

Using WebQuests to Promote Reading Comprehension for Students with Learning Disabilities

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Abstract

This study examined students' ability to improve their reading comprehension through WebQuests that included instruction on story maps and online story reading. Seven students with learning disabilities at the middle school level participated in the study. During each session, on their own computer students independently read a story, reviewed story structure (plot, character, setting, and theme), filled in a story map, and answered a short comprehension quiz, as they navigated through the WebQuest. After five WebQuests, a survey gauged their perceptions of the experience. Students correctly identified the terms plot, character, setting and theme, but had difficulties applying the concepts of story structure to their readings. Overall, students found the WebQuests to be informative and helped them with their reading.

Keywords: *webquest, learning disabilities, reading comprehension, computer assisted instruction.*

Introduction

Theoretical Framework

Reading comprehension is a crucial skill in the adult world without which individuals struggle to follow even simple written directions or take in new information by means of written text. Most students acquire these skills in school, but many do not make adequate gains in their reading including those students identified with learning disabilities (LD). Ninety percent of the population of students with LD has difficulty reading independently (Stetter & Hughes, 2011) including difficulties with decoding, or the breaking down of letters into sounds and words or understanding the meaning of the words or sentences, otherwise known as comprehension (Stetter & Hughes, 2010b).

The need for good reading comprehension increases as students advance in their school

years with a myriad of skills involved including vocabulary knowledge, inference, critical reading and a meta-cognitive awareness of text structure and difficulty (Boardman, Buckley, et al., 2016). Since comprehension involves such a bundle of tasks, there are many methods or strategies for assisting students to develop better reading comprehension (Hall, Cohen, Vue, & Ganley, 2015) the importance of which the National Reading Panel (NRP) (2000) summarized. Students who receive strategy instruction in areas such as comprehension monitoring, cooperative learning, graphic and semantic organizers, story structure, question answering, question generation, summarization, and multiple strategy teaching improved their overall reading comprehension (Boardman, Buckley, et al., 2016).

Because students must learn and implement reading comprehension skills, or they do not ascertain new information (Gnaedinger, Hund, & Hesson-McInnis, 2016) problems in comprehension can severely limit students with LD's understanding of new material (Boardman, Vaughn, et al., 2016). As students progress through school, reading comprehension becomes more crucial as new material is presented increasingly in a written format (Connor, 2016). For students with LD, helpful instructional strategies include such methods as prior knowledge activation, story grammar/structure instruction, strategies instruction, peer programs, repeated readings, and vocabulary instruction (Boardman, Buckley, et al., 2016).

Story Structure and Story Mapping

The NRP (2000) stated that certain areas of instruction assist students with reading problems more than others including instruction in story structure (Stetter & Hughes, 2010b). Story structure maintains that every narrative story has a beginning with rising action, intermediate events that promote the story, a story high point or climax, and a story closing with falling action and resolution. Syntheses of the research have shown instruction in story structure to promote learning (Boon, Paal, Hintz, & Cornelius-Freyre, 2015; Stetter & Hughes, 2010b). Other studies have focused on at-risk high school students' increased comprehension with story structure instruction (Stetter & Hughes, 2011) or younger students with LD and their introduction to story structure (Alves, Kennedy, Brown, & Solis, 2015)

The visual representations of story structure are called story maps which research has found to be a strong strategy for reading comprehension improvement (Boon et al., 2015). Repeated focus on this strategy improved the use of story structure, and comprehension in students with LD at the middle school level (Alves et al., 2015), while students with LD at the high school level learned better comprehension strategies by using story maps (Faggella-Luby, Schumaker, & Deshler, 2007). Many students with LD and reading comprehension difficulties have little or no concept of the structure of stories (Boon et al., 2015) meaning that explicit instruction in this area can help students with LD make gains in their comprehension (Alves et al., 2015). Though studies have shown that story structure and mapping instruction assist many students with LD in bettering their reading comprehension, questions remain on how best to teach students to use these methods. Perhaps computers could be used to better present story maps to students with LD.

