

A SUMMARY OF THE READING COMPREHENSION RESEARCH UNDERTAKEN WITH STUDENTS WHO ARE DEAF OR HARD OF HEARING

T

HE AMERICAN FEDERATION OF TEACHERS (1999) has stated that “the most fundamental responsibility of schools is teaching students to read” (p. 7). The central purpose of reading is comprehension—constructing meaning from text. The purpose of the present study was to identify, review, and summarize the research published in professional peer-reviewed journals related to reading comprehension and school-age students who are deaf or hard of hearing between 1963 and 2005. Fifty-two studies were identified and reviewed. The results were summarized in a table and reported descriptively. The most frequently researched reading comprehension teaching strategies were identified and discussed. The need for more research in this critical area was noted.

**JOHN L. LUCKNER AND
C. MICHELE HANDLEY**

LUCKNER IS A PROFESSOR AND HANDLEY A DOCTORAL STUDENT IN THE SCHOOL OF SPECIAL EDUCATION, UNIVERSITY OF NORTHERN COLORADO, GREELEY.

Being able to read is more important than ever. It is essential for achieving in school, being an informed citizen, succeeding in one’s career, and experiencing personal fulfillment. It has also been reported that individuals who read a lot tend to be smarter than their peers who do not read much (A. E. Cunningham & Stanovich, 1998), and that individuals who read well are healthier than those with low reading ability (American Medical Association, 1999; Berkman et al., 2004). Unfortunately, as noted by the American Federation of Teachers (1999), “Learning to read is not natural or easy for most children” (p. 16).

Reading comprehension is considered the essence of reading (Durkin, 1993)—“the very heart and soul of reading” (Reutzel & Cooter, 2004, p.

155). Undoubtedly, it is the central purpose of reading. It has been defined as “the active process of constructing meaning from text; it involves accessing previous knowledge, understanding vocabulary and concepts, making inferences, and linking key ideas” (Vaughn & Linan-Thompson, 2004, pp. 98–99).

Skilled readers are active and purposeful. In order to comprehend what they read, they

- set goals for reading
- apply their knowledge and experiences to the text
- read words and phrases fluently
- use strategies and skills to construct meaning during and after reading
- adapt strategies that match the text and their goals

Table 1 (Continued)

Summary of the Characteristics of the Reviewed Studies

Source	Control group	Type of study	Age	Participants' gender	Ethnicity (where conducted)	Setting
Evans (2004)	No	Case study	9, 10, 11 yrs.	3, not reported	Canada	Manitoba School for the Deaf
Gentry, Chinn, & Moulton (2004)	Yes: deaf	Quasi-experimental	9–18 yrs. (<i>M</i> = 12 yrs. 3 mos.)	10 males, 18 females (only 25 actually participated)	13 African American, 1 Hispanic, 14 Caucasian (LA, TX)	Mainstreamed classes and residential school
Miller (2005)	Yes: hearing	Descriptive	Hard of hearing: 7th–11th grades, ave. age 15.5 yrs. Deaf: 7th–11th grades, ave. age 15.25 yrs. Hearing: 7th–11th grades, ave. age 14.92 yrs.	19 hard of hearing, 20 deaf, 36 hearing. Gender not reported.	Northern Israel	Deaf/hard of hearing: self-contained, partially mainstreamed in public school. Hearing: public school

journals related to reading comprehension and school-age students who are deaf or hard of hearing. Our findings suggest that over the 42-year period from 1963 to 2005, a total of 52 studies of any type (single subject, case study, descriptive, quasi-experimental, causal-comparative, or experimental) were completed and published. Twenty-seven of the 52 published studies included an intervention. While none of the reviewed studies met the U.S. Department of Education Institute of Education Sciences' (2003) criteria for "strong" or "possible" evidence of effectiveness, the summary of the research suggests that, in the Institute of Education Sciences' phrase (p. 17), "tentative evidence-based practice" (e.g., Thompson, Diamond, McWilliam, P. Snyder, & S. W. Snyder, 2005) exists for five reading comprehension teaching strategies:

1. explicit comprehension strategy instruction
2. teaching students story grammar
3. modified DRTA
4. activating background knowledge
5. use of well-written, high-interest text

Potential limitations of the present study need to be noted. First, although we attempted to undertake an exhaustive review of the literature, it is possible that valuable studies were not included because the search terms used were not sufficient or because we missed a study when conducting the manual searches. Second, reading, summarizing, determining implications for each study, and developing Table 1 was an interpretive process. It

is possible that other individuals using similar procedures may have summarized the corpus of studies differently.

Outside the field of deaf education, reading comprehension has received extensive scientific attention during the past 30 years. It is now understood that learning to read is a relatively lengthy process that begins very early in development (Lyon & Chhabra, 2004). Language acquisition, vocabulary development, phonologic sensitivity, and alphabetic skills are strong predictors of later reading proficiency (National Institute of Child Health and Human Development, 2000; Snow, Burns, & Griffin, 1998). Skilled readers currently are seen as active participants who construct meaning through intentional, problem-solving processes. In addition, they have extensive background knowledge of the world that

Communication modality	Degree of hearing loss	Intervention and duration	Dependent variable	Summary	Implications
ASL/Written English (Bilingual-bicultural model)	Not reported	Bilingual/bicultural program	Parent and teacher interviews, home and classroom observations	Teachers effectively presented information to students through multimodal methods (i.e., ASL, spoken words, pictures, print). Inconsistencies existed in the application of the bilingual/bicultural approach with deaf students.	Teachers and families expressed positive attitudes toward the use of the bilingual/bicultural approach. However, inconsistencies in application of the approach need to be addressed.
ASL (and Signed English by the teachers)	Not reported	Multimedia stories	Videotaped story retelling	Students performed better when presented with print + pictures as compared to print only and print + pictures + sign language.	The use of pictures may aid in comprehension of written text.
Spoken Hebrew and Israeli Sign Language	Hard of hearing, BEA 60–80dB. Prelingual / deaf: BEA > 85dB, prelingual	No intervention	Multiple-choice questions	Students who were deaf or hard of hearing were able to process individual words at the same rate as their hearing peers. However, they demonstrated less developed syntactic and semantic knowledge compared to hearing peers when processing sentences.	Students may benefit from allocating additional instructional time to develop background knowledge prior to reading text.

they relate to the ideas in text in order to understand what they are reading (Pressley, 2002). Reading also is viewed as an interaction between the text and the reader. When reading is successful, the result is a coherent and usable mental representation of the text (Irbasso & Bouchard, 2002).

In the remaining sections of the present article, additional information about the most frequently researched reading comprehension teaching strategies that emerged as a result of our investigation is provided, and a concluding remark about the need for additional research in the field is presented.

Explicit Comprehension Strategy Instruction

The studies reviewed for the present report, as well as research reported in

general and special education, suggest that there may be multiple ways to improve the reading comprehension of students who are deaf or hard of hearing. Intervention and descriptive research suggests that students who are deaf or hard of hearing benefit from explicitly taught comprehension strategies. Yet too often this does not happen. As P. M. Cunningham (1998) noted, “Children are routinely asked questions after reading but are infrequently provided with demonstrations of the comprehension strategies needed to answer the questions posed. In short, too often assigning and asking are confused with teaching” (p. 47). In contrast, a variety of researchers (e.g., Block & Pressley, 2003; Gersten et al., 2001; National Institute for Literacy, 2003; National Institute of Child Health and Human Develop-

ment, 2000; Pressley, 2002; Vaughn & Linan-Thompson, 2004) suggest that adults tell readers why and when they should use strategies, what strategies to use, and how to apply them. The National Reading Panel (National Institute of Child Health and Human Development, 2000) stated, “The idea behind explicit instruction of text comprehension is that comprehension can be improved by teaching students to use specific cognitive strategies or to reason strategically when they encounter barriers to comprehension when reading. The goal of such training is the achievement of competent and self-regulated reading” (ch. 4, p. 40). The suggested teaching steps for explicit comprehension instruction include

1. Direct explanation. The teacher explains to students why the

strategy helps comprehension and when to apply the strategy.

2. Modeling. The teacher models, or demonstrates, how to apply the strategy while reading the text that the students are using.
3. Guided practice. The teacher guides and assists the students as they learn how and when to apply the strategy.
4. Application. The teacher helps students practice the strategy until they can apply it independently.

The most frequently taught strategies are:

Prediction—drawing on prior knowledge to imagine upcoming events prior to their appearance in the text. Effective comprehenders infer, combine details, and follow main ideas. They also monitor their predictions as they read, and when they are incorrect, they recognize it and revise their thinking.

Questioning—monitoring what is being read to recognize when a word, sentence, or paragraph is misunderstood, as well as generating questions to keep track of what is going on and how the ideas fit together, and to think about implicit information such as motivations, emotions, and themes.

Imagery—creating a mental image from the words read. When making mental images or visualizing, skilled readers add details, such as smells, tastes, and emotions, to the sights they create so that they have a moving picture in their head of what they have read.

Connecting—activating prior knowledge before, during, and after reading by linking personal expe-

riences and previously read texts to construct meaning.

Summarizing—condensing main ideas, deleting irrelevant details, and succinctly retelling the key points in the text.

Teaching Story Grammar

Intervention and descriptive studies also suggested that students be taught the elements of story grammar. Narrative story grammar or story structure involves an understanding of the setting, the main characters, the problem, the attempts to solve the problem, and the resolution. Knowing this pattern can help students understand stories as well as make predictions. The same steps for teaching comprehension strategies we have already discussed in the present article can be used to teach students narrative story structure. Discussion of stories that focus the story elements, as well as story maps, can also be used to help students understand the components of narrative stories.

Modified Directed-Reading Thinking Activity

The modified directed-reading thinking activity (DRTA) also had a positive impact on students in several intervention studies. Schirmer (2000) reported that the steps often used when modifying the DRTA (Stauffer, 1969) with students who are deaf or hard of hearing include these six techniques:

1. Concept development—Activate prior knowledge, build background, and introduce new vocabulary.
2. Sight vocabulary—Introduce six to eight new words daily; teach letter-sound relationships and morphologic rules.
3. Guided reading—Set the purpose for reading; have students read silently; ask students ques-

tions; have students re-read relevant sentences or paragraphs to clarify answers.

4. Discussion—Encourage students to analyze, synthesize, evaluate, and critique what they have read.
5. Skill development—Have students do independent seat work related to the story or for general reading skill development.
6. Enrichment—Use writing, dramatization, or artwork to help students extend their comprehension of the story.

Activating Background Knowledge

Multiple researchers recommended that teachers and students should activate background knowledge prior to reading. Students' background knowledge about a topic strongly influences their ability to comprehend what they read (Fountas & Pinnell, 2006). Often, students who are deaf or hard of hearing do not have the same depth or breadth of knowledge about topics as their hearing peers (Schirmer, 2000). Consequently, teachers need to spend time activating and expanding students' background knowledge prior to reading. Examples of actions that professionals can undertake to help students prepare for what they are going to read (adapted from Trachtenburg, 1989) include the following:

1. In-class experience. Bring in an object, animal, food, or artifact for hands-on exploration.
2. Visual aids. Show pictures or videos pertaining to the topic.
3. Mental imagery. Help students begin to think about the story by helping them imagine what they might experience when they begin to read. Say something like "Imagine that you are inside a haunted house. What do you see, smell, taste, or feel?"

4. *Conceptually related books.* Provide topical books spanning a wide range of reading levels. Display these "theme" books in an inviting manner and allow students to use them as they please.
5. *Free recall.* "One of the characters in this story is a bear. What do you know about bears?"
6. *Webbing.* Start a web and have the students help extend it.
7. *Simulation.* Ask the students to enact a minidrama that sets the scene for the story.
8. *Anticipation guides.* Write a statement that captures the major concepts in the story. Let the students react to the open-ended statement. For example: *Laughter is good medicine*, or *Life is an adventure*.

Using Well-Written, High-Interest Texts

Adults promote children's literacy development in many dynamic and overlapping ways. Three primary behaviors are (a) supporting the development of basic processes such as attention, communication, conceptual development, and reasoning (Pianta, 2006); (b) teaching the alphabet, sight words, decoding skills, vocabulary and concept development, and comprehension strategies (Juel, 2006); and (c) exposing children to good writing and motivating them to build their interest in and love of good books and diverse forms of literature (Edmunds & Bauserman, 2006).

Fountas and Pinnell (2006) emphasized the importance of using quality literature with students when they wrote, "For readers to build effective and flexible literacy processing systems, the texts they encounter in their literacy education must be varied, well written, accessible, and plentiful. Moreover, texts must be engaging" (p. 123). Research with hearing children

suggests that reading stories to children and talking with them about the stories is moderately to strongly related to language growth, emergent literacy, and reading achievement (Bus, van Ijzendoorn, & Pellegrini, 1995).

Simultaneously, research with hearing students has also indicated that teachers who are the most effective in supporting children's literacy development devote more time to guided and independent reading than other teachers (Allington, 2002; Pressley, Rankin, & Yokoi, 1996). Fortunately, a wide variety of wonderful trade books, core basal reading programs with packaged trade books, and sets of leveled readers, as well as diverse texts (e.g., humorous, expository, series, drama, and cyber), in addition to magazines, newspapers, and poetry, currently exist for adults to share with children and youth.

Conclusion

Proficiency in reading has assumed an increasingly important role in today's highly technical society. Everyday examples include accessing the Internet or e-mail; reading instructional manuals for computers, cars, and appliances; reading directions for assembling children's toys, traveling, cooking, or taking medications; and enjoying leisure activities such as reading the newspaper, a magazine, a book, or captions on the television. Given the unacceptably low educational outcomes attained by individuals who are deaf or hard of hearing, the increasing importance of print literacy for succeeding in contemporary society, and the paucity of good research available to establish EBPs, there is an urgent need to increase the quantity and improve the quality of research undertaken in the field of deaf education. Our examination of the reading comprehension literature was only able to identify several "tentative" EBPs. Unfortunately, this study, like

previous reviews of the literature (e.g., Easterbrooks & Stephenson, 2006; Luckner et al., 2005/2006; Schirmer & McGough, 2005), has highlighted areas where research is absent or limited. Specifically, each review has noted that most of the programs and techniques used widely in the field of deaf education have a paucity of research to support their use. Certainly, greater attention needs to be given to examining the efficacy of the instructional procedures and materials used to promote the literacy skills of students who are deaf or hard of hearing.

Additional research is also needed to examine the effect of teaching students who are deaf or hard of hearing phonemic awareness and phonics and to determine if the development of those skills positively affects the development of reading comprehension skills. A large and growing body of literature with hearing students indicates that children's success in becoming skilled readers requires that they become aware that spoken words are composed of smaller elements of speech, understand that letters represent these sounds, learn the correspondences between sounds and spellings, and acquire a repertoire of highly familiar words that can be recognized on sight (e.g., Adams, 1990; McCardle & Chhabra, 2004; National Institute of Child Health and Human Development, 2000; Neuman, 2006; Snow et al., 1998).

Simultaneously, it is generally accepted that children who are deaf or hard of hearing learn to read following the same skill development sequence that hearing children do (e.g., Ewoldt, 1978; King & Quigley, 1985; Leybaert, 1993; Mayer, 2007; Paul, 1998, 2001; Schirmer & McGough, 2005; Williams, 2004). Yet an intuitive belief that has guided the field of education of students who are deaf or hard of hearing is that a hearing loss

prohibits access to the phonological system of the English language. Consequently, the majority of teachers of students who are deaf or hard of hearing do not incorporate the teaching of phonology—the association of sounds with the letters and the letter sequences they represent—into their reading instruction (LaSasso, 1978, 1987; LaSasso & Mobley, 1997). However, research with skilled readers who are deaf or hard of hearing indicates that they do employ phonological information while reading (e.g., Bebko, 1998; Hanson & Lichtenstein, 1990; Leybaert, 1993; Perfetti & Sandak, 2000; Schaper & Reitsma, 1993). In addition, a series of studies conducted by Beverly Trezek and associates (Trezek & Malmgren, 2005; Trezek & Wang, 2006; Trezek, Wang, Woods, Gampp, & Paul, 2007) suggest that phonemic awareness and phonics instruction can be modified and supplemented to meet the beginning and remedial reading needs of students who are deaf or hard of hearing.

Consequently, it is possible that the attempt to bypass phonemic awareness and phonics by professionals in the field of deaf education, which to date has demonstrated minimal success, causes many students who are deaf or hard of hearing to continue to struggle with lower-level skills such as word recognition, syntactic parsing, and understanding vocabulary. As a result, all too often they do not enjoy reading or develop the independent reading strategies—such as self-questioning, activating prior knowledge, summarizing the main idea, constructing representational images, predicting what text will follow, drawing inferences, monitoring for misunderstanding, and re-reading difficult passages—that are necessary to understand many narrative or expository texts.

References

Adams, M. J. (1990). *Beginning to read: Thinking and learning about print*. Cambridge, MA: MIT Press.

Allen, T. (1986). Patterns of academic achievement among hearing impaired students: 1974 and 1983. In A. Schildroth & M. Karchmer (Eds.), *Deaf children in America* (pp. 161–206). San Diego, CA: Little, Brown.

Allington, R. (2002). What I've learned about effective reading instruction from a decade of studying exemplary elementary classroom teachers. *Pbi Delta Kappan*, 83(10), 740–747.

American Federation of Teachers. (1999). *Teaching reading is rocket science: What expert teachers of reading should know and be able to do*. Washington, DC: Author.

American Medical Association. (1999). Ad hoc committee on health literacy for the Council on Scientific Affairs. *Journal of the American Medical Association*, 281, 552–557.

Bebko, J. (1998). Learning, language, memory, and reading: The role of language automatization and its impact on complex cognitive activities. *Journal of Deaf Studies and Deaf Education*, 3, 4–13.

Berkman, N. D., DeWalt, D. A., Pignone, M. P., Sheridan, S. L., Lohr, K. N., Lux, L., et al. (2004). *Literacy and health outcomes* (Summary, Evidence Report/Technology Assessment No. 87). Rockville, MD: Agency for Healthcare Research and Quality.

Blocher, D. H., Heppner, M., & Johnston, J. (2001). *Career planning for the twenty-first century* (2nd ed.). Denver, CO: Love.

Block, C. C., & Pressley, M. (2002). Introduction. In C. C. Block & M. Pressley (Eds.), *Comprehension instruction: Research-based best practices* (pp. 1–10). New York: Guilford Press.

Bus, A. G., van Ijzendoorn, M. H., & Pellegrini, A. D. (1995). Joint book reading makes success in learning to read: A meta-analysis of intergenerational transmission of literacy. *Review of Educational Research*, 65, 684–698.

Center for Assessment and Demographic Studies. (1991). *Stanford Achievement Test, eighth edition: Hearing-impaired norms booklet*. Washington, DC: Gallaudet Research Institute.

Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental designs for research*. Boston: Houghton Mifflin.

Cawthon, S. (2004). Schools for the deaf and the No Child Left Behind Act. *American Annals of the Deaf*, 149, 314–323.

Conference of Educational Administrators of Schools and Programs for the Deaf. (2006). *Assessment, equity, and access for deaf and hard of hearing children: Demonstrating student progress under the No Child Left Behind Act*. Retrieved November 26, 2006, from http://www.ceasd.org/position_papers.shtml

Cuculick, J. A., & Kelly, R. R. (2003). Relating deaf students' reading and language scores at college entry to their degree completion rates. *American Annals of the Deaf*, 148, 279–286.

Cunningham, A. E., & Stanovich, K. (1998). What reading does for the mind. *American Educator*, 22(1–2), 8–15.

Cunningham, P. M. (1998). The multisyllabic word dilemma: Helping students build meaning, spell, and read "big" words. *Reading and Writing Quarterly: Overcoming Learning Difficulties*, 14, 189–218.

Dew, D. (Ed.). (1999). *Serving individuals who are low-functioning deaf: Report of the Twenty-Fifth Institute on Rehabilitation Issues*. Washington, DC: George Washington University.

Durkin, D. (1993). *Teaching them to read* (6th ed.). Boston: Allyn & Bacon.

Easterbrooks, S. R., & Stephenson, B. (2006). An examination of twenty literacy, science, and mathematics practices used to educate students who are deaf or hard of hearing. *American Annals of the Deaf*, 151, 385–397.

Edmunds, K., & Bauserman, K. (2006). What teachers can learn about reading motivation through conversations with children. *Reading Teacher*, 59(5), 414–424.

Ewoldt, C. (1978). Reading for the hearing or hearing impaired: A single process. *American Annals of the Deaf*, 123, 945–948.

Fountas, I. C., & Pinnell, G. S. (2006). *Teaching for comprehension and fluency: Thinking, talking, and writing about reading, K–8*. Portsmouth, NH: Heinemann.

Gall, M. D., Gall, J. P., & Borg, W. R. (2003). *Educational research: An introduction* (7th ed.). Boston: Allyn & Bacon.

Gersten, R., Fuchs, L. S., Williams, J. P., & Baker, S. (2001). Teaching reading comprehension strategies to students with learning disabilities: A review of the research. *Review of Educational Research*, 71(2), 279–320.

Hanson, V. L., & Lichtenstein, E. (1990). Short-term memory coding by deaf signers: The primary language coding hypothesis reconsidered. *Cognitive Psychology*, 22, 211–224.

Holdaway, D. (1979). *The foundations of literacy*. New York: Scholastic.

Holt, J., Traxler, C., & Allen, T. (1997). *Interpreting the scores: A user's guide to the ninth edition Stanford Achievement Test for educators of deaf and hard-of-hearing students* (Gallaudet Research Institute Technical Report No. 97–1). Washington, DC: Gallaudet University.

Individuals With Disabilities Education Improvement Act of 2004, Pub. L. 108–446, 20 U.S.C. § 1400 et seq. (2004).