



## Promoting Reading Success: The Effects of an Adapted Book on Reading Comprehension

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Received: March 10, 2017; Accepted: June 03, 2017; Published: June 06, 2017

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Competing interests: The authors have declared that no competing interests exist.

*Cite as: Thomas D, Ross B. Promoting Reading Success: The Effects of an Adapted Book on Reading Comprehension. J Commun Disorder Assist Technol. 2017; 1: 1-11.*

### ABSTRACT

Picture symbols paired with written words are commonly used in adapted literacy materials and augmentative and alternative communication systems to support the development of speech and language skills in a wide range of populations. However, the research base on the effectiveness of pictures paired with text in increasing reading comprehension is limited. In addition, *communicative reading strategies* (CRS) have been used as an effective shared reading approach to facilitate reading acquisition in children with low reading skills and with children who use picture/text symbols, such as AAC users. The purpose of this study was to evaluate the effectiveness of an adapted book, combined with CRS in improving reading comprehension for a child at risk for learning how to read. One kindergarten child, aged 6:1 with poor reading skills attended twelve 15-minute sessions of the intervention. A formal assessment of reading comprehension and an informal set of story-related questions were used to determine the effectiveness of the intervention. Improvement was noted in reading comprehension and comprehension of story-related questions. The use of an adapted book and CRS may be an effective intervention for children with low reading skills, such as those with complex communication needs.

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**Key Words:** Adapted books, Reading comprehension, Communicative reading strategies, Pictures

## INTRODUCTION

The aim of this investigation was to determine whether an adapted book, combined with communicative reading strategies (CRS) [1] would affect measurable change in the reading comprehension and comprehension of story-related questions of a kindergarten child with low reading ability. CRS is an integrated, meaning-based feedback approach to improve reading comprehension skills. This evidence-based approach facilitates the reconstruction of meaning of the text through dialogue, prompts, and cues. Evidence suggests this approach increases reading comprehension in children who are struggling in learning how to read [2].

It has been reported that one in five children have difficulty learning to read [3]. Young children who struggle to learn to read have difficulty catching up academically to their peers [4]. Ninety percent of children who were poor readers in the first grade remained poor readers in the fourth grade [5]. In addition, research has shown that many children evaluated for special education services due to poor academic performance were struggling in reading [6]. Thus, reading comprehension, one of the most critical skills learned by children in school, is a significant concern of children who are struggling readers. Text comprehension, or the ability to understand what is read and to actively use strategies to enhance reading comprehension is the purpose of reading [7]. Therefore, it is important for readers to be actively involved while reading by thinking about what they are reading and monitoring their comprehension of the information [7-9].

One way to actively involve a poor reader and facilitate reading comprehension is to use an integrated or interactive model to promote multiple levels of processing. Interactive models of reading instruction emphasize the use of both linguistic knowledge (i.e., phonemic awareness, sentence structure, and word formation rules) and conceptual knowledge for text comprehension. Reading feedback strategies used in an integrated approach are viewed as an interactive process between the teacher and the reader, with the focus on gaining meaning from the text rather than saying all of the words correctly. The reader is encouraged to use background knowledge and attend to the discrete elements (i.e., word structure or function) within the context of the passage [10].

Accordingly, CRS is an integrated model of reading that facilitates reading comprehension in an interactive, engaging environment [1]. Studies have shown support for the use of CRS to improve oral and written language skills in school-aged children [2, 11-14]. In 2005, Crowe compared the effects of CRS and another decoding-based feedback approach in improving reading comprehension of school-age children with low reading ability. The children who received CRS performed significantly better than did the children who received the decoding-based feedback approach on formal comprehension measures and story-related comprehension questions.

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In Crowe's 2005 study, a high-interest, controlled readability trade book was used as the stimulus book throughout the intervention. However, no adaptations, such as the use of graphic or picture symbols paired with the text were utilized. Picture/text symbols have been used to modify or adapt books as a way to provide children with another form of support to develop comprehension. Picture/text symbols have been widely used in augmentative and alternative communication (AAC) intervention to aid in the development of reading in AAC users [15] and to increase communication skills during shared reading [16].

