
<td>12.6</td>
<td>Af. Amer.</td>
<td>5</td>
<td>29</td>
<td>18</td>
</tr>
<tr>
<td>Joseph</td>
<td>Male</td>
<td>11.4</td>
<td>Af. Amer.</td>
<td>5</td>
<td>24</td>
<td>19</td>
</tr>
<tr>
<td>Leroy</td>
<td>Male</td>
<td>12.2</td>
<td>Af. Amer.</td>
<td>5</td>
<td>19</td>
<td>11</td>
</tr>
<tr>
<td>Michele</td>
<td>Female</td>
<td>10.11</td>
<td>Caucasian</td>
<td>3</td>
<td>16</td>
<td>11</td>
</tr>
</tbody>
</table>

*Standard score on Basic Reading subtest of Wechsler Individual Achievement Test.*

*Standard score on Reading Comprehension subtest of Wechsler Individual Achievement Test.*
Self-Questioning and Story Mapping

mapping and self-questioning procedures, implemented the daily data collection procedures, and administered comprehension tests.

Dependent Variables

Story Map Response Accuracy

Each story map the students completed prior to taking the comprehension test was assessed for accuracy. The first author developed a story map key for each assigned reading selection that listed the possible correct student responses for each item. After reading the story, the students completed a story map which consisted of the following sections: main characters, setting, problem, major events (the student was expected to list 4), and story outcomes. Each response counted as one item. A response was counted as correct if it matched one of the possible responses listed on the answer key. Unanswered or partially answered items were scored as incorrect. Percent accuracy was calculated by dividing the number of correct responses by the total number items on the story map and multiplying by 100.

Self-Questioning Response Accuracy

Prior to taking the comprehension test, the students answered orally into a tape recorder a list of 10 generic questions printed on a laminated card (e.g., Who is the main character? Where does the story take place? When does the story take place? How is the main character trying to solve the problem?) at 2 predetermined points within the reading selection and once more upon completion of the story. At each stopping point in the story, students were required to answer all 10 of the self-questions. If the students did not have enough information to answer a particular question at the first or second stopping point, they were instructed to say, “cannot answer.” Students were expected to re-answer questions or modify their answers at each stopping point. The teacher indicated where the two predetermined stopping points were by marking a star at each point in the reading passage. The star signaled the students to turn on the tape recorder and begin self-questioning for all 10 questions. At the end of the story, the students were permitted to rewind the tape to review their answers before giving their final 10 answers. The first author developed an answer key listing acceptable answers for each question. A response was counted as correct for each question if it matched one of the possible responses listed on the answer key. Unanswered or partially answered questions were scored as incorrect. Percent accuracy was calculated by dividing the number of correct responses by the total number questions multiplying by 100.
Comprehension Tests

For each condition, the students completed a comprehension test after reading the story. The comprehension test consisted of a total of 10 open-ended questions, 5 literal and 5 inferential, about specific events in the story. The literal comprehension questions required students to recall explicitly stated details from the reading selection (e.g., “What did Jerome tell the dragon to burn?” “How did the wizard turn into a little boy?”), and the inferential questions required students to conclude information from the story which was not explicitly stated (e.g., “Why did the people of the town want to get rid of the dragon?” “Why did the people of the town begin to think that Jerome was really a prince?”). The students were required to read the questions aloud to the teacher to ensure the question was read correctly. If a question was read incorrectly, the teacher reread the question. Justin, Joseph, and Michael were given 15 minutes to write their responses to all 10 questions. Due to their limited writing skills, Leroy and Michele were given 30 seconds to orally state a complete answer to each question and the teacher wrote down the student’s answer verbatim.

During the comprehension test, the students were given no prompts or hints by the teacher, and were not allowed to refer to their story maps or audiotapes. The teacher developed an answer key listing possible correct responses for each question. A response was counted as correct for each question if it matched one of the possible responses listed on the answer key. Unanswered or partially answered items were scored as incorrect.

Procedures to Assess Believability of Data

Examination of Stories

The teacher selected 33 stories at the students’ independent reading level and developed comprehension questions for each story, then randomly assigned each story and corresponding comprehension test to each of the 3 conditions: story mapping, self-questioning, and no intervention. She then asked two teachers to examine the stories and test questions to determine that they were approximately equal in difficulty level.

