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Comprehending Science Writing: The Promise of Dialogic Reading for Supporting Upper Elementary Deaf Students

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Abstract

Dialogic reading is an instructional strategy that has shown promise for supporting the reading development of children both with and without disabilities. Specifically, there may be positive effects of vocabulary knowledge, morphological knowledge, participation during reading, and emergent literacy skills. However, the knowledge base on the efficacy of dialogic reading with informational text is extremely limited. In addition, there are much available data on the use of dialogic reading with deaf students. The current study describes a multiple baseline single-case design study of a dialogic reading approach used with a deaf student enrolled in upper elementary school. Findings show promise for the dialogic reading approach for use with this genre and this population, though further research is necessary.

Keywords

elementary school, age, deaf/hard of hearing, exceptionalities, intervention strategies, literacy, reading, single subject, methodology, research, sign language

Dialogic reading (DR) is a commonly used practice for promoting reading comprehension among diverse groups of children. Often, DR is used to support children's ability to access and comprehend narrative texts, frequently among children in preschool through mid-elementary school. Although there is abundant research on the use of DR with young hearing children (Chlapana, 2016; Cohrssen, Niklas, & Tayler, 2016; Huennekens & Xu, 2016; Maine, 2013; Pillinger & Wood, 2014) or children with disabilities (Fleury & Schwartz, 2017; Morgan & Meier, 2008; Rahn, Coogle, & Storie, 2016; Towson, Gallagher, & Bingham, 2016), little research has documented the use of DR for literacy with deaf[1] students (Fung, Chow, & McBride-Chen, 2005). Given the promise of this strategy as potentially effective tool for reading instruction, more research on the use of DR among deaf children and the range of texts and ages for which it is effective is needed.

Literature Review

DR

DR is an instructional strategy in which a child reads a text alongside an adult, who engages with the child as they read, asking specific categories of questions designed to promote comprehension of the text (Lonigan & Whitehurst, 1998). These categories are completion, where the child is prompted to fill in a word in a spoken sentence; recall, where the child details the events of all or part of the text; open-ended prompts, often connected to pictures where the child is asked to elaborate on the events portrayed; wh- prompts, or questions that ask who, what, when, where, why, or how; and distancing prompts, which are also known as the comprehension strategy making connections (Lonigan & Whitehurst, 1998).

The DR approach has been identified as successful among emergent and elementary age children without disabilities. Researchers have found that DR has positive effects on discussions around print (Chlapana, 2016; Cohrssen et al., 2016; Maine, 2013). In addition, DR seems to have positive effects on emergent literacy skills (Cohrssen et al., 2016; Pillinger & Wood, 2014) even across languages among emergent dual-language readers (Huennekens & Xu, 2016). There is even evidence that DR may improve enjoyment of reading (Pillinger & Wood, 2014). In the only study to question the utility of DR for use with informational texts among young readers, Chlapana (2016) found that using DR helped 5- and 6-year-old children recognize informational text features and demonstrate comprehension of informational texts.

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DR also seems effective for children with disabilities. Targeted vocabulary knowledge has been shown to improve after DR instruction for a generalized group of children with disabilities (Towson et al., 2016) as well as for children with developmental disabilities (Rahn et al., 2016), autism (Fleury & Schwartz, 2017), and those considered at risk of reading difficulty (Morgan & Meier, 2008). Although minimal research has examined outcomes for children with disabilities outside of vocabulary acquisition, there is some evidence that DR can improve participation during a book reading session for children with autism (Fleury & Schwartz, 2017). DR also has potential to have positive impacts on morphographic knowledge among children with language disorders (Maul & Ambler, 2014).

To our knowledge, only two articles addressed the use of DR strategies with deaf children. Fung and colleagues (2005) used a quasi-experimental design with a group of 28 deaf children in Hong Kong in kindergarten through second grade who were assigned to either a DR condition, a typical reading condition (children read the same books but without DR strategies), or a control condition (no reading instruction). They found that the DR group learned more vocabulary than children in either the typical reading or control conditions. Trussell and Easterbrooks (2014) conducted a single case design (SCD) study of DR among deaf readers and similarly found that knowledge of target vocabulary improved after instruction using DR. These findings suggest that DR can be effective for supporting vocabulary acquisition of deaf students, though its effects on other areas of literacy development are unknown.