One way to adapt a book is to print the picture/text symbols and place them on the pages of the book so that each sentence in the story is represented [17-19]. Pictures and written words may allow a child to comprehend language by relying on recognition rather than recall in children who have difficulty processing linguistic information [20]. When given a picture symbol paired with the written word, the child is able to alternate between the picture/word (that represents the referent) and other aspects of the interaction. This in turn, helps to facilitate joint attention within a shared context that can lead to increased comprehension [21]. Typically developing children (aged 6 years) with advanced language skills were able to interpret picture/text symbol sentence sequences when communicating during shared reading interactions [22].

Currently, there is limited information on the effects of a book, adapted with picture/text symbols, combined with CRS on reading comprehension in children with low reading ability. Combining an adapted book with CRS could support the development of reading comprehension in an interactive, meaning-based context. Therefore, this investigation will look at whether a stimulus book, adapted with pictures/text symbols, combined with CRS would affect measurable change in the reading comprehension and comprehension of story-related questions of a kindergarten child with low reading ability.

## METHOD

### Experimental Design

A single-subject, pretest-posttest comparison design was used to assess if the stimulus book, adapted with pictures/text symbols, combined with CRS would affect measurable change in the reading comprehension and comprehension of story-related questions of a kindergarten child with low reading ability. The duration of the study was six weeks. Testing and treatment for the study began at the end of February of the participant's kindergarten year and was completed in a small, private room at the school. Pre- and post-testing occurred during the first and last week. Intervention was completed over a 4-week period, with the participant receiving 15 minutes of intervention three times each week.

### Participant Selection and Description

Recruiting procedures included a meeting with kindergarten teachers at a Title 1 public elementary school in

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Northern Louisiana to discuss the nature and purpose of the study. The teachers recommended children for the study who met the following inclusion criteria: (a) had low reading ability and achieved at-risk scores (strategic) on the *Dynamic Indicators of Basic Early Literacy Skills (DIBELS)* (University of Oregon Teaching and Learning Center, 2009); (b) were first time kindergarten students (had not repeated kindergarten); (c) had normal hearing acuity and normal or corrected vision; (d) were not diagnosed with learning disability or speech or language impairment; (e) were not receiving specialized reading intervention other than regular classroom reading instruction; (f) and were monolingual English speakers.

One participant was randomly chosen from the children referred by their teachers who met the inclusion criteria. The participant included in this study was a 6 year-, 1 month-old African American female. Informed parental consent was obtained. Assent was obtained for the participant. Approval to conduct this study was granted by the Institutional Review Board, University of Central Arkansas Sponsored Programs Office.

Three norm-referenced assessment procedures were completed with the participant to determine levels of performance for language, reading ability, and intellectual functioning prior to the intervention. Assessment of language (Clinical Evaluation of Language Functions-4, CELF-4; Semel, Wiig, & Sicord, 2003) and reading ability (Gray Oral Reading Tests, Fourth Edition GORT-4; Form A; Wiederholt & Bryant, 2001) was completed and analyzed by the author, a licensed and certified speech-language pathologist. Assessment of intellectual functioning (Wechsler Intelligence Scale for Children – 3, WISC-3; Wechsler, 1991) was completed and analyzed by a licensed school psychologist employed by the school district.

Baseline assessment suggested that the participant exhibited receptive and expressive language skills within normal limits and intellectual functioning in the average range. Results of the GORT-4 indicated the participants overall reading ability to be in the poor range. Descriptions of pre-testing results are reflected in Tables 1, 2, and 3 respectively.

Subtest	Scaled Score	Percentile Rank
Core Language	93	32
Receptive Language	108	70
Expressive Language	91	27
Language Content	94	24
Language Structure	98	45
Working Memory	88	21

Table 1: CELF-4 Baseline Scores. (Scaled score M = 100; SD = 15)

Subtest	Raw Score	Standard Score (SS)	Percentile
Rate	0	7	16
Accuracy	1	6	9
Fluency	1	6	9
Comprehension	4	7	16
Quotient: Sum of Fluency and Comprehension	3	79	8

Table 2: GORT-4 Baseline Scores. (Subtest SS; M = 10, SD =3; Quotient SS; M =100, SD = 15)

Subtest	Scaled Score	Percentile Rank
Verbal Comprehension	87	19
Perceptual Reasoning	100	50
Working Memory	91	27
Processing Speech	103	58
Full Scale	92	30