Interobserver Agreement

A general education teacher with 20 years teaching experience independently scored 25% of the story maps, self-questioning answers, and comprehension test answers for each student. Mean interobserver agreement (IOA) was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. Mean IOA for story maps and comprehension
Self-Questioning and Story Mapping checks for all students was 100%. Mean IOA for self-questioning for all students was 98%.

Procedural Reliability

Another observer, a general education teacher with 22 years teaching experience, was present for 7 (21%) of the 33 sessions to assess procedural reliability. The observer followed and marked a procedural checklist during each observation. For each session observed, the special education teacher followed the procedures in the correct sequence to 100% accuracy.

Experimental Design

An alternating treatments design (Cooper, Heron, & Heward, 1987) was used to compare the effects of the story mapping, self-questioning, and no intervention on each student’s reading comprehension test performance. Data were collected on three sessions per week (Monday, Tuesday, and Wednesday). Before data collection began and every third session afterwards, the teacher put 3 slips of paper in a hat with the words “no intervention,” “story mapping,” and “self-questioning” printed on them. The order in which the slips of paper were drawn designated the condition for the first, second, and third session of each week. The procedures for each condition were as follows:

No Intervention

The teacher directed the student to read the story orally. Upon completion of the story, the teacher gave the student the 10 comprehension test questions and directed the student to write the answers (Justin, Joseph, and Michael) or to state the answers (Michele and Leroy). The “no intervention” condition was designed to function as a baseline.

Story Mapping

The teacher directed the student to orally read the story. Upon completion of the story, the teacher gave the student a story map and directed him or her to complete it. Justin, Joseph, and Michael wrote out each of the story elements in the designated areas of the story map. Leroy and Michele dictated the answers to the teacher who wrote their responses verbatim on the story map. After the story map was completed, the student was given 5 minutes to review the story map independently. Then the teacher took the story map from the student, gave the student the 10 comprehension test questions, and directed the student to write the answers (Justin, Joseph, and Michael) or to state the answers (Michele and Leroy).
Self-Questioning

The teacher directed the students to orally read the story, stop at each point marked in the book (about every 2–3 pages), ask themselves the 10 generic questions printed on the laminated card, and tape record their answers on an audiotape. This self-questioning procedure occurred twice during the story and one last time upon completion of the story. The student was allowed to change any answers at any stopping point. Prior to taking the comprehension test, the student was allowed to rewind the tape recorder and review his or her answers. Then the teacher collected the tape recorder, gave the student the 10 comprehension test questions, and directed the student to write the answers (Justin, Joseph, and Michael) or to say the answers (Michele and Leroy).

Training Procedures for Story Mapping and Self-Questioning

Prior to data collection, the special education teacher trained Michele, Leroy, and Joseph in the story mapping procedure across five 40-minute training sessions while Justin and Michael received self-questioning training. Michele, Leroy, and Joseph then received self-questioning training while Justin and Michael received story mapping training. Justin and Michael were trained each day at 8:00 a.m. in the use of story mapping the first week and self-questioning the second week. Michele, Joseph, and Leroy were trained at 9:00 a.m. each day in the use of self-questioning the first week and story mapping the second week. The training procedures for story mapping are outlined in Table II, and the training procedures for self-questioning are outlined in Table III. At the end of each training session, all students attained at least 90% accuracy on their story maps and self-questioning responses.

RESULTS

First, the experimenters assessed the effects of story map training and self-questioning training on the accuracy with which the students completed their story maps and self-questioning responses during each session prior to taking the comprehension tests. The accuracy of responses was high for all students in both conditions, but slightly higher in self-questioning (see Table IV). The mean percent correct for story map items ranged from 81.9% to 92.8% ($M = 85.8\%$; $SD = 4.3$), and the mean score for the self-questioning responses ranged from 88.2% to 94.6% ($M = 91.6\%$; $SD = 2.9$).