Use of Computers in Reading Comprehension

As computers became more common in schools, research focused on using them to teach reading to students, including those with LD, increased (Aleven, Beal, & Graesser, 2013). However, most of the research showed that having the technology available in classrooms does not necessarily impact students' instruction and learning (Cristia, Ibararán, Cueto, Santiago, & Severin, 2012). Although there is a growing amount of research on using computer tools and programs with students with LD (MacArthur, 2009), most studies researched drill and practice reading programs (Savage, Abrami, Hips, & Geault, 2009). Programs that teach comprehension strategies and skills are more complex, since they include many more discreet components than

basic decoding practice, making clear research questions and data analysis more difficult. However, research completed to date using computer programs and tools to enhance comprehension of students with LD has increased comprehension skills (Boon et al., 2015; Cristia et al., 2012; Cullen, Alber-Morgan, Schnell, & Wheaton, 2014). Thus, using computers to enhance comprehension shows promise, but more research is needed as programs become available for students with LD.

Though the term hypertext emerged in the 1960's to refer to written language that did not have a predetermined order, its current use illustrates more fluid movement between the text itself and textual supports (Srivastava, Gray, Nippold, & Schneider, 2012) such as vocabulary definitions, additional information, study guides, and other supports. Hypermedia focuses on adding additional video or audio clips (Stetter & Hughes, 2010a). Many studies focused on hypertext, hypermedia and how they could benefit students with LD (Srivastava, et al., 2012). It is the flexibility of this medium that lends itself to increasing the learning of students with LD (Stetter & Hughes, 2010a).

A way to harness the flexibility of the Internet exists through the use of WebQuests which are websites that present an inquiry-based lesson with a teacher selected topic (Pak, 2015). Interlocking text pages guide students through the teacher-designed, project-specific website, as well as containing links to other relevant websites. The activity ultimately becomes a web-based scavenger hunt. WebQuests come in two forms, a shorter version (Akhand, 2015) where students can have a class-long WebQuest or a long term, week-long project version of a WebQuest. Sections of a WebQuest include an introduction to the topic, a task section which describes what students must do, a process section describing the activity components, and a resource section that links to helpful external websites (Leung & Unal, 2013). WebQuests provide structured guidance on the topic at hand and can hold students' interest through their varied yet systematic approach. Lessons become more meaningful with support of other resources such as original texts, photos, and meaningful background information websites.

Since there is an ongoing need for research in the area of computerized learning, especially with hypertext for students with LD (Stetter & Hughes, 2010a), the current study aimed to ascertain if, through the use of a WebQuest, students with LD can learn a comprehension strategy, story mapping, which has been shown to increase comprehension. Thus, the purpose of this pilot study was twofold: 1) to determine if a WebQuest designed to utilize story structure and story maps assisted the development of reading comprehension of students with LD and 2) to learn how students with LD felt about learning through a WebQuest.

Study

Participants

Seven seventh and eighth grade students (six male; one female) with LD from one middle school volunteered to participate in the study, after receiving parental permission. The middle school was located in a lower socioeconomic neighborhood in a major metropolitan city in the Midwest. The case manager of the school sent parents of students with LD a solicitation letter for the study to which 10 parents responded positively, and of those ten, seven students assented to participate in the study. All students were identified by the school as having LD and were receiving special education services. Reading levels of the seven students with mild to moderate LD were approximately at the third to fifth grade levels. All students participated in computer classes every week but it is unknown if students had previously completed WebQuests. Students received a gift certificate for their participation at the end of the study.

Materials

Students met in the school's computer lab outside of school hours. Students worked individually

on a computer to perform all tasks associated with the WebQuests. The researchers constructed five WebQuests around five different stories with each story having multiple sequential webpages including: an explanation of the task at hand, a page explaining plot, character, setting, and theme, a sample story map, the story the students were to read with links to vocabulary, a story map to fill in, and a short multiple choice quiz. Students made their way through each WebQuest at their own pace. At the end of each WebQuest, both the story map and the quiz were sent to the researchers via email after student completion.