Benefits of Interactive Literacy Instruction for Deaf Students

One aspect of DR that may hold particular benefit for deaf students is the use of interactive instructional strategies to support and scaffold access to text. Theoretical models argue for the importance of interactive teaching and learning opportunities for deaf students, especially such opportunities that incorporate visual modes of understanding (including, but not limited to, the use of American sign language [ASL]; Kuntze, Golos, & Enns, 2014; Co-Author and Author 1, in preparation). Applied research on interactive reading instruction with deaf children has found promise in this strategy (Charlesworth, Charlesworth, Raban, & Rickards, 2006). One case study of a deaf child who used signed English found that interactive instruction may have been a key piece of her instructional experiences that allowed her to improve her reading ability (Nielsen & Luetke-Stahlman, 2002). Other researchers have found that interactive literacy instruction may improve vocabulary knowledge and morphosyntactic understanding (Richels, Schwartz, Bobzien, & Raver, 2016). In addition, parent engagement in interactive storybook reading contributed to later literacy scores among children with cochlear implants (DesJardin, Ambrose, & Eisenberg, 2009). In short, interactive instruction seems to be a key element of literacy instruction for deaf children, regardless of language or modality.

The use of interactive writing strategies with deaf students has also been the subject of recent research. For instance, Williams (2011) in a case study found that interactive instruction in writing was a promising approach to use with this population. Subsequently, the Strategic and Interactive Writing Initiative (SIWI), a writing program designed for deaf and hard of hearing children that emphasizes interactive instruction, has been found to reduce the use of ASL features in writing (Wolbers, Bowers, Dostal, & Graham, 2014) and improve writing performance in English, including length of writing and use of complex sentences (Wolbers, Dostal, & Bowers, 2011; Wolbers et al., 2015).

While the research base on interactive instruction is promising, there is still much that is unknown. Expanded research that examines interactive and dialogic styles of reading instruction of children at different ages and during reading different types and genres of text is necessary to better understand the potential that such strategies hold. One area of particular need of evidence for effective instructional strategies is the disciplinary reading that becomes increasingly essential for success as students navigate the content area texts found in middle and high schools (Moje, 2008). Although disciplinary literacy is frequently discussed as the reading encountered specifically during reading content texts (e.g., science, history, mathematics) in these upper grades (e.g., Jacobs, 2008), some have made the case that opportunities to engage with informational texts and learn disciplinary literacy skills should be introduced during elementary school (Moss, 2011). What is known about disciplinary literacy and deaf children is explored below.

Deaf Students and Reading to Learn

Although a great deal of the deaf education literature is devoted to the study of language and literacy acquisition, there is little research exploring the development of literacy past what Chall (1983) termed the "fourth-grade slump"—the point around fourth grade when reading development slows down, possibly because teachers stop teaching children *how* to read and instead expect them to *learn from* what they read. What do we know about when deaf students move past learning to read and begin reading to learn? Few researchers study the more advanced literacy skills that students acquire in upper elementary through high school for this population, and fewer still examine the application of these skills outside of narrative texts.

The language found in informational texts contains a wide array of features, and students often require more advanced literacy skills to access and comprehend them (Uccelli, Phillips-Galloway, Barr, Meneses, & Dobbs, 2015). Snow and Uccelli (2009) described the language found in more academic, content area writing as including more complex syntax, precise vocabulary, unique organizational structures, and a detached and authoritative stance. Early theoretical argumentation regarding the more academic literacies found in informational texts and how these may be accessed by deaf children identified these more advanced literacy skills as a potential source of difficulty for deaf students, especially those learning through ASL (Mayer & Wells, 1996). In the years since then, some research has expanded our understanding of academic English skills and reading among older deaf students.

