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The Effects of a Story-Mapping Procedure to Improve the Comprehension Skills of Expository Text Passages for Elementary Students With Learning Disabilities

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The purpose of this study was to examine the effects of using a story-mapping procedure to improve and enhance the reading comprehension skills using expository text passages for 3 fourth-grade students with learning disabilities (LD). The study was conducted in the resource classroom in which the participants regularly received reading instruction. A multiple-probe design across participants (Alberto & Troutman, 2009) was utilized to evaluate the effects of the procedure to facilitate the students' comprehension of expository text passages. The participants were individually instructed on common elements of a story and taught to complete a story map while reading expository text passages. After completing the story map, the participants answered five comprehension questions about the selection. Results of the study indicated that the use of the story-mapping procedure improved all three participants' percentage of correct comprehension questions of expository text passages. In addition, the results also revealed immediate improvements from the baseline to intervention phase; and maintenance probes suggested that the effects of the intervention were sustained even after two weeks with no story-mapping instruction. Limitations of the study, implications for practice for classroom teachers, and suggestions for future research are discussed.

Keywords: Story-Mapping; Reading Comprehension; Expository Text Passages; Elementary; and Learning Disabilities

Today, more than ever, the ability to read and comprehend text is crucial to achieving success in school and in the working world. Reading comprehension is often a challenge for students, especially those in the elementary grades, but even more so for students with learning disabilities (LD) (see Block & Pressley, 2002; Dole, Duffy, Roehler, & Pearson, 1991; Gersten, Fuchs, Williams, & Baker, 2001; Mastropieri & Scruggs, 1997; Mastropieri, Scruggs, Bakken, & Whedon, 1996; Pearson & Hamm, 2005; Pressley, 1991, 1998; Swanson, 1999; Talbott, Lloyd, & Tankerslely, 1994, for reviews). Currently, the LD population in America's schools is higher than ever, and continuing to grow (Hallahan, Lloyd, Kauffman, Weiss, & Martinez, 2005). While each child has her or his own unique strengths and weaknesses, among the LD population the most common deficits have been found in the area of reading (DiCecco & Gleason, 2002).

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Reading comprehension is the process of constructing meaning from words. Comprehension goes beyond simply recognizing words and sentences on a page, but instead is the ability to make connections and generate understanding from those words (National Reading Panel, 2003). Comprehension is an important skill not only in language arts and reading classes, but also across content areas and grade levels. The ability to comprehend written text is an essential component of learning, yet it is an area in which many students continue to struggle and fall short.

Explicit reading instruction that is effectively implemented is key in the classroom (Faggella-Luby & Deshler, 2008). While good readers learn, understand, and can choose appropriate comprehension strategies to use while reading, less skilled readers or those with LD have a more difficult time. Students with LD in the elementary grades struggle to comprehend narrative and expository texts presented to them. As they get older and materials become more difficult, they are expected to read more complex works such as textbooks and novels (Gardill & Jitendra, 1999). Without comprehension skills, these students not only fall behind their peers, but lose self-confidence and willingness to achieve success (Hallahan et al., 2005).

There are many evidence-based strategies that have been found effective for enhancing students' comprehension skills. These strategies are used by readers, especially good readers, to help them better understand, learn, and remember what they read. Reading comprehension strategies are an important element in helping a child become an independent and fluent reader (National Reading Panel, 2003). While there is a large body of research in the area of reading, only a small portion of this literature relates to reading comprehension instruction and students with LD. Within the current research, several reading comprehension methods have been found effective. In particular, the effectiveness of using a story-mapping procedure as a comprehension strategy has been documented extensively (Babyak, Koorland, & Mathes, 2000; Baumann & Bergeron, 1993; Boulineau, Fore, Hagan-Burke, & Burke, 2004; Boyle, 1996; Davis, 1994; DiCecco & Gleason, 2002; Dimino, Gersten, Carnine, & Blake, 1990; Faggella-Luby, Schumaker, & Deshler, 2007; Fore, Scheiwe, Burke, & Boon, 2007; Gardill & Jitendra, 1999; Gurney, Gersten, Dimino, & Carnine, 1990; Idol, 1987; Idol & Croll, 1987; Li, 2007; Onachukwu, Boon, Fore, & Bender, 2007; Taylor, Alber, & Walker, 2002; Vallecorsa & deBettencourt, 1997).

Review of the Literature

"A story map is a graphic organizer with story-grammar elements as headings. The visual prompts appear to cue students to recognize text structure as they read text" (Onachukwu et al., 2007, p. 29). Generally, a story map includes elements such as setting, character, events, problem, solution, and theme. While some story maps may differ in appearance and elements included, they all provide a guide for recording, organizing, and comprehending information about a topic.

Story-mapping has been used across grade levels and content areas and has proven to be successful in the area of reading comprehension (Beck & McKoewn, 1981). Some notable early studies were conducted by Idol (1987) and Baumann and Bergeron (1993). Idol (1987) taught 27 third- and fourth-grade students to use a story-mapping strategy to improve comprehension of narrative texts. The story map instruction focused primarily on characters, time, place, problem, goal, action, and

outcome. Results from this multiple baseline study across participants showed that using story maps produced a positive effect on the students' ability to comprehend the texts. Similarly, Baumann and Bergeron (1993) investigated the effects of story-map instruction on the narrative comprehension of first-grade students. Instruction focused on several story-grammar elements, such as character, place, time, problem, and solution. Results indicated that those students who received instruction with the story map outperformed students who did not receive instruction.

Story-mapping has also been demonstrated to improve reading comprehension in (1) upper-elementary school students with LD (Davis, 1994; Idol & Croll, 1987); (2) middle school students with mild disabilities (Boyle, 1996; Vallecorsa & deBettencourt, 1997); and (3) secondary students with LD (Dimino et al., 1990; Gurney et al., 1990). More recently, there have been four recent studies that have shown that story-map instruction increased elementary and middle school students' reading comprehension skills.