The stories used were all narrative fiction; with four out of the five having surprising endings (see Table 1). Using the Fry readability formula, researchers determined the grade level for each story with scores that ranged from third grade to fourth grade reading levels. Except for one student who claimed to have read the first story previously, all the stories were new to the students.

Table 1. Stories

Name	Author	Words	Level	Brief Synopsis
“After Twenty Years”	O. Henry	1,175	4 th	Two friends are supposed to meet, as promised after twenty years. Each had taken opposite roads, one becoming a policeman and the other a thief.
“The Apple Box ”	Joe McManus	2,704	3 rd	Two young students use an apple box in various ways. Eventually they involve their town in helping an older neighbor.
“Key Item”	Isaac Asimov	878	3 rd	A computer that the entire world depended on stopped working. One technician realized it had developed feelings.
“A Man Who Had no Eyes”	O’Henry	1023	3 rd	A beggar and a businessman meet on the street after years. Both had survived a workplace fire and were blind. The beggar had tried to kill the other man.
“The Pen Pal”	Margaret Poynter	817	3 rd	A young girl waited to meet her pen pal when she was kidnapped and replaced by an alien, just as she had done to someone else several years before.

Procedures

The students met for an hour after school for a total of five sessions. Students who missed sessions were allowed to schedule make-up sessions with five of the students needing to reschedule at least one session. Students completed all make-up sessions within a month of the start of the study; however several students were unable to complete all the sessions due to their extensive after school activity schedule.

At the first session, researchers informed the students that they could ask for help if they had any procedural questions about the WebQuests as they worked independently on their computers. They proceeded at their own pace through the story and other sequentially presented information on the WebQuest. Students read the story, filled out a story map and completed reading comprehension questions on the web pages during each session. A researcher circulated throughout the group, helping students with procedural or internet access difficulties. No students appeared to be frustrated and none quit working during a session.

Instruments

Story maps and quizzes.

Each of the five story maps, one for each of the stories, had blank spaces for two main character names, and larger blank spaces for setting, plot, each of the characters, and theme where students wrote descriptions of the parts of each story. For each answer, their responses were scored either correct or incorrect. The researchers scored plot in a slightly different manner because it contained several blank boxes; thus plot scored correct, partially correct, or incorrect. Students could score up to six points for correctly completing the five responses per story map. After each WebQuest, students completed an online comprehension quiz that consisted of three to six questions with students' responses emailed directly to the researchers.

Story structure assessment

During the final session, students completed a short, researcher-made assessment to ascertain their understanding of story structure which included four matching questions on the words: plot, character, setting and theme.

Perception survey

At the end of the study, the students took a ten question online survey, in the form of a five-point Likert scale, which included strongly agree, agree, no opinion, disagree, strongly disagree and no answer. The questions solicited student feedback regarding the ease of use of the webpages and their perceptions about learning online. Other questions asked whether or not students felt the WebQuest helped them with their reading comprehension, if they learned new things, and their like or dislike of the activity. The survey also included questions about the difficulty of the stories and activities. Student took the survey during their final session with one student not completing the survey due to missing the final session. The researchers reported the results using percent of students who answered a given statement with a given rating.

Results

Story Map

The story map assisted students in identifying the characters, setting, plot and theme of the story. Completing the story map proved difficult for most students, but some sections appeared to easier than others for them (see Table 2 and Table 3).

Table 2. Total Correct for Combined Story Map and Quiz

Student	Story 1 (12 max)	Story 2 (12 max)	Story 3 (12 max)	Story 4 (9 max)	Story 5 (11 max)
Angel	8	7	9	6	6
Jose	6	7	6	5	6
Velma	NA	4	1	2	3
William	8	9	5	6	3
Marco	9	9	NA	NA	6
Edgar	NA	7	7	6	NA
Leo	NA	9	7	NA	NA

Note. NA= no score as student did not make-up session.