Secondly, the experimenters assessed the effects of story mapping and self-questioning on comprehension test accuracy for each condition: self-questioning,
Self-Questioning and Story Mapping

Table II. Story Mapping Training

<table>
<thead>
<tr>
<th>Day 1</th>
<th>The teacher:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>led a discussion about improving reading comprehension</td>
</tr>
<tr>
<td>2.</td>
<td>showed and explained story maps to students</td>
</tr>
<tr>
<td>3.</td>
<td>used overhead transparencies to present story map elements while students completed guided notes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day 2</th>
<th>The teacher:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>reviewed story map elements using a pre-printed response card activity in which students identified story elements</td>
</tr>
<tr>
<td>2.</td>
<td>read a story to the students</td>
</tr>
<tr>
<td>3.</td>
<td>modeled story map completion using an explicit think-aloud procedure</td>
</tr>
<tr>
<td>4.</td>
<td>asked students to respond to story map items (e.g., Who are the main characters?) by writing their answers on individual dry-erase boards</td>
</tr>
<tr>
<td>5.</td>
<td>led discussion of students’ responses</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day 3</th>
<th>The teacher:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>reviewed with students the story map elements</td>
</tr>
<tr>
<td>2.</td>
<td>administered a quiz on story map elements</td>
</tr>
<tr>
<td>3.</td>
<td>read story to students</td>
</tr>
<tr>
<td>4.</td>
<td>asked students place pre-printed sentence strips corresponding to the story on a large story map and discussed with students their selections</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day 4</th>
<th>The teacher:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>returned quizzes and provided feedback</td>
</tr>
<tr>
<td>2.</td>
<td>read story to students</td>
</tr>
<tr>
<td>3.</td>
<td>elicited student responses to complete a story map the on overhead projector while students completed their individual story maps</td>
</tr>
<tr>
<td>4.</td>
<td>administered a comprehension quiz on the selected story</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day 5</th>
<th>The teacher:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>provided feedback on comprehension quizzes from Day 4</td>
</tr>
<tr>
<td>2.</td>
<td>asked students to read story independently and complete a story map independently</td>
</tr>
<tr>
<td>3.</td>
<td>provided individual feedback</td>
</tr>
</tbody>
</table>

The experimenters used the Mann Whitney U to analyze the differences between self-questioning and story mapping, self-questioning and no intervention, and story mapping and no intervention. The Mann Whitney U is a statistical test appropriate for single subject research in which the percentage of overlapping data points is analyzed to determine if there is a significant difference between conditions. Using a probability level of <.05, there were no significant differences between self-questioning and story mapping for all 5 students (range: .660 to .059; see Figures 1 and 2). However, significant differences were found for each student when comparing self-questioning to no intervention (range: .002 to .000) and story mapping to no intervention (range: .005 to .000). For all 5 students, the data paths for the story mapping and self-questioning conditions frequently overlapped, but there was little to no overlapping of the "no intervention" data path with either of the two interventions.

For all 5 students, mean comprehension test scores in the story mapping and self-questioning conditions were high, with a difference of .51 favoring the
Table III. Self-Questioning Training

Day 1  The teacher:
1. defined and provided a rationale for self-questioning
2. presented 10 generic self-questions (Where does the story take place?)
3. discussed each of the self-questions with students
4. used overhead transparencies to present self-questioning procedures while students completed guided notes

Day 2  The teacher:
1. reviewed self-questioning information from Day 1
2. modeled self-questioning procedures using an explicit think-aloud procedure using the tape recorder
3. provided practice for self-questioning procedures using the tape recorder

Day 3  The teacher:
1. reviewed self-questioning
2. led a guided practice in which students took turns reading and tape recording the self-questions and their answers
3. provided students with individual dry erase boards to write the answers to comprehension questions the teacher asked

Day 4  The teacher:
1. gave the students laminated cards with self-questions printed on them
2. instructed students to read a story independently, and tape record self-questions and answers at designated points
3. listened to the audio tape with individual students and provided feedback

Day 5  The teacher repeated the procedures from Day 4

self-questioning condition (see Figure 3). The mean test scores for the story mapping condition ranged from 7.82 to 9.0 correct answers, and for self-questioning the range was 8.73 to 9.19. The mean scores for no intervention for all students ranged from 4.28 to 7.28. Using a 70% passing criterion, 4 out of 5 students averaged a failing grade in the no intervention condition.

The mean number of literal and inferential comprehension questions answered correctly in each condition by each student were also analyzed (see Figure 4). All students scored higher on literal than inferential comprehension questions during the no intervention and the story mapping conditions. However, in the self-questioning condition, Justin, Joseph, Leroy, and Michael scored slightly higher on the inferential questions.