In the first study, Gardill and Jitendra (1999) utilized a multiple baseline design across participants to teach narrative story elements to six middle school students with LD (sixth through eighth grade). The study assessed three aspects of story-mapping: (1) the degree to which story-map instruction impacted reading comprehension skills, (2) the generalization of strategy effects to novel passages, and (3) impacts on oral story retells. The intervention included a teacher model, teacher feedback, and independent practice phases. After reading a passage, students were given a story map and a comprehension test; and the total percentage of story elements and of basal comprehension questions answered correctly was recorded for each student. Results indicated an increase in the percentage of correct answers on all six students' comprehension tests. These results were maintained during the generalization and maintenance conditions as well.

A second study, by Babyak et al. (2000), investigated the effects of a story-mapping procedure on the reading comprehension skills of four upper-elementary school students with behavior disorders. The participants attended a summer school program for students with behavior disorders and were reading several grade levels below their current grade. Each student was individually administered the story-mapping intervention, which included the teaching of characters, settings, problems, events, and outcomes. During the intervention, students were required to read several passages, retell the passages in their own words, complete a story map, and answer comprehension questions related to the stories. Results indicated that the implementation of the story-map intervention effectively helped increase the percentage of correct responses to comprehension questions. Also, all four students increased their accuracy of story problem identification, but were unable to improve their ability to identify the main idea of a passage.

In the third study, conducted by Boulineau et al. (2004), a descriptive ABC design was used to examine the effects of story-mapping on the reading comprehension performance of six elementary school students with LD. During the baseline condition, student performance on story-grammar elements was probed, but no instruction was provided. During the intervention condition, direct instruction of story-grammar elements using the story-grammar map was provided by the teacher. In the final phase (maintenance), the teacher withdrew all instruction. After students

read each story and completed a story map, their progress was assessed by calculating the percentage of correct items completed on each story map. Results indicated an increase in percentage of correct story-grammar elements for each student from baseline to the intervention conditions. These effects continued for all participants through the maintenance phase.

Last, Onachukwu et al. (2007) examined the effects of using a story-mapping procedure to improve the reading comprehension of three middle school students with LD. A multiple baseline design across participants was utilized to evaluate the effects of the procedure. The participants were members of an eighth-grade inclusive classroom in a public middle school. During baseline, students independently read assigned stories and answered comprehension questions. No instruction or feedback from the teacher was given during this condition. The next phase was training, during which time the teacher provided individual instruction in the story-grammar elements using the story map. The first participant received guided practice until a score of at least 80% was reached for two consecutive sessions on the reading comprehension tests and on identification of story elements. During intervention, the participant independently read a story, completed a story map, and answered comprehension questions. This phase continued until the participant answered 80% of the comprehension questions correctly during three consecutive sessions. The intervention was then introduced to the next participant until all three participants had received treatment. Maintenance data was also collected. Results indicated immediate improvements in the percentage of correct comprehension questions, following the implementation of the story-mapping intervention. Effects remained high through the maintenance condition, even without the use of the story map.

As demonstrated in these studies, story-mapping is an effective way to enhance reading comprehension in students with LD. However, the current research has several limitations. Primarily, two single-subject research designs were utilized in past studies: descriptive and multiple baseline across participants' designs. In the Boulineau et al. (2004) study, favorable results were found and maintained using a descriptive three-phase design. While they provided exceptional procedures, unfortunately only correlational conclusions could be made from their findings. The current research also lacks studies that focus *specifically* on the use of a story-mapping procedure with expository text passages. While there are studies that combine the use of narrative and expository texts, these are limited to secondary settings. Last, studies, such as Onachukwu et al. (2007), combined the use of story-mapping with a global measure of comprehension (comprehension questions) to enhance their findings, but again this type of study has only been conducted in a middle school setting.

Therefore, the purpose of the present study is to replicate and extend previous findings on the effectiveness of a story-mapping procedure on the reading comprehension of elementary students with learning disabilities. Previous procedures were manipulated to include expository texts, and the following research question is presented: What are the effects of a story-mapping procedure on the ability of elementary students with learning disabilities to answer comprehension questions about expository passages?

Method

Participants

Three elementary-aged students with learning disabilities participated in this study. All participants were in fourth grade and attended a public elementary school in rural northern Georgia. All three participants were male; two Caucasian and one African American. The school contained approximately 900 students in kindergarten through fifth grade. Each student chosen for participation in the study had met the state of Georgia's eligibility criteria for a specific learning disability (SLD) and received special education services in a resource classroom for students with mild disabilities at the time of the study. All participants were also members of a general education classroom and received additional services in reading, writing, and/or math. These students had been found eligible under the discrepancy model in accordance with IDEA (2004) regulations.

Students selected for participation in this study met the following requirements: Each (1) had no previous exposure or instruction using a story-mapping procedure; (2) scored at least two grade levels below current grade placement on the *Qualitative Reading Inventory-4* (QRI-IV) (Leslie & Caldwell, 2006); (3) spent at least one class period a day each week receiving reading instruction in a special education resource setting; and (4) attended at least 95% of school days during the previous grading period. The resource room teacher was asked to recommend students who fit these criteria. The primary area of deficit was in reading, and the student had been struggling in the area of reading comprehension. After three students were identified as possible candidates for the study, parent/guardian permission was obtained for each student before the study commenced.