Research has documented academic English as an area of difficulty for some deaf students (Scott & Hoffmeister, 2017, 2018; Scott, Galloway & Dobbs, in preparation). Among older deaf students, a relationship may exist between academic English ability and both reading (Scott & Hoffmeister, 2017) and writing proficiency (Scott & Hoffmeister, 2018). For both these skill areas, among signing deaf children ASL is also significantly related to literacy outcomes, suggesting that it is potentially the combination of L1 proficiency and facility with academic print that may be impacting reading and writing skills. As students advance in grade level, and are expected to acquire more information via reading content area texts, one might speculate that ability to understand and produce more academic registers of English might increase in importance.

Academic English proficiency levels may have a direct impact on disciplinary literacy. Disciplinary reading and writing have been found to make specific and complex demands of the reader in order for them to successfully comprehend a text (Fang, Schleppegrell, & Cox, 2006). There are several approaches to improving disciplinary literacy skills that range from focusing on developing disciplinary knowledge, teaching discipline-specific literacy practices, or extending and building upon general literacy skills (Gabriel & Wenz, 2017). There is limited research that specifically aims to *improve* rather than simply understand the disciplinary literacy skills of deaf readers. In the only such study, a case study of a deaf student who used ASL and struggled with content literacy, it was found that teaching her to write summaries and identify informational text features were helpful for her development (Howell & Luckner, 2003). In the present study, we implemented a modified DR approach using science texts for a student enrolled in upper elementary school. A single case, multiple baseline design across behaviors design was conducted to answer the research question: Is there a functional relation between the use of core features of DR and an increase in the level of comprehension of an informational text?

Method

Participant and Setting

Arjun (a pseudonym) was an 11-year-old rising fifth grader when he participated in this intervention. He was identified as deaf when he was 5 months old and received early intervention services using speech only. He had received two cochlear implants when he was below 2 years old, but his mother reported that his spoken language had not improved significantly afterward. When he began elementary school, he was given an ASL interpreter and learned to communicate in sign. At the time of data collection, he was in a mainstream classroom in the metro Atlanta area with a full-time ASL interpreter. Arjun's mother reported that he struggled with reading comprehension and estimated that he was reading on about the first- or second-grade level. Arjun was not diagnosed with any additional disabilities.

Arjun completed all assessment, baseline, and intervention sessions in an empty conference room at a local university. The intervention took place over 2 weeks, 4 days each week, excluding the assessment session which occurred 1 week before the intervention began. Each day included two 30-minute sessions. In each session, one informational book was read using DR. Overall, there were four baseline sessions (2 hr), three Tier 1 sessions (1.5 hr), three Tier 2 sessions (1.5 hr), and four Tier 3 sessions (2 hr), for a total of 14 baseline and intervention sessions (7 hr of instruction) across the 2 weeks. Author 1 was the interventionist. She was an experienced teacher of the deaf and held licenses out-of-state in deaf education K-12, elementary education, reading education K-12, and English as a second language K-12. She was fluent in ASL and delivered all sessions in voice-off ASL.

Materials

During baseline and intervention, a set of informational texts on the topic of science were used. These texts were published by the company Teacher Created Materials (Housel, 2015; Maloof, 2015; D. H. Rice, 2015a, 2015b; W. B. Rice, 2015), and they covered scientific concepts such as erosion, weather, volcanos, earthquakes, the water cycle, climate, and pollination. Overall, 14 books were included across baseline and the three tiers of intervention. Books were randomly assigned to baseline and intervention tiers using a random number generator. The books ranged in Lexile level from 360 (second grade) to 660 (third grade; Doman, n.d.). Books in baseline averaged 500L, books in Tier 1 averaged 490L, those in Tier 2 averaged 453.33L,

Table 1. Language and Literacy Assessment Results.

Assessment area	Standard score	Grade equivalency	Age equivalency	Descriptor
Reading comprehension	—	1st	—	Significantly below average
Reading fluency	86	3.8	8 years 9 months	Below average
American sign language proficiency	90	—	—	Average

and those in Tier 3 averaged 510L. All four baseline and intervention tiers had Lexile averages at the second-grade level, slightly above Arjun's reading level.

Measures

Design. A multiple baseline design across behaviors (Ledford & Gast, 2018) was selected. Multiple baseline designs are appropriate for evaluation of skills that are likely to persist (e.g., reading), and where the tiers can be assumed to be relatively independent (Ledford & Gast, 2018).

Baseline and probe assessments. Following the standard structure of DR instruction, baseline and probe assessments included four comprehension questions: recalling the passage (1), wh- prompts (2), and distancing questions (1). In addition, one question was added that focused on the use of text features (for instance, where is the caption on this page? What is a header for?). These questions were added due to their relevancy for reading and understanding informational texts and were asked by the interventionist at the end of each session. Responses were transcribed and scored by a PhD student and experienced teacher of the deaf to ensure accuracy of baseline and probe assessment scoring. Agreement on baseline and probe assessment responses was 86%, indicating a high degree of reliability in scoring.

Reading comprehension. Reading comprehension was assessed using the Qualitative Reading Inventory, Fourth Edition (QRI-4; Leslie & Caldwell, 2016). Although this assessment does not produce a standardized or norm-referenced score, it provides qualitative detail on comprehension ability and an instructional reading level. In addition, the QRI-4 includes informational passages, which is uncommon in reading assessments. Arjun's instructional reading level was identified by the QRI-4 as first grade, putting him significantly below average in reading comprehension. In general, he scored lower on implicit questions than explicit questions on this assessment. This suggests that although Arjun may be able to locate some answers to comprehension questions that can be found in text, he struggled more with making inferences that required him to combine textual information with his own experiences or background knowledge. See Table 1 for all assessment results.

Reading fluency. To obtain a measure of reading fluency, the Test of Silent Word Reading Fluency, Second Edition (TOSWRF-2; Mather, Hammill, Allen, & Roberts, 2004) was used. This assessment has been used successfully with deaf students in the past (Scott & Hoffmeister, 2017, 2018), and is notable in that it provides a score for fluency that does not require oral reading. In this assessment, the student is given a block of text without spaces between the words (i.e., onmygouphe) and asked to draw vertical lines to indicate word boundaries (i.e., on|my|go|up|he). Arjun's reading fluency score was within the average range according to his standard score, but still somewhat low.

ASL proficiency. As this intervention was designed to be implemented in ASL, we also assessed ASL proficiency to ensure that Arjun's ASL abilities were sufficient to benefit from this type of instruction. To evaluate this, we used the American Sign Language Receptive Skills Test (ASL-RST; Enns, Zimmer, Boudreault, Rabu, & Broszeit, 2012). This assessment is administered through video recordings of a signer expressing words and ideas. The individual being assessed chooses from four pictures which one most accurately represents the signed word or phrase. According to the ASL-RST, Arjun's ASL proficiency is within the average range, indicating that this intervention was appropriate for his language abilities.

Procedures

Baseline. Instruction in baseline consisted of before, during, and after reading activities. Before reading, the interventionist pre-taught three to five vocabulary words that were important for understanding the text. These words were presented on digital cards that included the English word, a picture representing the word's meaning, and, where possible, the ASL sign. After teaching the word's meaning, Arjun was asked to both sign and fingerspell the word. During reading, baseline did not include any DR instruction. Instead, the interventionist commented on the events in the story through connecting them to the pictures. For example, "Look, there is a volcano! People are running away." After reading, the interventionist asked Arjun one recall question, two wh- questions, one text feature question, and one distancing question. To ensure that baseline sessions were not significantly shorter than intervention, instruction closed with Arjun searching for pre-taught vocabulary words in

the book, and rereading the sentences that contained these words. Baseline sessions lasted on average 23.5 min.