Table IV. Mean Percent Accuracy of Story Map Responses and Self-Questioning Responses for Each Student Prior to Taking the Comprehension Tests

<table>
<thead>
<tr>
<th>Student</th>
<th>Story map responses</th>
<th>Self-questioning responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joseph</td>
<td>80.9</td>
<td>88.2</td>
</tr>
<tr>
<td>Michael</td>
<td>81.9</td>
<td>88.2</td>
</tr>
<tr>
<td>Justin</td>
<td>92.8</td>
<td>92.8</td>
</tr>
<tr>
<td>Leroy</td>
<td>87.3</td>
<td>94.6</td>
</tr>
<tr>
<td>Michele</td>
<td>86.4</td>
<td>94.6</td>
</tr>
<tr>
<td>Mean for all students</td>
<td>85.8</td>
<td>91.6</td>
</tr>
</tbody>
</table>
Self-Questioning and Story Mapping

Fig. 1. Number of comprehension test questions answered correctly by Justin, Michael, and Joseph in each condition.
A week after the last day of data collection, the teacher interviewed each student individually to determine his or her opinion of story mapping and self-questioning. Although all of the students indicated that both story mapping and self-questioning helped them comprehend the stories, 4 out of 5 students preferred self-questioning. These four students indicated that they enjoyed using the tape recorder and listening to themselves after rewinding the tape. One student stated, “I can’t answer those questions unless I think about what’s happening in the story. This helps me remember what was happening when I answer the test questions.” One student preferred story mapping because he did not like to be interrupted in the middle of the story to answer “a bunch of questions.”
DISCUSSION

This study indicates that through systematic training, elementary students with learning disabilities can complete story maps and answer self-questions with a high degree of accuracy. Training for both conditions included the use of guided notes, response cards, modeling with think alouds, guided practice activities, feedback, and independent practice. The complete training package for each condition evidently was successful for teaching the students the reading comprehension strategies within a relatively short time period. However, we cannot draw
conclusions about which specific variables of training were most effective for promoting student learning.

Overall, the main findings from this study indicate that both story mapping and self-questioning were effective strategies for increasing reading comprehension. This study supports the existing research on the effectiveness of story mapping (Bauman & Bergeron, 1993; Davis, 1994; Idol, 1987; Idol & Croll, 1987) and self-questioning (Chan, 1991; Davey & McBride, 1986; Graves & Levin, 1989; Nolte & Singer, 1985) for elementary students, and extends this research to Mississippi elementary students with learning disabilities.
Factors common to both interventions that may have influenced the students’ success include their active responding to the text (Idol, 1987; King, 1992; Wong, 1998), and their attention directed to the important story elements (Idol, 1987; King, 1992; Reutzel, 1984). Focusing on story elements may promote reading comprehension because it can help the student store and retrieve information (Baumann & Bergeron, 1993; Idol, 1987; Reutzel, 1985).

Although there was no statistical significance indicating which reading strategy was more effective, most students scored slightly higher on the comprehension tests in the self-questioning condition. One of the reasons for this outcome is that, in addition to having more opportunities to respond to the reading selection, the students also tended to elaborate more when responding to the self questions verbally into the tape recorder. Previous research has demonstrated that enhanced recall may be related to elaboration (Pressley, Symons, McDaniel, Snyder, & Turnure, 1988). Additionally, the students rewound the tape and listened to their answers, and the variable of repeated listenings also has been demonstrated to increase retention (Brown, Dunne, & Cooper, 1996).

The data in this study also indicate that students scored high on both literal and inferential comprehension questions in the story mapping and self-questioning conditions compared to the no intervention condition. However, of the three experimental conditions, students only scored higher on the inferential questions during self-questioning. This outcome lends support to the possibility that self-questioning may promote inferential comprehension. Self-questions may require the student to think about and draw conclusions about information that is not explicitly stated in the story. For example, the story may not have explicitly stated the answer to the question, “How is the main character trying to solve the problem?” The reader may have to infer the answer to that question.

In the story mapping condition, the students were expected to complete the story map based upon more explicitly stated information (e.g., main character, setting, problem). Despite the probability that story map completion may require less skill with inferential comprehension, students answered inferential comprehension questions with a high degree of accuracy in the story mapping condition. Possible ceiling effects may have influenced the relatively small differences in the types of questions the students answered correctly in the story mapping and self-questioning conditions.