Table 1
Participant Information

Participant	Gender	Age (Years/ Months)	Disability	Full-scale IQ[a]	Reading Level[b]
John	Male	10-9	SLD	92	Primer
Peter	Male	9-3	SLD	93	Primer
Nick	Male	10-6	SLD	96	1

[a]Student performance on the WISC-III (Wechsler, 1991) used to determine IQ scores.
[b]Student performance on the QRI-IV (Leslie & Caldwell, 2006) word lists.

Throughout the study, participants were asked to read passages taken from the *Read Naturally* (Ihnot & Ihnot, 2007) series. These passages were chosen because they were all expository, were already leveled, and contained comprehension questions for each passage. Before the start of the study, participants were assessed to

determine with which level passage they would begin. Because all participants were not on the same reading level, using the series' placement procedures was extremely helpful. *Read Naturally* assigns levels to their materials based on the Fry, Spache, and Harris-Johnson readability formulas. Estimating the participants' current reading level—using previous test scores QRI-IV (Leslie, L., & Caldwell, J., 2006), current STAR Reading level (Renaissance Learning, 2006) and recommendations from the classroom teacher—helped the researcher decide on an initial passage to begin the placement process. Following the *Read Naturally* manual, each participant was given one minute to read an assigned passage, and the number of words read in that minute was then matched with a placement table in the manual to determine a starting level. Using the placement processes set forth by the *Read Naturally* series eliminated the notion that participants' decoding skills had an effect on their ability to answer comprehension questions, while finding their placement levels was effectively found.

Setting and Arrangement

The study was conducted in a special education resource classroom in a public elementary school. The room contained one kidney-shaped table facing a white board in the front of the room and one rectangular-shaped table in the back of the room. During the training phase, the participant receiving instruction was taught at the table in the back of the room or outside at a picnic table, while the other participants completed their daily reading activity at the table in the front. The researcher and student sat side by side during the training and intervention phases. Intervention sessions were scheduled to take place during the first 15 to 30 minutes of students' daily reading instruction in the resource classroom and were conducted intermittently throughout the week.

All students were familiar with the setting; having received services in the classroom for at least a year. Nothing in the setting was changed or altered in order to eliminate the possibility that participants' surroundings aided or inhibited their learning during the study. There were also other students in the resource room who were not participating in the study. While the study was being conducted, these students typically worked with the classroom teacher or paraprofessional in a small group or one-on-one in the front or back of the classroom. These other students were also receiving special education services under the categories of SLD, other health impairment (OHI), and emotional and behavioral disorder (EBD). The classroom teacher, her paraprofessional, and the researcher were always present in the classroom when intervention sessions were being conducted.

Materials and Equipment

Reading passages were taken from the *Read Naturally* (Ihnot & Ihnot, 2007) series. All passages are leveled and were utilized across conditions. The passages were also all expository and, as previously stated, were individually selected based on each student's current reading level at the time of the study. Passages included one to three short paragraphs (approximately 100–150 words), and following each passage were four multiple-choice questions and one short answer question pertaining to the selection. Passages that contained an easily identifiable (1) problem and/or a goal, (2) a solution, and (3) a main idea were selected by the researcher prior to the start of the study. These passages were also read by the classroom teacher to confirm that these elements were present. Answers to the comprehension questions were found in the

Read Naturally manual and were used for grading. See Appendix A for a sample passage and comprehension questions.

Participants also used the story map (see Appendix B) during the intervention to help identify specific elements in the passages. The map consists of five main areas for recording information about the passage. These areas include (1) time/place, (2) who/what, (3) problem/goal, (4) solution/ending, and (5) main idea. During the intervention phase, blank story maps were presented to students to fill in while reading each of the passages. A timer was also utilized to keep track of time, while participants were completing the reading assignments in each of the phases. All materials were stored with the researcher throughout the study.

Response Definitions and Recording Procedures

Each reading passage taken from the *Read Naturally* (Ihnot & Ihnot, 2007) series was accompanied by five comprehension questions. The manual also included answers to each of these questions. The first four comprehension questions were all in multiple-choice form and contained four answer choices (a, b, c, d). The fifth and final comprehension question for each passage required a short answer of at least a few words or of no more than a sentence. The answer key in the manual provided answers for each of the multiple-choice questions, as well as possible correct answers for the short answer questions.

The answer key in the *Read Naturally* manual was used by both the researcher and an additional grader throughout the study. Answers were either correct or incorrect, receiving no points or one point per question. The total number of points a participant could receive for each set of comprehension questions was five.

The story map was also used during the intervention phase. As stated previously, passages were selected before the start of the study. Stories that contained all five story elements included in the story map and that were easily identifiable were chosen for the study. The researcher read each passage prior to the study and created story-map answer keys. Each story map contained five elements (time/place, who/what, problem/goal, solution/ending, and main idea); and all possible answers for each element were displayed in each passage's answer key. Answers were either correct or incorrect, according to the possible answers determined by the researcher prior to the study, and received either no points or one point per response. The total number of points a participant could receive for each story map was five. No partial credit was given for answers because all possible answers were straightforward. Of course, not all student responses were worded exactly the same, but still contained some of the same information that the researcher was looking for. Each answer key presented all possible answers and wordings of answers so as to limit the discrepancy between graders.

During the baseline condition, responses were recorded only for answers to comprehension questions, as this sort was the only variable the participants were exposed to during that time. As students began intervention, in addition to the comprehension questions, responses were also recorded for the identification of story elements in the story map. During the maintenance phase, data continued to be collected for both variables.

The comprehension-question and story-map worksheets that participants completed served as permanent products. Participants had 10 minutes to read passages and complete the comprehension questions during each of the baseline probes.

During the intervention and maintenance phases, participants had 20 minutes to read the passages, complete the story map, and answer the comprehension questions.