Table 3: WISC-3 Baseline Scores. (Scaled score M = 100; SD = 15)

## Procedures

### Assessment and intervention material

The GORT-4 was used as the norm-referenced, pre- and post-test measure in this study. The trade book, *Ten Apples Up on Top!* (LeSeig, 1961) was used as the stimulus book throughout the study. The stimulus book was adapted to include picture/text symbols. Writing with Symbols software [26] that uses Picture Communication Symbols™ (PCS) was used to print the sentence sequences on each page of the book. The pictures were then glued onto each page of the book. The same stimulus book was used so that the event became more familiar and routine, and schemata could be developed for the objects, actions, and roles of the story [19,23]. The stimulus book was based around a theme or common topic, for example, a picture of the lion with one apple on top of his head provided a multitude of information to discuss about the topic and opportunity for introducing concepts, discussing actions, and talking about events [23,24]. This trade book was selected for its high-interest, controlled readability, and repeatable lines. The difficulty of the text ranged from ages 4 through 8. The book included 72 pages, with colored pictures that represented the main events in the story; the text carried the primary narrative content, and used rhyme. Figure 1 reflects a page from the adapted stimulus book.

A set of comprehension questions developed by the author from the stimulus book were used as the informal measure of story-related comprehension. The questions were designed to assess the participant's long-term comprehension of the stimulus book, adapted with pictures paired with text and CRS. The questions were constructed by the author and the complexity ranged from simple what, who, and where and yes/no questions (i.e., did or do) to

more complex what happened, how, and why questions (see Appendix A). The questions were read by the author at the end of each session.



Figure 1: Page of adapted stimulus book

## Intervention

CRS was used to produce an interactive, conversational-style approach and to engage the participant in constructing meaning from the adapted text. The author presented the book to the participant in each session.

The author used the following strategies and cues during reading:

1. Before reading the book, the participant was encouraged to look at the pictures and make predictions about the story. To facilitate the predictions, the author asked the participant questions, such as “*Who are the characters?*” and “*What do you think the characters will do in the story?*”
2. The picture/text symbols were referenced by pointing to each one on the page while reading.
3. As the participant asked questions, the author answered the questions and explained and defined unfamiliar words. For example,
 

*Child: What’s that?*  
*Adult: A spatula. You use it to mix and spread food.*  
*Child: You cook with it.*
4. As the participant made comments, the author acknowledged the comment or summarized then redirected the participant back to the adapted text. For example,
 

*Child: Skate. You gotta skate at the skating rink.*  
*Adult: That’s right. He’s skating.*
5. At the end of each session, the participant was asked the story-related comprehension questions developed for this study.

## RESULTS

### Norm-referenced Comprehension Measure

Examination of the data showed an increase in overall reading ability from pretest to posttest. On individual subtests, no gains were noted for rate. However, accuracy, fluency, and comprehension scores increased from baseline. An Oral Reading Quotient was calculated by summing standard scores of fluency (sum of rate score and accuracy score) and comprehension scores. The overall Oral Reading Quotient increased 12 points, from 79 at pretest to 91 at posttest (M = 100, SD = 15). Overall reading ability increased from poor to within the average range following the intervention.

Subtest	Total Raw Score	Standard Score	Percentile
Rate	0	7	16
Accuracy	2	7	16
Fluency	2	7	16
Comprehension	9	10	50
Sum of Fluency and Comprehension	17	91	27

Table 4: GORT-4 Post-test Scores

### Informal Comprehension Measure

To assess the effectiveness of the intervention, sixteen story-related questions were used to assess long-term recall at the end of each session. The number of details recalled by the participant was examined. The participant’s accuracy from the initial session to the final session increased from 37 % to 80 % is shown in Figure 2.