Character

Most students correctly identified the two main characters of each story, but giving a description of the characters presented more of a challenge for them. Though results were mixed on the first two WebQuests with respect to character description, at least half of the students were able to correctly describe the main characters. Students had more difficulties on the last two WebQuests.

Only one student correctly identified character traits, while no one wrote the description correctly on the last day.

Setting

Identifying the setting was more difficult than identifying the characters for the students. Students performed better on the first and fourth WebQuests than the others. One student was able to identify the setting correctly on four out of five WebQuests, while one other student scored two out of five WebQuest settings correct. The other students were only able to correctly identify the setting during one session.

Plot

For the plot, students had to complete multiple components on the story map. One space was for the initiating event, while the others were for other events in the story. There was also space to write the high point or climax of the story. The daily average was that about half of the students got the retelling of the plot partially correct. The four students who participated in the first story got the first story's plot partially correct. Other student WebQuests' scores did not achieve the first day's high. However, most of the students were able to recount some aspects of the plot of the stories.

Theme

Theme presented the most difficulty with most students unable to correctly identify it. However, two students were able to correctly identify the theme of the second, more formulaic story, saying that "*Its make new friends*".

Table 3. Percent of Students Who Achieved Correct Scores on Story Map by Section

	Story 1	Story 2	Story 3	Story 4	Story 5
Character	75	86	100	100	100
Character description	75	57	50	20	0
Setting	75	43	0	60	20
Plot	100	43	50	60	40
Theme	0	0	0	0	0

Comprehension Quiz

The students received many perfect scores on the session quizzes, which they took after finishing each WebQuest. Students did very well on the first and second stories but had a greater variability in scoring on later stories. Overall, students seemed much more comfortable with the multiple-choice format than the story map format, because they received better scores.

Table 4. Perception Survey Results

	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
The WebQuest was easy to use.	50%	33%	17%	0%	0%
The WebQuest helped me with my reading.	17%	84%	0%	0%	0%
I understood the directions.	50%	33%	17%	0%	0%
I liked doing the WebQuest.	17%	67%	17%	0%	0%
The WebQuest stories were too hard.	17%	0%	0%	67%	17%
I did not like filling out the story map.	0%	33%	17%	17%	33%
The comprehension questions at the end of the WebQuest were too hard.	0%	17%	33%	17%	33%
I did not use the vocabulary page.	0%	17%	33%	50%	0%

I went back to the story page.	17%	50%	33%	0%	0%
I learned new things from the WebQuest.	50%	50%	0%	0%	0%

Perception Survey

The perception survey (see Table 4) gauged the students' reactions to using WebQuests to assist with their reading comprehension. The survey findings indicated that 83% of students either agreed or strongly agreed with the following statements: "*The WebQuest was easy to use*" "*I understood the directions in each WebQuest,*" and "*I liked doing the WebQuest*". One hundred percent of the students agreed or strongly agreed with the statements, "*I learned new things from the WebQuest*" and "*The WebQuest helped me with my reading.*" The majority of the students reported having a positive experience with the WebQuests.

Discussion

Students in the study performed better on the comprehension quizzes at the end of each WebQuest compared to their performance on the story map embedded as an activity in the WebQuest. Student performance generally showed that students comprehended the stories, but did not understand the purpose of the story map strategy. Another possibility is that the story map activity led the students to increased comprehension of the text, so that they could perform better on the short quiz (Blakenship, Ayres, & Langone, 2005), but results on this pilot study were inconclusive due to confounding variables further discussed in the limitations and implications section.

Filling out the story map appeared to have been a very complex task for the students to do independently. With the exception of identifying and describing the characters, students had trouble with notating important plot points, describing the setting, and summarizing the theme of the story. No progress was shown in the course of this investigation (Stetter & Hughes, 2011).

