Use of Kidspiration© Software to Enhance the Reading Comprehension of Story Grammar Components for Elementary-Age Students with Specific Learning Disabilities

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The aim of this research brief was to explore the efficacy of story mapping, with the integration of Kidspiration© software, to enhance the reading comprehension skills of story grammar components for elementary-age students. Three students served as the participants, two in third grade and one in fourth, with specific learning disabilities (SLD). Using an ABC single-subject design (Alberto & Troutman, 2009), we investigated the use of a computer-based story mapping procedure on the acquisition of nine specific story grammar components. Results showed a dramatic increase in the comprehension levels, as all three of the participants improved from the baseline to the intervention phase, with no overlaps in the data. Furthermore, during the final phase, all three of the participants continued to show an increase in their scores from the baseline measures. Finally, limitations of the study and considerations for future research implications to using story maps, with the infusion of technology-based applications, are discussed.

Keywords: Story Mapping; Story Grammar Components; Reading Comprehension; Strategy Instruction; Elementary; Technology; and Specific Learning Disabilities

Reading comprehension is commonly a difficult task for many elementary-age students with specific learning disabilities (SLD). Students with SLD often experience deficits with reading comprehension (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, & Tankersely, 1994, for reviews) and typically function one or more years below grade level in reading, mathematics, writing, and spelling (Mastorpieri, Scruggs, & Gratez, 2003). In fact, Gersten et al. reported that approximately (80%) of students identified with SLD have reading problems and struggle with comprehension of written textual materials (Gersten et al., 2001). To compound the matter, students with SLD often fail to monitor and assess the own comprehension skills while reading (Roberts, Torgesen, Boardman, & Scammacca, 2008) and often lack specific cognitive strategies to

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compensate for their difficulties with comprehending textual information (Antoniou & Sovignier, 2007; Boon & Spencer, 2010).

Recent research in the area of cognitive strategy instruction has revealed a number of promising approaches to support students with SLD with their reading comprehension skills. For example, one instructional strategy that has been shown to be effective for students with SLD is the use of *story mapping* (Babyak, Koorland, & Mathes, 2000; Boulineau, Fore, Hagan-Burke, & Burke, 2004; DiCecco & Gleason, 2002; Faggella-Luby, Schumaker, & Deshler, 2007; Fore, Scheiwe, Burke, & Boon, 2007; Li, 2007; Onachukwu, Boon, Fore, & Bender, 2007; Taylor, Alber, & Walker, 2002) and novel, integrative uses of *computer-based instruction* (CAI) (Boon, Fore, Blankenship, & Chalk, 2008; MacArthur, Ferretti, Okolo, & Cavalier, 2001). In fact, over the last few years, these two areas of intervention research have merged and successfully integrated to become known as "*computer-based story mapping*" using such programs as Inspiration© software (Inspiration© Software, Inc., 2000).

Although previous research has demonstrated a growing research-base on the efficacy of Inspiration© software intended for students in grades six through twelve across a variety of content-areas (Blankenship, Ayres, & Langone, 2005; Boon, Burke, Fore, & Hagan-Burke, 2006; Boon, Burke, Fore, & Spencer, 2006; Boon, Fore, Ayres & Spencer, 2005; Sturm & Rankin-Erickson, 2002; Roberts & Joiner, 2007), there are *limited* empirical studies that have explored the use of Kidspiration© software, which was created for students at the elementary level, specifically kindergarten through the fifth grade. Therefore, the aim of this research brief was to explore the use of Kidspiration© software to enhance the reading comprehension of nine specific story grammar components for three elementary-age students with SLD.

METHOD

Participants and Setting

The students attended a highly diverse Title I elementary school located in the southeastern part of the United States. With a student population of approximately 1,500, over fifty percent of the student population was considered to be economically disadvantaged and received free and/or reduced lunch. The study consisted of three elementary-age students; two of the three participants were enrolled in the third grade, and the third participant was in the fourth grade. All three participants were identified as having an SLD and received direct special education services in the areas of reading, spelling and writing in a self-contained setting but participated in the general education curriculum for two content-areas, science and social studies instruction, and specials.

To be included in the study, the participants had to meet the subsequent criteria for inclusion: Students were required (a) to receive one hour of special education support services in reading instruction, according to their Individualized Education Plan (IEP), in a self-contained classroom; (b) to score a minimum of one grade below grade level, based on the students reading comprehension subtest scores of the Kaufman Test of Educational Achievement (K-TEA) (Kaufman & Kaufman, 1985); (c) to have a reading comprehension goal specifically stated on their Individualized Education Plan (IEP); (d) to attend a minimum of 95% of the school days for the first

nine weeks of the marking period; and (e) to return the student and parent consent forms.