**Limitations and Future Research**

We were unable to collect baseline data prior to implementing the reading strategy interventions because of time constraints. The collection of baseline data would have probably provided more support for a functional relationship between the two interventions and increased reading comprehension. However, in this alternating treatments design, the no intervention condition may have served as an
adequate baseline condition because it allowed a comparison between the interventions and absence of interventions. Future research should attempt to collect baseline data as well as maintenance and generalization data.

Another limitation of this study was that the effects of story mapping and self-questioning were examined on only 5 students with learning disabilities. In order to extend the generalization of these reading comprehension strategies, future research should examine the effects of story mapping and self-questioning on various populations of students ranging in age and ability levels. In addition, the students in this study were trained to use the reading comprehension strategies in the special education resource room with one type of reading material, and data on the effects of the strategies were collected in the resource room only. Although the students successfully acquired story mapping and self-questioning skills after training, data were not collected on the extent to which the students were able to generalize these skills to other settings. Future research should incorporate a generalization training component which attempts to assess the students’ independent use of the skill in classrooms other than where training occurred with different types of content area reading material. For example, generalization training might first provide guided practice in different settings with other types of reading materials. Then the students can be prompted to use these strategies when the trainer is not present, self-assess their performance, and report their performance back to the trainer.

The students in this study were trained to self-question using a list of generic questions, prompts to self-question, and a tape recorder. Future research on self-questioning should include a training component in which the students can transition to creating their own self questions and determining independently the points in the story when they will self-question. Future research should also attempt to assess the extent to which students maintain the skill over time.

In order to document that the students actually read the story, the teacher required the students to read aloud during the training and data collection sessions. Additionally, the teacher prompted the students to use each strategy. So it is not known if the students would continue to use these strategies independently or during silent reading activities. Since many students are expected to read silently, especially as they get older, future research might examine the effects of story mapping and self-questioning training on reading comprehension during silent reading tasks. Future research might also attempt to assess independent or spontaneous use of the specific strategies.

Another limitation of this study was that the comprehension checks only assessed each student’s immediate recall of literal and inferential information. So the authors were unable to determine if either intervention had differential effects on the students’ retention of the reading material over time. Future research should attempt to assess delayed recall of the reading selection by administering a comprehension test on the following day and/or a maintenance test every couple
Self-Questioning and Story Mapping of weeks. This may be especially relevant for content area reading assignments in which students are expected to comprehend and remember the concepts or information over time.

The teacher trained the students in small groups of two or three. Small group instruction provided more individualized attention to students than might occur in a regular classroom. This degree of individual attention may have enhanced the effectiveness of the training. Future research might examine the effects of the story mapping and self-questioning training on large groups of students as this may be a more efficient use of time.

Implications for Practice

The results of this study indicate that both story mapping and self-questioning are effective strategies for teaching reading comprehension, and students with learning disabilities can acquire these skills within a short time period. The training time for each strategy only required five 40-minute sessions. Because story mapping and self-questioning both yielded similarly high results on the comprehension tests, teachers have a choice about which method to select. Students who tend to be visual learners may have more success with story mapping, while auditory learners or students who need more repetition may be more successful using the tape recorder for the self-questioning strategy.

Student preferences may also play a role when deciding which strategy to select. Four students in this study preferred self-questioning because they stated they enjoyed using the tape recorder. One student did not like being interrupted during the story to self-question and preferred story mapping. The teacher may want to assess preferences when deciding which strategy to use because students who engage in academic tasks they enjoy are likely to have increased success (McNeish, Heron, & Okyere, 1992). The use of the tape recorder in this investigation was a novelty to the students, so the teacher must consider the possibility of student enthusiasm diminishing over time.

The use of systematic instruction during training for both reading comprehension strategies was demonstrated to be effective. Practitioners can use the instructional techniques employed in this investigation, and make modifications to the procedures to suit their own unique teaching situations. Examples of procedural modifications may include instruction to larger groups, the number of trials needed to attain mastery, and variations of active student responding modes. Teachers may also want to consider having the students develop their own self-questions or story maps after they have demonstrated an independent level of mastery. It is important to remember that instruction must be tailored to the individual needs of students with disabilities, and teachers must frequently assess the effectiveness of any teaching method to make timely instructional decisions about any modifications that need to be made.
REFERENCES


Self-Questioning and Story Mapping