Data collection was conducted after each participant completed the worksheets, and a simple count of correct answers was calculated directly on each sheet. Again, the total number of points that could be received for each activity was 5, so totals ranged from 0 to 5 for any given comprehension test or story map. After a worksheet had been graded and a total number correct out of five had been found, that number was then converted into a percentage. A percentage correct was calculated by dividing the number of questions the participant answered correctly by the total possible points (5), and this number was multiplied by 100. For example, if a participant correctly answers four of the five comprehension questions, his or her score would be 80% for that passage. After scores had been determined on the worksheets, they were then transferred to a data collection sheet.

Procedures

General Procedures.The study was conducted during two months and was 24 sessions long. Sessions were conducted each day of the school week in a resource room setting. Sessions were scheduled only during the participants' regular reading instruction time, and there was only one each day. Reading instruction for fourth grade began at 11:00 a.m. and ended at 11:45 a.m. At this time, the students came to the resource classroom from their general education classrooms to receive reading services. All sessions began as soon as students arrived in the resource room and were settled. Baseline sessions lasted no longer than 15 minutes, and intervention and maintenance sessions, no longer than 25 minutes. Because of the individuality of the training sessions, their lengths varied from 15 to 30 minutes. Time was kept during each session using a standard digital timer.

After participants finished their given assignments pertaining to the study, the rest of their time was spent under the instruction of the resource room teacher. Schedule conflicts, such as assemblies and field trips, were discussed with the classroom teacher before the start of the study, so as to minimize interruptions and to keep the study on schedule.

This study utilized a multiple-probe design across participants (Alberto & Troutman, 2009). The first phase of the design was baseline. During the baseline phase, participants were probed intermittently by use of the comprehension questions measure. Once a participant reached a stable baseline of at least three data probes of 40% accuracy or less, he began the training phase, while the other participants remained in the baseline condition. During the training phase the student received one-to-one instruction on the story elements and began using the story map. After three days of instruction the student began the intervention phase. During the intervention phase he was again asked to read a short passage and answer comprehension questions, but now also had to complete the story map as an aid while reading. Once the participant reached 80% accuracy on the comprehension questions for three consecutive sessions, training began for the next student. The procedures continued in the same fashion until all participants had received the intervention. Two weeks after the end of the intervention phase, three maintenance probes were collected. The procedures during this phase, as well as the data collection system, were identical to those used in the intervention phase.

Baseline procedures. During this first phase of the study, participants were instructed to come directly to the resource room during their reading class period. Each day they were required to bring only a pencil, and the researcher had a supply if someone forgot. When participants arrived in the room, they were instructed to sit at the table in the front of the classroom. As the students settled in, the researcher handed each a reading passage. The students were then instructed to read the passage carefully and afterwards answer the five comprehension questions on the back of the sheet. Before having the participants begin, the researcher also wrote the story mapping elements on the whiteboard and said, "These are all elements that make up a good story. Read them to yourself and raise your hand if there is one that you cannot read. Think about these elements as you read your story." After students had a chance to read the words, the researcher erased the words and instructed the participants to independently read their passages and answer the comprehension questions.

Participants had 10 minutes to read the passage and answer the five questions. Ten minutes provided the participants with more than enough time to complete their given assignment, and was used to prevent participants from wasting time. They were encouraged to try their best, but no other feedback was given during baseline sessions. When finished, they were instructed to raise their hand, and the researcher collected their papers. If participants were finished before the 10 minutes, they were instructed to quietly read a book at their independent reading level until everyone was finished. After all papers were collected, the researcher told the participants that they did a good job and turned the rest of the class period time over to the resource room teacher. Answers to comprehension questions were graded afterwards using the procedures stated previously.

Probes were collected for at least three consecutive days, following the procedures above. Once one student achieved a stable baseline (40% accuracy or less), he began the training and intervention phases. After the first participant met criteria for the training phase and began the intervention phase, the other two students were probed once a week in the baseline phase. Again, the same procedures were utilized.

Training and intervention procedures. After a stable baseline was established, participants began a short training phase. As we stated previously, participants received instruction individually, and during this time, no data was collected for that student. The researcher continued to use the procedures set forth in the baseline condition for the other two students, while the student receiving intervention was instructed away from the other participants. As the other participants completed their daily reading assignments in the front of the room, the researcher and participant went to the table located in the back of the room or at a picnic table outside the classroom.

Training sessions lasted no longer than 30 minutes and were conducted on three consecutive days for each student. Training sessions began with the researcher presenting the participant with a copy of the story map (see Appendix B). A brief overview of the five elements took place, and the researcher also explained the purpose of using the story map as a helpful strategy a participant can use to organize information while reading and to increase comprehension. Each element was modeled for the participant and discussion and questions followed. Sample passages from the *Read Naturally* series were also utilized during this time. After reading a passage

to the student, the researcher modeled how to complete the story map. She engaged the student by asking questions such as: "Who or what was this story about? What do you think the main idea of this story was? Where did this story take place? Was there a problem or a goal in this story?" She also modeled how to answer the comprehension questions for that passage. After modeling several passages, the researcher engaged the student in a guided practice. During this time, the participant read a passage and identified as many story elements on the story map as he could. The researcher provided continual feedback on correct and incorrect answers, providing the student with as much or as little assistance in completing the task as needed. The student was encouraged to think out loud, self-question, look back or reread the passage, and ask the researcher for assistance. Guided practice continued until the participant scores at least 80% on the comprehension questions and story elements for two consecutive sessions. Once the participant had met criteria, the researcher told him that he would continue to use the story map but would do so independently. He joined the other participants during the following session and began intervention.