The perception survey results were telling. Overall, students found the WebQuest easy to use, the directions were clear, and most felt that the passages were easy to read. The one student who responded that the passage was difficult to read scored lower on most quizzes demonstrating that he was having more comprehensive or decoding difficulties than the rest of the students. This aligns with previous work that shows that students report a positive experience overall with working on the computer (Stetter & Hughes, 2010a). The procedural questions about the use of the vocabulary page, the story passage as reference, and whether or not the students liked filling out the story map were low at 50%. The vocabulary definitions and story passage were only a click away, but many students in the study found even that extra effort somewhat difficult by their own self report of support usage. Other research literature reports that students with LD are often overwhelmed with too much information (Boon et al., 2015). The most encouraging responses in the perception survey were that all of the students felt that they learned something from the WebQuest and that it helped with their reading. Students typically have positive reactions to working with WebQuests (Leung & Unal, 2013). Certainly, this sort of one-on-one work can help students improve their own reading comprehension (MacArthur, 2009). Overall, the students were very interested in the WebQuests, offering many suggestions to the researchers including that they would like to have the passage read to them through the computer and headphones, much as early computer research had done (Higgins & Boone, 1991). They also felt that using a multiple choice format would be much easier in filling out the story map since the story maps contained information that was typed and composed by the students themselves which is more of a writing task and difficult for students with LD.

Limitations and Implications

The students had only five WebQuests to complete in this study, making it difficult to see a treatment effect on students' comprehension with such a short intervention period. Generally, students with LD need more instruction in strategies than peers who are functioning at grade level

(Boardman, Vaughn, et al., 2016). Perhaps students would have benefitted from several weeks or months of intervention in order to best internalize the ideas behind the strategy (Stetter & Hughes, 2010a).

Additionally, not all students completed all sessions. Students had many conflicts from their extracurricular activities that prevented their completion of the WebQuests, with only three students completing all five sessions. Makeup meetings would be rescheduled and then missed. To really gauge the effectiveness of the intervention a much more in-depth and mandatory schedule was needed.

Students completed their work at their own pace but perhaps needed brief mini-lessons about the material along with a clear teacher-provided structure for how the lesson would function. Students benefit from direct teacher instruction and perhaps the concept of story structure/story mapping was too difficult a concept for students with LD to grasp because they needed multi-modal and repeated support to fully understand it (NRP, 2000). Future work in how mini-lessons fit with computer activities or in overall teacher lesson plans about reading and reading comprehension could benefit both students and the field.

Also unknown is student utilization of supports linked to the story maps. Did they utilize the vocabulary definitions or the sample story map? How often did they reference the story itself? The current research did not track this and perhaps a glimpse into students' online utilization of supports would provide a better picture of how best to optimize future versions for students with LD. Knowing more about what students used could perhaps inform teachers in their instruction of students with LD about how to utilize the supports provided by the WebQuest. Perhaps they did not understand that the associated pages would help. Teaching students to better utilize supports could be explored in future work.

Overall, the intervention was reading and writing intensive, two tasks that are often exceedingly difficult for students with LD (Boardman, Vaughn, et al., 2016). In future, it might be better to follow student suggestions and include the ability for students to use drop down menus for multiple choice answers instead of writing them in the online boxes themselves and to provide limited to extensive use of word and passage reading so that students could ease their passage decoding to better understand the story structure strategy.

Teacher instruction in reading comprehension is especially crucial when paired with instruction on the computer (Dynarski, et al., 2007). Due to students with LD having difficulties in motivation and organization (Mastropieri & Scruggs, 2007) explicit, in-depth, repeated instruction in reading comprehension strategies may assist them (Gnaedinger, et al., 2016) and computers are one way to facilitate this. This instruction could be paired with overall exposure to print so that they have extensive ability for guided practice of the strategies which they are learning. However, more study is needed in the area of hypertext and hypermedia instruction with students with LD (Stetter & Hughes, 2010a); not only to see if this could improve comprehension, but also modifying curriculum for students who need support. Additionally, story map instruction is a strong, strategic way of improving reading comprehension (Stetter & Hughes, 2010b) and can be reinforced through the use of computer tools and programs, such as WebQuests. However, much more experimentation is needed to ascertain the full possibility of use of WebQuest instruction (Pak, 2015)

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