Intervention. To examine the effectiveness of this intervention across behaviors, DR was split into three components, each of which introduced a new reading comprehension component through a dialogic approach based on the questioning categories used during DR (open-ended, recall, wh-, distancing, and completion questions). In this modification, open-ended questions, which in DR frequently are based on pictures, were modified to focus on informational text features. This change was made because these features are often visual (e.g., graphs, charts, captions on pictures) and understanding these features is a vital component of informational text reading. Completion questions were removed due to language use, as presenting an English completion question in ASL may be unclear.

Tier 1 introduced Arjun to identifying text features and recalling events from the text. Before reading, the same procedures for introducing and practicing important vocabulary words from the text from baseline were followed. During reading, the interventionist would stop Arjun during reading to dialogue with him about text features, and to ask for and model recalling. An example of a text feature dialogue is, "Show me where the caption is. What is a caption for?" An example of a recall dialogue was, "What did we learn about on this page? Tell me about it." After reading, the interventionist asked Arjun one recall question, two wh- questions, one text feature question, and one distancing question. Tier 1 sessions last on average 30.67 min.

During Tier 2, the interventionist continued dialogic instruction on text features and recall. Wh- questions were also added. Before reading in Tier 2, the same procedures for introducing and practicing vocabulary words from the text used in baseline and Tier 1 were followed. During reading, the interventionist would stop Arjun to dialogue about text features and to recall events from the text, as well as to ask wh- questions. In this tier, the number of recall and text features questions were reduced (though still present) compared with Tier 1 to keep the instructional time within 30 min. Some examples of wh- questions asked during Tier 2 included, "What is the outside layer of the earth called?" and "Why do we call some volcanos 'dormant'?" After reading, the interventionist asked Arjun one recall question, two wh- questions, one text feature question, and one distancing question. Tier 2 sessions lasted on average 24.67 min.

During Tier 3, the interventionist continued dialogic instruction on text features, recall questions, and wh- prompts. Distancing prompts or distancing questions were also added. Before reading, the same procedures for introducing and practicing important vocabulary words from the text from baseline and Tiers 1 and 2 were followed. During reading, the interventionist dialogued with Arjun using discussions on text features, recall, and wh- prompts, and distancing questions. Examples of distancing questions included, "What do you do to help take care of the planet?" or "Have you ever experienced a hurricane before? What was it like?" During this tier, questions about text features, recall, and wh- prompts were reduced (though still present) compared with Tiers 1 and 2 to keep the total instructional time within 30 min. After reading, the interventionist asked Arjun one recall question, two wh- questions, one text feature question, and one distancing question. Tier 3 sessions lasted on average 28.5 min.

Treatment fidelity. To ensure treatment fidelity, a graduate research assistant observed more than half of the sessions (8/14, 57%). Fidelity was measured through the use of a checklist developed by the first author. During baseline, the observer used a seven-item checklist, which followed instructional practices such as using a picture walk, preteaching vocabulary words, and reaching a threshold of comments about pictures during reading. The Tier 1 checklist included six items, which reflected instructional activities expected in Tier 1 such as asking him to recall information from the text and dialoging about text features. The Tier 2 fidelity checklist was seven items long, and included all items from Tier 1, and added instruction using wh- prompts. The Tier 3 fidelity checklist was eight items long, and included all items from Tier 2, and added instruction using distancing questions. Fidelity was measured using a minimum threshold of presence of instructional and assessment elements (i.e., in Tier 3, the interventionist was required to ask Arjun distancing questions at least 5 times—if these questions were asked 4 times, this was counted as not present). Interventionist instructional fidelity was reported at 96%.

Data analysis. Line graphs were examined using standards for analysis of SCD graphs (Ledford & Gast, 2018). Specifically, visual analysis was used to determine immediacy of an effect by change in level, trend, or variability. In keeping with analysis of multiple baseline design graphs, data were further analyzed for overlap between baseline and intervention and vertical analysis between tiers.