Table 1. *Participant Demographic Information*

Participant	Gender	Age (Years/ Months)	Race/ Ethnicity	Grade Level	Disability	Full-Scale IQ[a]
Kevin	Male	9	Caucasian	3	SLD	80
Ernesto	Male	10	Hispanic	4	SLD	84
Jose	Male	9-6	Hispanic	3	SLD	89

[a]Student performance on the WISC-III (Wechsler, 1991) used to determine IQ scores.

Experimental Design

An (ABC) single-subject research design (Alberto & Troutman, 2009) was used to asses the effectiveness of using computer-based story maps to enhance students reading comprehension skills. The research design consisted of three phases: (a) baseline, (b) implementation of Kidspiration© software paired with explicit instruction, and (c) maintenance which was conducted two weeks after implementation of the intervention phase to assess whether students could maintain the strategy.

Dependent Measures

The dependent measure for the students included nine open-ended story grammar components (see Appendix) that were completed either on the computer or in a paper-and-pencil format. Responses were scored by two data collectors: the special education teacher, and an outside researcher. Each data collector marked their answers independently and then compared answers to each of the items during all three phases of the study. If the data collectors had different results, they explained their reasoning. If an agreement was not reached, then a third outside party was consulted.

To ensure procedural reliability within the conditions, the teacher consistently utilized a procedural checklist across all three instructional conditions (e.g., baseline, intervention, and maintenance phase). Items on the procedural checklist included: (a) stating the reasons for using story maps, (b) supplying students with story books at their reading levels, (c) having each student orally read sections of the passages in their storybook, (d) providing verbal praise after each of the students' reading of the story passage, (e) identifying each story grammar component on Appendix, and (f) providing the students with the story map either on the computer (intervention phase) or in a paper-and-pencil (maintenance phase) format.

Materials and Equipment

The story books entitled *Bug in a Rug, Jen the Hen, Fat Cat, Dog in the Fog,* etc., were selected and used during all three phases of the study from the Fun with Phonics Series (Graves, 2007; Graves & Smith, 2007). Each of the story books were

on the students' independent reading level and were chosen because they all had a clear main character, problem to solve, and solution indicating how the problem was resolved. Before beginning instruction, the teacher wrote the nine-story grammar components on the white board, which included (a) the *title* of the story, (b) *characters*, (c) *setting*, (d) *time*, (e) *problem*, (f) *solution*, (g) *outcome*, (h) *reaction*, and (i) *theme* (see Appendix for an example of the story map with Kidspiration© software).

Procedures

The intervention procedures, extending from those employed by Boulineau et al., were implemented daily in a language arts self-contained classroom, including only the three students with specific learning disabilities, as they were all performing on the same reading level, and took place during their regularly scheduled reading instruction time, which lasted in duration for 45 minutes.

Baseline. During the baseline phase, (*Phase A*), the participants completed one story a day for four consecutive school days. Before reading a story, the teacher led a discussion to access students' prior knowledge and key vocabulary words to be encountered in the story. During the story readings, the students were randomly selected to read aloud a passage from the story, which typically consisted of two pages from the story, while the other two students followed along in their books. Then, each student received verbal praise from the teacher after reading their selected passages. Upon completion of reading the story, the participants were instructed to identify the following nine-story grammar components using a paper-and-pencil format. No verbal praise and/or feedback were provided while the participants were completing the activity.

Intervention. For the intervention (story mapping) phase (*Phase B*), each participant was provided a Dell Latitude D620 laptop computer and trained to use the Kidspiration© software, which is an electronic graphic-organizing software program designed for elementary-age students in kindergarten through the fifth grade. The software program used the same story grammar components as the paper-and-pencil task. In preparation to read the story, the teacher wrote the story grammar components on the white board, and the students discussed each of the elements and provided examples from previous stories they had read during the marking period.

Before beginning the intervention phase, the researcher conducted a 30-minute training session for the students on how to use the basic functions of the software program, such as how to insert text, change/modify the font, use the text-to-speech component, and how to use the "eraser" icon to make any corrections, while inserting relevant information from the story into the computer-based story map. During the six days of intervention, the students read the stories in a "round-robin" format using the same procedures as those described in the baseline phase.

Upon completion of the story, each of the students completed the nine-story grammar components (see Appendix for an example of the story map with the Kidspiration© software template) entering the information using the Kidspiration© software program on their laptops. As the students worked independently, they had to complete three independent steps: (a) click on the word, for example, "title" next to the picture of the storybook and have the software read the word back to them (by selecting the listen icon "shaped like an ear" to activate the text-to-speech option), as

often the students did not know what the word was on the story map; (b) click on the question and "prompting phrase" in the box to the right of the picture, which was again read aloud to them by the computer; and (c) type in the blank word box their responses to each of the nine-story grammar components and use the "word guide" spell checker option when needed.