On the first day of intervention, the researcher followed the identical procedures of those used in baseline. She handed out the passages to the students, reminded them to do their best, and wrote the story elements on the whiteboard. She also provided the story map to the participant receiving intervention. This was the only difference between the baseline and intervention conditions. Those participants not receiving intervention at that time had 10 minutes to read their passages and answer the five comprehension questions, while the participant receiving intervention had 20 minutes to complete his assignments. As the participants finish their given assignments, they raised their hands and the researcher collected their materials. If the allotted time elapsed and a student was still working, his worksheets were collected, even if they were incomplete.

The intervention phase continued until the participant answered 80% of the comprehension questions correctly for three consecutive sessions. Once he satisfied the criteria, the intervention was then introduced to the next participant, with the same training procedures in place, until each participant had received the intervention. Students who satisfied criteria during the intervention phase also continued to be probed once a week until all students had satisfied the criteria for the intervention condition. Again, grading of both independent variables was conducted by the researcher and by the paraprofessional as well. Answer keys were pre-made and available to use for grading each session. The grading procedures stated previously were utilized, and data for each participant was recorded onto each participant's personal data collection sheet. The above procedures were followed until all participants reached criteria in the intervention phase. At this time the intervention concluded and no more probes were collected.

It should be noted that not all students participated in the study every day. Because a multiple-probe design was utilized, students were probed intermittently during the baseline and intervention sessions at a minimum of once a week. Students who were not participating in the study on a particular day worked quietly on other assignments provided to them by the classroom teacher until those students who were participating in the study that day were finished with their work.

Maintenance procedures. The final phase of the study was conducted two weeks after the last participant reached 80% criteria on the reading comprehension questions. No instruction was provided at this time. During this phase, the previous procedures continued to be followed. Participants independently read the selected passage, completed a story map, and answered the comprehension questions. Three maintenance probes were collected, and previous grading procedures continued to be utilized.

Experimental Design

A single-subject multiple-probe design across participants (Alberto & Troutman, 2009) was utilized in this study to answer the research questions. Introduction of the intervention was staggered across participants. Experimental control was demonstrated through the sequential application of the intervention and through a convincing replication of effect across participants. When a stable baseline was achieved for the first participant, a prediction was made that if the condition were extended, similar levels of responding would be found. When we were sure that baseline data were stable, the first participant was introduced to the independent variable and an abrupt change was seen in his responses. Verification of the previous prediction was achieved when the baseline levels for the other participants had little or no change at that time. When levels of responding for the first participant stabilized in the intervention phase, it was then introduced to the next participant. Because the second participant's behavior change was similar to that of the first, a replication of effect and a functional relation were demonstrated between the independent and dependent variables. This process continued until all participants in the study received intervention (Cooper, Heron, & Heward, 2007).

The experimental conditions included baseline, training, intervention, and maintenance. This design allowed for the evaluation of history and maturation threats to internal validity through the time-lagged introduction of the intervention through multiple tiers, varying the lengths of participant's baseline phases, and requiring stability of data before there were any condition changes. Testing threats were controlled through the use of intermittent probes, as opposed to a continual collection of data. This intermittent probing controls against the facilitative and inhibitive testing effects that might be possible in a study where data is collected continually during a long period of time. Threats to attrition were controlled before the start of the study by the researcher's becoming familiar with the students and their surroundings. Threats to variability were controlled through the establishment of a stable baseline before the implementation of the intervention, and threats to instrumentation were easily controlled by using a good and consistent measurement system throughout the study (Gast & Ledford, in press).

A multiple-probe design across participants addresses external validity through inter-subject replication. Because there are several participants in the study, the effects of the independent variable on the dependent variable are replicated across each of them. Conversely, this design does not allow for intra-subject replication. Intra-subject replication refers to repeating the effect with the same participant more than once during a study. Because this design does not withdraw or reverse the intervention and then reintroduce it, intra-subject replication is not possible (Gast & Ledford, in press). External validity was also demonstrated in relation to previous

studies conducted on this topic. This study replicates and extends two primary works: Boulineau et al. (2004) and Onachukwu et al. (2007). The current study was conducted with different participants and in different settings from those of the previous studies. The experimental design was also changed, as well as the genre of the passages (expository) being read by participants. While there are several differences between previous research and the current study, it is important to note that the independent variable remained the same, and as was previously demonstrated in prior studies, the present research was effective.

Reliability

Inter-observer agreement. Inter-observer reliability data was collected across all conditions using a point-by-point agreement formula. The researcher independently graded student responses to the comprehension questions and story maps, and a paraprofessional served as the second grader. The paraprofessional required limited training, and was introduced to the grading procedures only before the start of the study. The *Read Naturally* (Ihnot & Ihnot, 2007) manual was used to assess the answers to the reading comprehension questions. The procedures were straightforward, as the correct answers were all presented in the manual. Examples of pre-made story map keys were also shown and explained to the observer. Again, all possible answers were presented on the key, so the observer did not have to read the passages or come up with her own answers. While the paraprofessional was present in the classroom throughout the study and was familiar with the participants, she was not aware of the purpose or the conditions of the study.

Point-by-point reliability was calculated by counting the number of agreements between the researcher and the paraprofessional and dividing this number by the total number of agreements and disagreements. This number was then multiplied by 100% (Cooper et al., 2007). Reliability data was collected at least once per condition for each participant. Data for John was collected during sessions 1, 7, 19, and 22 (33% of baseline, 40% of intervention, and 33% of maintenance). Data for Peter was collected during sessions 1, 7, 19, and 22 (33% of baseline, 25% of intervention, and 33% of maintenance). Last, data for Nick was collected during sessions 1, 7, 19, and 22 (29% of baseline, 33% of intervention, and 33% of maintenance). Reliability data was collected for John, Peter, and Nick during 36%, 31%, and 31% of the total sessions, respectively.

The overall mean agreement on the reading comprehension questions was 100%. An answer key from the *Read Naturally* manuals was used by both the researcher and paraprofessional, which likely explains the high percentage. The mean agreement for the story maps was 96%.