Results

Figure 1 depicts the results of the multiple baseline design across target reading skills. The design met standards with reservations, because only some tiers include four data points (Kratochwill & Levin, 2010). Data indicated a basic effect for Tiers 1 and 2. In Tier 3, there was change in trend during baseline, making demonstration of a functional relation impossible. Tier 1, which was the DR condition with instruction focused on recall and text features, showed initial decreasing trend in baseline. Following intervention,

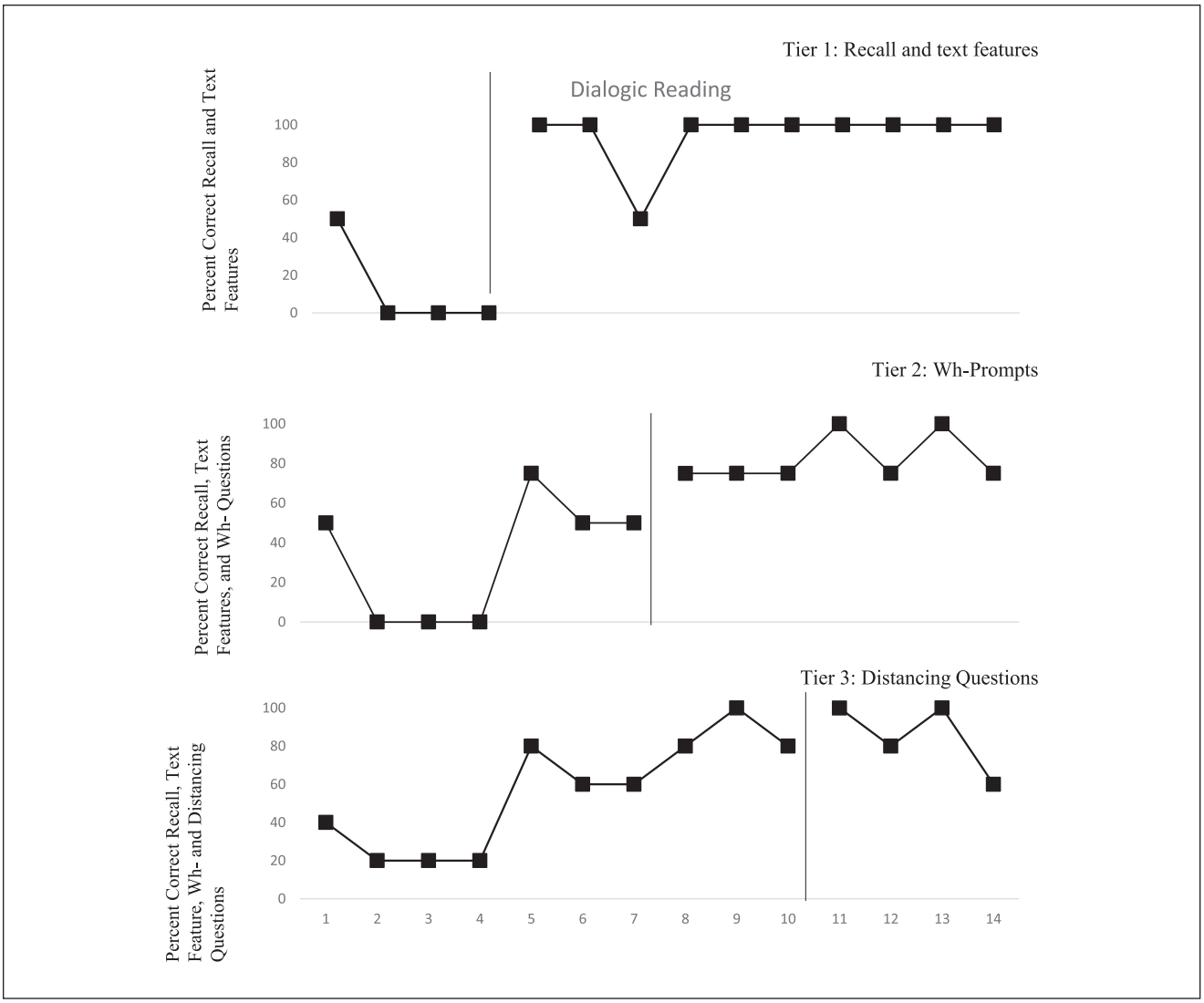

Figure 1. Results of dialogic reading intervention on response to reading comprehension questions.

data maintained at 100% except for Data Point 3 which was lower (50%). Tier 2, added wh- prompts, showed variability in baseline, ending on stable data at 50% accuracy. Following intervention, there is a small immediate change in level, which maintained with some variability. Tier 3, which added distancing questions, showed a steady increasing trend in baseline, which maintained through intervention. Vertical analysis of data revealed a dip in responding in Tier 1 concurrent with introduction of the intervention in Tier 2. Upon intervention in Tier 2, Tier 3 baseline data showed an increasing trend, potentially indicating some carryover effects. Arjun had a mean of 25% accuracy in baseline (range: 20%–40%), 66.67% in Phase 1 (range: 60%–80%), 80% in Phase 2 (range: 80%–80%), and 85% in Phase 3 (range: 60%–100%).

Discussion

This study examined the use of DR with informational texts with a deaf student who communicated using ASL. An SCD approach was used to examine this question. Results indicated two moderate basic effects of the DR prompts for recalling, identifying text features, and answering wh- questions. There was not an interpretable effect of distancing due to apparently spontaneous generalization in baseline. The findings indicated that this may be a promising approach for improving the comprehension of informational text, as Arjun improved in his ability to answer comprehension questions between baseline and intervention. Although elements of the DR approach were staggered across tiers of intervention, there was evidence of carryover between tiers. We will discuss these issues below.

Comprehension and DR

During baseline, Arjun struggled to answer comprehension questions correctly, earning a score of 0 across three out of four baseline sessions. This was consistent for all types of questions (recall, wh- , text feature, and distancing). There was an immediate change in level after the first intervention session which was maintained across all three intervention tiers, suggesting that the DR approach provided the scaffolding that Arjun needed to access and comprehend the text. Although there has already been ample evidence that DR is a successful strategy to use for students with disabilities (Fleury & Schwartz, 2017; Morgan & Meier, 2008; Rahn et al., 2016; Towson et al., 2016) and emergent readers (Chlapana, 2016; Cohrssen et al., 2016; Huennekens & Xu, 2016; Maine, 2013; Pillinger & Wood, 2014), there are few studies that explore DR with deaf readers, and none on how DR may improve deaf readers' comprehension. The current data, though insufficient to draw general conclusions, suggest DR can be successful in this context.

Some carryover was evident between all three intervention tiers, indicating the intervention may have had a generalized effect on student functioning. Trussell and Easterbrooks (2014) completed the only other SCD study examining the use of DR with deaf students. This multiple baseline across content probe design study focused on vocabulary acquisition rather than type of comprehension question responses and did not find these same carryover effects (Trussell & Easterbrooks, 2014). In fact, a majority of studies of DR measure vocabulary acquisition rather than comprehension as the primary outcome among children with disabilities or who are deaf (Fung et al., 2005; Morgan & Meier, 2008; Rahn et al., 2016; Towson et al., 2016; Trussell and Easterbrooks, 2014) and did not find similar effects. There are a couple of possibilities as to why these effects occurred in this study, which are explored below.

First, it is possible that the nature of reading comprehension involves strategies and processes that are too intertwined to isolate as was attempted in the current study. Research on comprehension strategy use suggests that proficient non-native English readers frequently monitor their comprehension and employ a range of comprehension strategies to support their understanding of text (Wang, 2016). It may be that such strategies are used not in isolation but rather in concert with one another. The ability to answer wh- questions about a text may not be wholly divorced from understanding that text well enough to also recall events or make connections. Perhaps the carryover effect occurred because dialogic instruction around the content of the text naturally boosted Arjun's ability to comprehend the text more generally.

Second, it may be that this was an anomaly based on Arjun's particular abilities and reading profile. This SCD study included Arjun as the only participant due to limitations in time and recruitment, and as such it is not possible to identify patterns of response across individuals. A DR SCD study that used a multiple baseline design across participants may be more appropriate for future research because it does not require a multicomponent intervention to be split into pieces. In addition, a more systematic analysis of the components may allow for more certain identification of the active ingredients of DR. Regardless of the causes of the carryover effect, these findings demonstrate promising results. Although more research is necessary to fully understand the ways to utilize DR to support the reading comprehension of deaf children, these findings indicate that the DR approach may be a positive tool for reading.

DR as a Tool for Understanding Informational Texts

Many children are not exposed at early ages to informational texts and may lack instruction in how to read and understand informational texts (Duke, 2000). Therefore, it is likely that specific and explicit instruction in these areas is important for all children. Deaf children seem to benefit from explicit instruction (Trussell & Easterbrooks, 2017; Wolbers et al., 2015). These results suggest that DR as an instructional tool may provide the explicit instruction necessary for deaf children to engage with informational texts. Kuntze and colleagues (2014) suggested that for deaf children who use a visual language, social mediation of texts may be necessary to support comprehension, and indeed, opportunities for face-to-face interaction may improve learning outcomes (Cannon, Fredrick, & Easterbrooks, 2010; Dostal & Wolbers, 2014).

Although their theoretical model was not designed for informational texts, these findings suggest that DR, an interactive instructional approach, may be beneficial for informational text comprehension. Understanding of text features, which is a skill that is necessary for understanding informational texts, was a skill that Arjun specifically struggled with during baseline. DR instruction demonstrated the ability to support Arjun in understanding text features and their uses. DR has been researched extensively for use with fiction (e.g., Rahn et al., 2016; Towson et al., 2016). However, this is the first study to explore the use of DR with an older deaf student reading informational texts. Findings suggest that DR may be an appropriate strategy for scaffolding the reading of such texts.

There are several limitations to this study that should be addressed. First, there were time constraints that limited the number of baseline and intervention sessions. This resulted in the number of sessions being inconsistent across tiers, and failing to meet minimum requirements for a multiple baseline design that meets standards

(Kratochwill & Levin, 2010). In addition, only one participant enrolled in the study. Given the current context and information, we cannot make speculations about a broader applicability of this approach. Similarly, this study by design targeted students who communicated primarily using ASL, and should not be generalized to deaf children who use other languages or communication modalities.

Although there were efforts to keep experiences across baseline and intervention conditions similar in terms of length of time and book difficulty, there was natural variance in both. Although sessions ranged between 20 and 30 min, times did vary. The baseline condition, for instance, was on average slightly shorter than intervention conditions. Similarly, Lexile levels of books varied slightly by condition, and while average Lexile levels were all around the second- or third-grade levels, there were some books that were more difficult than others. However, despite these limitations, we believe that this study shows promise for the use of this approach with informational texts among deaf children who use ASL as their primary language.

Conclusion

Deaf education research has addressed instructional practices in limited ways. The current study examined one particular area that has been significantly neglected, the use of an instructional strategy to support the reading of informational texts with a signing deaf child. The results of this study suggest that DR, a social, interactive, and explicit approach to supporting comprehension that is traditionally used with narrative texts among younger readers, may be a promising approach for supporting the reading comprehension of older readers navigating more complex informational texts. The opportunities to pair with a more knowledgeable other who can direct the reader's attention to specific areas and ask questions designed to scaffold the reader through the text may be one reason that DR appeared to be successful for informational text reading with Arjun. Opportunities to develop more academic registers of language, both in face-to-face communication and in print, in meaningful, social ways, may make DR a particularly useful tool for use with signing deaf children.

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Note

1. There are a number of ways to refer to children who are deaf or hard of hearing. The target population of this article are children with severe to profound losses who use American sign language (ASL) to communicate. Therefore, we refer to students as "deaf."

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