Upon completion of the computerized story map, the participants were given five minutes to study their story map before being assessed on their recall of the story passages. At the end of the five minutes, the participants' computers were removed, and each participant used a piece of notebook paper to identify the nine story grammar components of the story, without the use of the story book and/or software. The intervention lasted until the participants reached nearly 90% accuracy (8 out of the 9 items) on three consecutive sessions.

Maintenance. During the maintenance phase (*Phase C*), which occurred two weeks after completion of the intervention phase, the participants read the stories in the same manner as used during the baseline phase. After completion of reading the story, the participants were given a blank story map with all nine of the story grammar components created using the Kidspiration© software and were asked to complete the story map without any reminding and/or referencing any of the components. The participants were also not given praise and/or feedback when they completed their story map. The maintenance phase lasted three days.

Reliability. The procedural reliability measures were collected by the classroom teacher and paraprofessional in the self-contained classroom using a written procedural checklist, which was modified from a previous study by Boulineau et al. for 30% (4 of the 13) total sessions. Inter-rater agreement was reached by having one teacher score each of the story maps across all three instructional phases of the study, and then a second researcher scored each story map for 30% of the sessions, which resulted in a mean overall agreement of 98%.

RESULTS

As can be seen in Figure 1, the mean percentage of the story grammar components answered correctly is shown for each of the three participants across the baseline, intervention, and maintenance phases.

Kevin

During the baseline phase, Kevin's reading comprehension scores were minimal, as his mean percentage of correct story grammar components was 22% (range 11 to 33%). However, during the intervention phase using the story mapping procedure, with the integration of Kidspiration© software, his scores improved dramatically, and his mean score was 85% (range 66% to 100%), which was a 63% increase from his baseline scores. Finally, during the maintenance phase, which was conducted two weeks after discontinuing the intervention phase, Kevin was able to recall the story grammar components without the use of the software, with a mean of 81%, (range 77% to 88%).

Ernesto

During the baseline phase, Ernesto, like Kevin, experienced difficulty with the story grammar components but scored slightly higher than his two peers and consistently recalled the same items in each of the four sessions, as his mean baseline score was 44%. In the intervention phase, Ernesto's performance improved drastically with a mean score of 89%, (range 55% to 100%), which was a 44% increase from his baseline scores. Similar to Kevin in the maintenance phase, Ernesto was able to maintain the story grammar components with a mean score of 85%, (range 77% to 88%).

Jose

Similar to both Kevin and Ernesto, Jose, in the baseline phase, did not perform well on the comprehension measures of the story grammar components, as his mean score was 33%, (range 22% to 44%). During the intervention phase, Jose showed significant improvements in his abilities to identify the story grammar components using the software program, as his mean score increased to 85% (range 66% to 100%), which was a 52% increase from the baseline scores. In the last phase, maintenance, Jose continued to show improvement with a score of 85%, (range 77% to 88%).

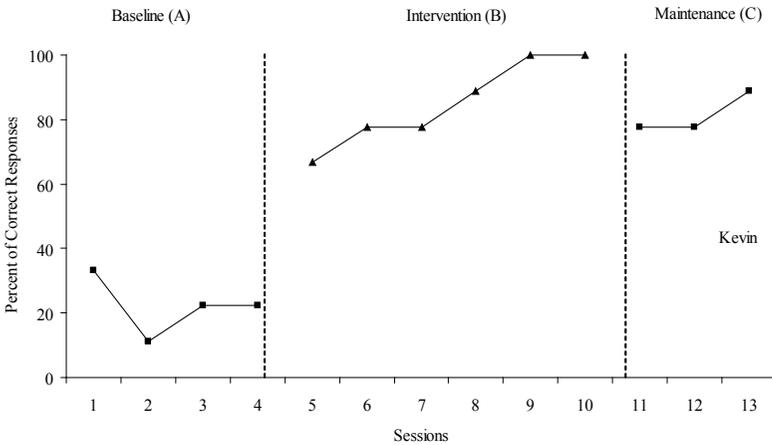*Figure 1*. Mean percent of correct story grammar components for *Kevin*.

Figure 2. Mean percent of correct story grammar components for *Ernesto.*
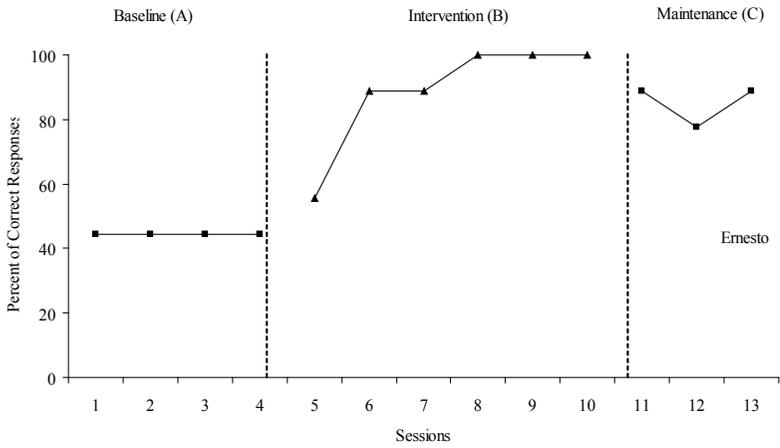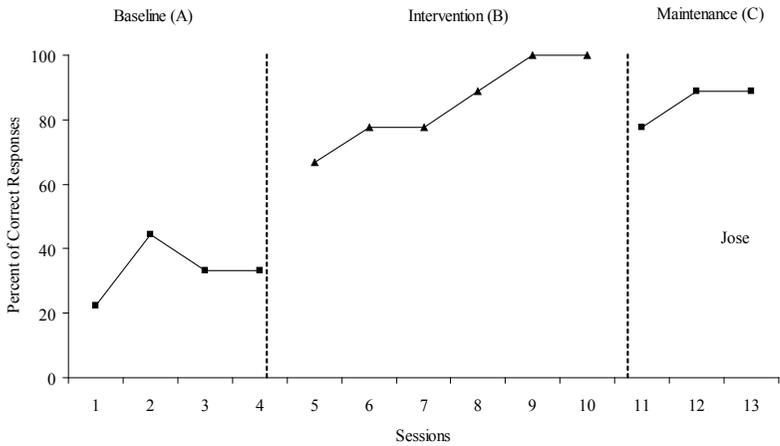

Figure 3. Mean percent of correct story grammar components for *Jose.*

Discussion

In sum, the results of this investigation confirm that story mapping is a beneficial intervention for elementary-age students to enhance their reading comprehension abilities of specific story grammar components. This corroborates previous research on the effectiveness of story mapping procedures, especially for students with SLD (e.g. Boulineau et al., 2004; Stagliano & Boon, 2009; Taylor et al, 2002). Most notably, this study provides new insights into the use of technology-based applications, such as Kidspiration© software, as a component of the instructional unit, to improve students' comprehension skills via the use of *visual and auditory supports* for elementary-age students with SLD, which has not been empirically explored yet.

Despite such favorable results, several limitations need to be addressed. First, the study employed a single-subject research design with only three students. Thus, group treatment/control designs, including larger number of students, are necessary to examine whether there are differential effects of using a story map in a paper-and-pencil format versus computer-based versions. Second, the study included only students with SLD in one self-contained language arts classroom; further research is needed on a variety of disability categories across other instructional settings. Third, the proportion of individual story grammar components were not examined across all three students; however, based on preliminary analysis of the data, observations in the classroom, and student feedback, it appears that the two main components that were the most challenging for students to master were (a) *outcome* and (b) the *theme or main idea* of the story. Fourth, because of the relatively short duration of the study, generalization procedures were not conducted to explore the impact of the strategy in other content-area classrooms.

Future research is needed to explore the use of story maps, with the integration of Kidspiration© software, across a variety of types of passages, including both expository and narrative text passages. Also, further research is warranted to allow students to create their own student-generated story maps, which could be completed before, during, or after reading the story. Finally, additional research is needed to explore the benefits of computer-based story maps across a wide range of age, grade-level, disability categories, and instructional classroom settings to explore the benefits of story mapping, with the integration of technology, on students' reading comprehension abilities.

<h3 style="text-align: center;">REFERENCES</h3>

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APPENDIX

(Example of the Story Map w/ Kidspiration© software)

Title

1 | What was the **Title** of the story?

Main Character

2 | Who was the **Main Character** of the story?
(Who was the story mostly about?)

Setting

3 | What was the **Setting** of the story?
(Where did the story take place?)

Time

4 | What was the **Time** of the story?
(When did the story take place?)

Problem

5 | What was the **Problem** of the story?
(What happened in the story?)

Solution

6 | What was the **Solution**?
(How did the problem get solved?)

Outcome

7 | What was the **Outcome**?
(So, how did the story end?)

Reaction

8 | What was your **Reaction** to the story?
(How do you feel about the story?)

Theme

9 | What was the **Theme** or main idea of the story?
(What lesson did you learn from the story?)