Procedural reliability. Procedural reliability was assessed by the paraprofessional or classroom teacher in the resource room using a written procedural checklist. One of the teachers observed the researcher's procedures during sessions 1, 7, 19, and 22. On these days, all participants were in one of the three conditions, and data was collected across participants in each condition. Procedural reliability data was collected during the same sessions as inter-observer agreement. A point-by-point agreement formula (Cooper et al., 2007) was again utilized. Procedural reliability was calculated by counting the number of times the teacher and paraprofessional agreed that a behavior either occurred or did not occur. This number was then divided by

the total number of agreements and disagreements and multiplied by 100%. Percentage agreement was reported for each teacher behavior included on the checklist. Data was collected during 36% (4 of 11) of John's total probe sessions and 31% (4 of 13) of Peter and Nick's. The percentage of agreement on the implementation of procedures was 97.5%.

The instructional procedures on the checklist were used in each of the three conditions. There were 10 instructional procedures that were measured and listed on the checklist. As the paraprofessional or teacher observed, she used the space provided next to each item to check whether indeed the researcher performed the given task. Some of the measures included on the checklist are as follows: the researcher (1) presents students with a passage, (2) answers any student questions before allowing him to begin, (3) begins timer, (4) collects papers, and (5) turns off timer.

Social Validity

Social validity data was collected on the study's goals and procedures. While past research has validated that the use of story-mapping is an effective method for increasing reading comprehension in students with learning disabilities, it is still important to affirm that the participants in this study found the story-mapping goals and procedures appropriate and helpful for students to organizer information and answer comprehension questions. This data was collected at the conclusion of the study through one-to-one interviews with the participants. Personal interviews were chosen as a means to collect data because of the age of the students. Providing the participants with questionnaires would most likely not have provided the researcher with a great deal of information. The participants had varying abilities and may or may not have wanted to read questions and write out responses, but even more important, they may not have been able to comprehend the questions and/or be able to formulate a written response. Asking them to do so may have resulted in incomplete or short answers, whereas personally asking students questions (1) gave them more time to think about the questions, formulate appropriate responses, and (2) eliminated any problems they might have had responding to a written questionnaire.

The personal interviews with students were held separately and lasted about five minutes. During this time the researcher asked the participants pre-made questions, and as students responded, she wrote down their answers. After all students had been interviewed, data was reported anecdotally. Interview questions included the following: (1) Do you think that using the story map helped you understand the stories better? Why or why not? (2) Was it easier to answer the questions? (3) At first, did you think it was hard to answer the questions? (4) Did it become easier to answer the questions? If so, how? (5) Do you think you could use the story map in another class or for another subject? If so, which? (6) Would you continue to use the story map when reading even if you did not have to? (7) Do you like to read? (8) What do you think about reading? Is it easy? Hard?

Results

The study was conducted across 24 sessions. During each probe session, participants read an expository passage and answered five comprehension questions pertaining to the passage. In addition, during the intervention and maintenance conditions, the participants also completed a story map. As expected, participants per-

formed at low levels on the comprehension questions during the baseline phase, but after receiving one-on-one training on the story elements, their percentage of comprehension questions answered correctly immediately increased. Not only was there an increase in their reading comprehension scores from baseline to intervention, but these improvements were also maintained after a two-week break.

Information regarding participants' performance on the individual story elements is also included below. These data provide (1) information about which elements were most commonly answered correctly by all participants, which elements were least commonly answered correctly, and (2) more individual item information for each student. While not the primary purpose of the study, this information can be used to inform future instruction for the individual students.

Comprehension Tests

John. John's performance on the reading comprehension questions during baseline was low. During the three probe sessions, his mean percentage correct was 6.67% with a range of 0% to 20%. During the intervention phase, his scores improved immensely, and his mean score was 92% with a range of 80% to 100%. In the last phase, maintenance, he continued to perform well on the questions, with a mean score of 86.67%, with a range of 80% to 100%. There was no percentage of overlap between the baseline phase and intervention and maintenance phases.

Peter. Peter's performance during the baseline phase was also low. His mean score on the comprehension questions was 26.67% with a range of 0% to 40%. During the intervention phase his scores increased immediately, and his mean score was 85% with a range of 80% to 100%. In the maintenance phase, his mean score was 86.67% with a range of 80% to 100%. There was no percentage of overlap between the baseline phase and intervention and maintenance phases.