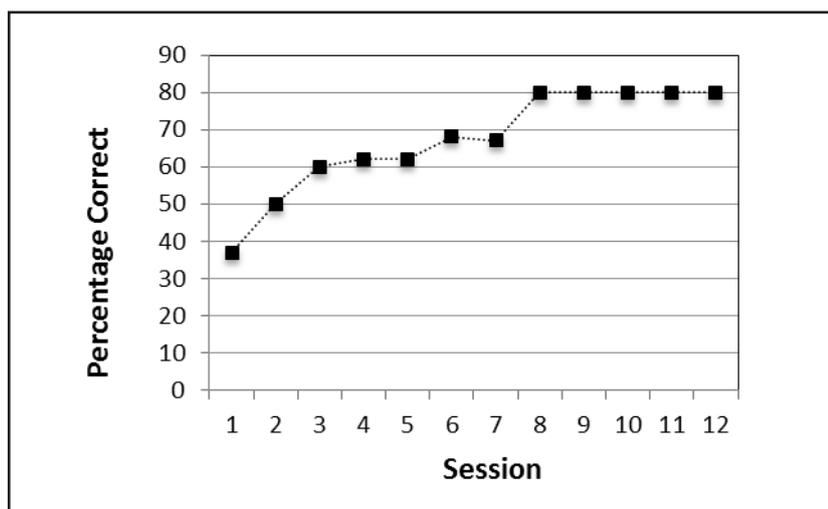


Figure 2: Participant's percentage of correct responses to comprehension questions each session

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The type of details of the participant's responses to the comprehension questions was also examined. The comprehension questions were categorized according to the type of response required (i.e., naming, yes/no, location, action, description, and inference). The participant recalled more details in the categories of yes/no, naming, location, and description than in action and inference. The percentage of responses by type is summarized in Table 5.

Question type	Percentage Correct
Naming	85
Yes/No	100
Location	83
Action	25
Description	73
Inference	8

Table 5: Participants percentage of correct responses to comprehension questions by type.

## CONCLUSION

The purpose of this investigation was to determine whether a stimulus book, adapted with pictures paired with text, combined with a meaning-based feedback approach to reading acquisition would affect measurable change in the reading comprehension and story-related comprehension skills of a kindergarten child with poor reading ability. After four weeks of intervention, where pictures paired with text were used with CRS, the participant showed an increase in reading comprehension on a pre- to post-test formal measure of reading. Overall reading ability (fluency and comprehension) increased from poor to within the average range following the intervention. In addition, the participant increased her comprehension when asked story-related questions. The participant exhibited long-term recall of story-details as measured by an informal measure.

The results of this study add to the literature on the use of book reading to increase literacy skills. The use of pictures paired with text in the stimulus book provided an additional benefit for the participant.

This study does, however, show the following limitations that warrant future research in the area of adapted literacy and its effects. First, the small sample size in the current study calls for replication with larger numbers of children to support this finding. Second, it is possible that the participant showed gains in reading comprehension because of the one-to-one book sharing interactions and not because of the adapted text given the large research support that one-to-one book sharing increases literacy skills in general [1,10,26]. Third, the short-term benefits of the adapted book on reading comprehension were measured immediately following the intervention. Future research should investigate the longer-term effects of the adapted book and CRS used in the current study. It would be important to look at the impact of the intervention on later reading comprehension skills. Additionally, in examining the story-related detail questions, the participant was more successful on lower-level

questions (i.e., naming, yes/no, and location) than on more challenging questions (i.e., action and inferences). The same questions were asked at the end of all 12 sessions. It is possible that the results would have been different if the participant was not trained on the same questions.

Future research could also focus on replication of this study with children who have special needs, such as children with learning disability, speech-language impairment, or complex communication needs or children who are bilingual.

#### Note

1. Picture Communication Symbols are a registered trademark of Dynavox Mayer-Johnson, Pittsburgh, PA.

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## APPENDIX A

Story-related questions asked after reading the story:

1. What is the title of the story?
2. Who are the characters in the story?
3. How many apples did the lion hold on his head at the beginning of the story?
4. What did the dog do with 4 apples on top of his head?
5. Do the lion, dog, and tiger want the apples to drop?
6. Where do the animals put the apples?
7. What can the animals do with 8 apples up on top?
8. How many apples in all do the lion, dog, and tiger put on their head?
9. Who comes in to make the apples drop?
10. What does the bear try to use to make the apples drop?
11. What do the animals do to not let the apples fall?
12. What happens to make the animals drop their apples?
13. Who ends up with apples on their heads?
14. How many apples do they all end up with on their heads?
15. Did the lion, dog, and tiger have fun?
16. Why did the apples fall?