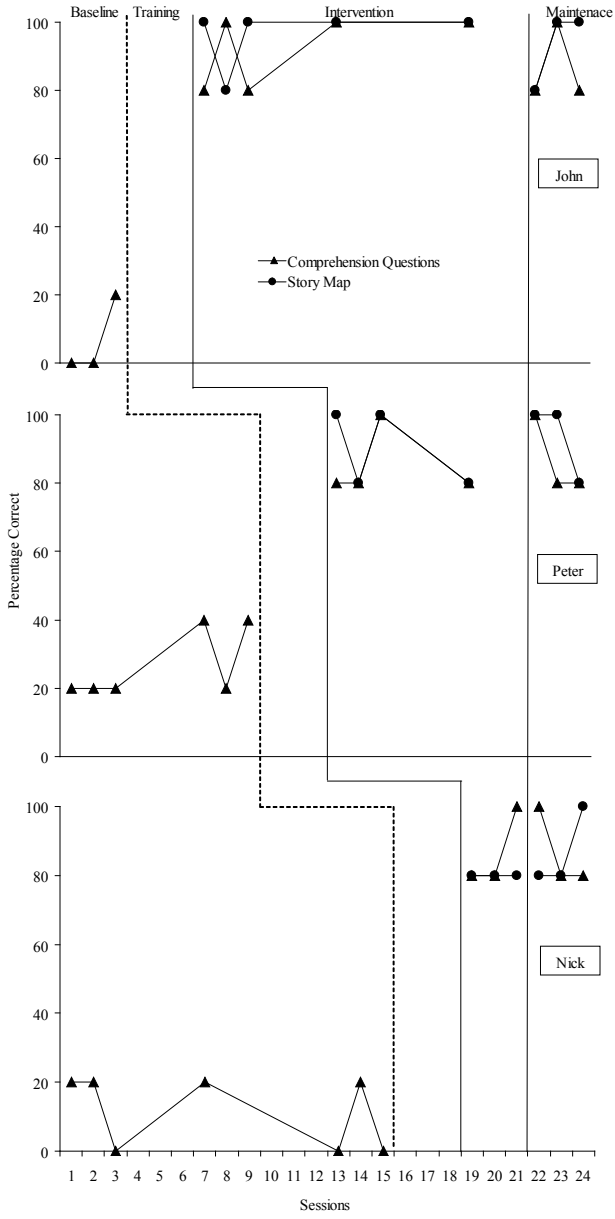
Nick. Nick's mean percentage during baseline was 11.43% with a range of 0% to 20%. During the intervention phase, his scores on the comprehension questions improved, and his mean score was 86.67%, with a range of 80% to 100%. Nick's responding continued at high levels during the maintenance phase, where his mean score was 86.67% with a range of 80% to 100%. Again, there was no percentage of overlap between the baseline phase and intervention and maintenance phases. <in

Story-Mapping Elements

During the intervention and maintenance phases, data was also collected on the participants' ability to correctly identify story elements using the story map. As expected, after individualized training sessions with the researcher, the participants were able to read expository passages, identify the appropriate elements of the stories, and record them on the story maps. Using the story map as a way of organizing the information presented in the passages, participants were then able to use them to answer the five comprehension questions for each passage. A relationship can be seen between correct identification of story elements and percent correct on the comprehension questions.

John's mean score for correct identification of story elements during the intervention phase was 92%, with a range of 80% to 100%. During maintenance, his mean score was 93.33% with a range of 80% to 100%. Peter's mean score during the intervention phase was 90% with a range of 80% to 100%. During the maintenance phase his mean score was 93.33% with a range of 80% to 100%. Nick's mean

Figure 1. Percentage of correct comprehension questions and story elements across baseline, intervention, and maintenance conditions for all three participants



score was 80% during intervention. Likewise, his mean score during maintenance was 86.67% with a range of 80% to 100%.

When completing the story map, all three participants were able to correctly identify whom or what the story was about and the time or place in which it happened with 100% accuracy during the intervention and maintenance phases. John accurately identified the problem/goal and solution/ending 100% of the time in each of his five intervention probes, and correctly identified the main idea of the story 80% of the time. He continued to identify the problem/goal and solution/ending with 100% accuracy during the three maintenance probes, and correctly identified the main idea 66.67% of the time.

During intervention, Peter accurately identified the problem/goal 100% of the time in each of his four probes, and correctly identified solution/ending and main idea 75% of the time. In his three maintenance probes, Peter identified the problem/goal and solution/ending with 100% accuracy, while he correctly identified the main idea 66.67% of the time.

Last, Nick correctly identified the solution/ending 100% of the time in each of his three intervention probes, and the problem/goal 66.67% of the time. In addition, he incorrectly identified the main idea 66.67% of the time. During maintenance he identified the problem/goal 100% of the time and solution/ending and main idea 66.67% of the time. From this data it is evident that main idea seemed to be the most difficult concept for all three participants to master, especially Nick.

In summary, it can be seen graphically displayed in Figure 1 how effective the story-mapping procedure was in increasing each participant's percentage of correctly answered comprehension questions of expository text passages. These effects can be seen across all three participants and maintained at high stable levels after the conclusion of the intervention.

Social Validity

The social validity interviews indicated that participants enjoyed using the story map and believed that it helped them organize their thoughts and answer the comprehension questions. When asked if he thought the story map helped him understand the stories better, Peter said, "Yes. This helped me remember all the elements in stories. It helped me remember when I wrote them down, and I would go back and use the paper if I did not know one of the answers to the questions." John also stated that the story map helped him answer the questions because when he writes things down, he remembers them better. Nick indicated that it was "too hard" to answer the questions without the story map.

All students responded by stating that they believed it was much harder to answer the comprehension questions before they were introduced to the story map. When asked if he would use the story map in another class, Peter said, "Yes, if the teachers in the other class would let me. I think it would help in social studies." John and Nick also stated that they might use it in another class. The students were also asked whether they would continue to use the story map when reading even if they were not required to. Nick responded that he would not, while Paul and John said they would. John said, "Yes, I would still use it because it makes it easier, and reading is sometimes really hard." All students also indicated that they believed reading to be

hard and that they did not like to read. They each stated that they believed reading to be hard because they do not always know all the words.

Discussion

Findings from this study not only add to the previous literature on this topic, but also provide new insight. As previous studies have suggested, story-mapping procedures are effective in increasing the reading comprehension of students with learning disabilities (Babyak et al., 2000; Boulineau et al., 2004; Gardill & Jitendra, 1999; Onachukwu et al., 2007). These studies and others have effectively shown that story map instruction can increase comprehension skills in elementary through high school students. While each study has unique procedures, they still produced similar findings. With the literature as a guide, the purpose of this study was to replicate and extend their findings.

The procedures used by Onachukwu et al. (2007) were helpful in creating this study. Several adjustments were made because their study focused on middle school students, while the current study was conducted at the elementary level. The current study also adds to the previous literature by using a different experimental design. A multiple-probe design across participants was utilized, not a multiple baseline across participants, which is the most common design used in the previous works. Another important change in the current study is the use of expository text passages instead of narrative. To date, there are no published works that investigated the use of a story-mapping procedure at the elementary level using expository passages. This study will hopefully spark the interest of others who believe in the importance of introducing elementary-aged students to different types of expository text structures, besides those found in textbooks.

Limitations of the Study

Although favorable results were seen in this study, several limitations should be taken into consideration. The current study was conducted in a short period of time, and because of these time constraints there was not much availability to conduct generalization procedures. Only expository passages were utilized in this study, in particular, stories that had either a problem or goal. The current study also is limited by its small sample size. The results indicate that after introduction of the story-mapping procedure, all three students' comprehension increased, but the small sample limits generalization of these findings to other students. This study was further limited by its experimental design, as more comparative-treatment designs are warranted to enable the individual effects of the story-mapping elements to be separated. The use of a multiple-baseline design across participants accounts for inter-subject replication, but not intra-subject replication. While the effects of the independent variable on the dependent variable are replicated across each student, there is no withdrawal or reversal of the intervention within the study.

Implications for the Classroom

The findings of this study will have implications for both the field of general and special education. The story-mapping procedure utilized is easy to teach, use, and supplement as part of daily literacy instruction in the classroom. While this study was conducted with students with learning disabilities in a resource room, the procedures could easily be adapted to a general education classroom or another set-

ting. In the current study, participants were individually taught the procedures, but instruction could also be effective if taught in small groups or even as whole class lessons. Future research might include students of varying abilities, not just those with learning disabilities across content-areas. The study could also be conducted in more than one setting; this would provide intra-subject replication, which is lacking in the current resear

Future Research

Future research might also extend the time period of the study and generalize the use of the story map to other genres (narrative) or to other content-area classrooms. The current study utilized expository text passages that included either a problem or a goal. Future research might consider teaching other expository text structures and modifying the current story map. This study does not permit for an evaluation of the individual story elements. While some information is provided about which ones were most commonly and least commonly identified by each student, these data are limited because this was not the focus of the study. The current study could also be enhanced by using technology-based concept mapping software, for example, the use of *Kidspiration© Software* (Inspiration Software, Inc., 2000) to facilitate students' comprehension skills with respect to the specific story-mapping elements. Allowing students to use computer software to create their own story maps (e.g., student-generated) would be one possibility (Blankenship, Ayres, & Langone, 2005). These ideas and others provide new research questions for the future, and will hopefully lead to further advancements in the field of special education (see Boon, Burke, Fore, & Hagan-Burke, 2006; Boon, Burke, Fore, & Spencer, 2006; Boon, Fore, Ayres, & Spencer, 2005; Boon, Fore, Blankenship, & Chalk, 2008).

Conclusions

The use of story-mapping procedures has been well documented throughout the literature as an effective reading comprehension technique. More specifically, story-mapping has been utilized and proven beneficial to individuals with specific learning disabilities. Future studies should focus more on each participant's performance on the individual story elements. In the present study, information was collected on which elements were answered correctly and incorrectly on each story map. While it was evident that participants had the most difficulty determining the main idea of the stories, nothing was done further with the information. Future research should use the individual story element answers to inform instruction. Finally, it would be interesting to see whether a connection can be made between reading comprehension and writing. Asking students to provide written summaries of the stories they have read may also provide another means to evaluate their reading comprehension skills.

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Appendix A

Sample Expository Text Passage and Comprehension Questions

Ice Cream Sodas

Review Key Words[5]

accidentally	by chance; not meant to happen
melt	to change from a solid into a liquid
invented	thought up; created
drink	liquid to swallow; a beverage

Read the Story[6-8]

Most people have heard the saying, "When life gives you lemons, make lemonade." Well, that's just what Robert M. Green did when he **accidentally** invented the ice cream soda.

Robert M. Green sold **soda pop** in Philadelphia. People really liked a special drink he made with soda pop and sweet cream.

One day in October of 1874, Mr. Green was selling his drinks at a celebration of the Franklin Institute. There was still a lot of time left in the day when he ran out of sweet cream. Instead of shutting his **stand** down early, he decided to make the best of things. He bought some ice cream, planning to let it **melt** and use it in place of the sweet cream. But before the ice cream had a chance to melt, some people wanted to buy a drink. Mr. Green didn't want to turn them away. So he made the drinks with the frozen ice cream. Lucky for Mr. Green, people loved the ice cream sodas.

Before inventing ice cream sodas, Mr. Green made about six dollars a day. After inventing ice cream sodas, he made about 600 dollars a day.

words read _____ words read _____

- errors _____ = _____ - errors _____ = _____ _____

cold score hot score expression

Appendix A (Continued)

Sample Expository Text Passage and Comprehension Questions

Answer the Questions

1. What is the main idea of this story?
   a. Ice cream sodas are made from soda pop and ice cream.
   b. The ice cream soda was invented by accident.
   c. Mr. Green made money selling ice cream sodas.

2. Why did Mr. Green buy ice cream?
   a. to make ice cream cones to sell
   b. to invent the ice cream soda drink
   c. to use in place of sweet cream in his drinks

3. What does **stand** mean in this story?
   a. a table or booth for selling
   b. to be up on your feet
   c. to put up with something

4. Why did Mr. Green put the ice cream in the soda pop before it melted?
   a. He wanted to sell drinks to people.
   b. People told him to do it that way.
   c. He wanted to invent a new drink.

5. "When life gives you lemons, make lemonade" means that we should turn our problems into good things. How did Mr. Green turn his problem into a good thing?

_____

_____ Number Correct: _____

Appendix B

Sample Story Map With Story Elements

Title: _____

Time/Place:

Who/What:

Problem/Goal:

Solution/Ending:

Main Idea: