Using Basic Reading Skills Instruction and Formative Assessments to Teach an Adult With Traumatic Brain Injury to Read

A Case Study

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Literacy expectations for persons with cognitive impairments, including impairments caused by traumatic brain injury (TBI), have remained quite low. Some researchers have suggested that educators move from a focus on teaching functional skills to teaching basic reading skills in a manner similar to instruction for nondisabled learners. The purpose of this study was to examine the effectiveness of basic reading strategies on reading skills for an adult with cognitive impairments caused by TBI while using formative assessment to inform instructional decision making. The findings suggest that persons with traumatic brain injury resulting in cognitive and memory impairments may have the potential to learn basic reading skills, even years after a TBI has occurred.

Keywords: reading instruction; adults; learning strategies; direct instruction; curriculum-based assessment; mental retardation; traumatic brain injury

raumatic brain injury (TBI) often results in physical changes in coordination, walking, seeing, and hearing as well as extreme fatigue. Cognitive changes are also common, including memory, thinking and reasoning, and understanding words (Bullock, Gable, & Mohr, 2005). All of these issues combine to provide unique learning challenges for students with TBI. Because each person with TBI has distinctive learning issues, educators are challenged to develop individualized programs designed to meet the configuration of strengths and needs idiosyncratic to each learner (Conners, 1992). Educators must possess the skills to select or design appropriate learning strategies and materials for students with TBI. This study thus focused on collecting daily data in an effort to provide instruction designed to meet the unique learning needs of the student involved while simultaneously providing a variety of literacy learning opportunities in reference to the five key areas of reading as identified by the National Reading Panel (NRP, 2000) (phonemic awareness, alphabetic principle, vocabulary, comprehension, and fluency). Although students with disabilities were not

included in the recommendations of the NRP, we used this framework as a model from which to begin assessing the effects of literacy instruction for our student (also see Al Otaiba & Hosp, 2004; Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006).

Susan, a pseudonym for the participant in this case study, experienced a TBI at 2 years of age, resulting in moderate cognitive delays, memory impairments, blindness in one eye, visual-spatial difficulties, and fatigue. We discovered that, for educational purposes, her most pressing problems were cognitive and memory issues; her other disabilities played a role as well, although in less significant ways. Therefore, because we could find little in the extant literature base regarding teaching adults with TBI to read, we chose to also review the literature regarding cognitive disabilities as related to literacy learning.

Authors' Note: We thank Beth Ann Loch for the time that she devoted to carrying out this study as well as for the many creative ideas that she shared with us.

Literature Review

This section reviews the extant literature concerning learning difficulties associated with TBI, literacy issues for persons with cognitive disabilities, and case studies that have been conducted to teach older learners or nonreaders to read. In addition, the extant literature base is reviewed throughout the article as support for specific decisions made based on Susan's progress. We were careful to draw on research-based methods of instruction; thus, we provide throughout the article the literature to which we referred as part of our decision making.

Learning Difficulties Associated With TBI

Barnes, Dennis, and Wilkinson (1999) found that persons experiencing TBI prior to age 6 had the most difficulty with reading as compared with persons having later onset TBI. Their findings showed that the older the child when the TBI occurred, the more time the child had to learn basic reading skills; thus, the lesser the negative impact on reading. Barnes et al. thus concluded that brain injury early in life may limit the level to which reading develops rather than the rate at which it develops. Gil (2003) supports this notion, adding that TBI is likely to affect the acquisition of new skills, putting children at risk for achievement deficits at a minimum or even leading to academic failure.

Furthermore, children who were younger at the time of injury performed quite poorly over time on tasks requiring sustained attention and the ability to encode and retain information over a brief period of time. Chapman et al. (2006) found that working memory, but not immediate memory, for words was impaired in children with moderate to severe TBI. Therefore, they suggest that these children may not effectively develop skills to select and retrieve or to manipulate information.

Literacy Issues for Persons With Cognitive Disabilities

In our review of the extant literature, we could find no research related to instructional approaches to literacy for persons with TBIs. Therefore, we chose to review the literature regarding teaching reading skills to persons with moderate to significant cognitive disabilities given that this was a considerable issue for Susan.

Increasingly, special education research is emphasizing the need for intensive instruction in reading for students with cognitive disabilities—an area that has been largely overlooked. Katims (2000a) compared several introductory textbooks in special education, as well as textbooks written specifically about students with mental retardation, and found that none of them provided an optimistic picture of literacy outcomes for persons with mental retardation. Joseph and Seery (2004) reviewed the literature on teaching phonetic analysis skills to students with moderate cognitive disabilities and found that "children with moderate mental retardation are underrepresented in studies seeking to explore the effectiveness of phonics instruction" (p. 89). We found this to be true in our review of the literature related to teaching all aspects of reading to persons with cognitive disabilities. This may be because historical beliefs about the abilities of persons with intellectual limitations have been characterized by low expectations regarding academic capability so that opportunities for instruction have been limited (Browder et al., 2006; Gallaher, van Kraayenoord, Jobling, & Moni, 2002). In addition, Gallaher et al. (2002) indicate that literacy instruction often is provided for these students during the early elementary years. Beginning around the fifth grade, however, they are assumed to have reached a plateau in their reading ability and skills instruction tapers off in favor of more functional/life skills instruction. These authors state that "there is [sic] little data about literacy achievement among adolescents and adults with intellectual disabilities, and there is an absence of research related to establishing effective instructional approaches" (p. 59). In fact, Katims (2000b) argues that educators of students with cognitive disabilities have perpetuated "literacy pessimism" for these students, usually focusing on functional approaches or isolated skills instruction in the absence of connected text. Several researchers contend that teachers have at their disposal a limited research base on effective reading instruction for students with mental retardation (Al Otaiba & Hosp, 2004; Morgan, Moni, & Jobling, 2006; Saunders & DeFulio, 2007).

Notably, the range of reading skills identified as important by the NRP has not been fully addressed for this population of students (Browder et al., 2006). In fact, most studies assessing effects of specific reading instruction methods for students with moderate or significant cognitive disabilities focus on sight-word instruction (e.g., Browder & Lalli, 1991; Browder & Minarovic, 2000; Browder & Xin, 1998; Conners, 1992; Lalli & Browder, 1993; Mechling, Gast, & Langone, 2002; Mosley, Flynt, & Morton, 1997). There are a few studies, however, that provide support for teaching specific reading-related skills to persons with cognitive disabilities (Houston & Torgesen, 2004).

For instance, Joseph and McCachran (2003) studied the use of word sorts with eight students identified as having mild to moderate mental retardation and eight participants who scored below the 20th percentile on a standardized reading achievement test. Words with a variety of spelling patterns (consonant-vowel-consonant [CVC] and consonant-vowelconsonant-consonant [CVCC]) were preprinted on index cards. Students were taught to categorize the words according to similar spelling patterns. There were no statistically significant gains between groups on letter-sound identification, pseudoword naming, phonological awareness, or spelling posttests. Within-group variability was pronounced for both groups, however, with some students making significant progress and others making little or no progress. The authors conclude that further research on contemporary word study methods for students with mental retardation is warranted, especially assessment on transfer of word study skills to reading of connected text, which was not examined in their study.

Conners, Rosenquist, Sligh, Atwell, and Kiser (2006) conducted a study with 40 students with mental retardation (MR), age 7 to 12. Twenty of these students were provided instruction in phonological reading skills for 22 ten- to twenty-minute sessions, whereas the other 20 served as a control group. All participants were given pre- and posttests to assess their phonological reading skills at the beginning and end of the study. Despite the short duration of this study, students in the instruction group made significantly better progress in phonological reading than did their peers in the control group. The authors conclude that children with MR are able to acquire phonological reading skills, particularly if instruction on these skills is specific and intense. Notably, the authors point out that more than 85% of the students in this study had received phonics instruction prior to the study but had made little or no progress.

Studies conducted by Cupples and Iacono (2000, 2002) found that explicit training in phonological reading skills resulted in improved word reading skills for 6to 12-year-old students with Down syndrome. In the first study (2000), the authors found that phonological awareness and early oral reading skills were positively associated. In a follow-up study (2002), the authors compared a whole-word versus an analytic (onset-rime) approach to teaching phonological awareness skills to students with Down syndrome. They concluded that using explicit instruction in phonological awareness, students with Down syndrome could learn to read monosyllabic words. Furthermore, when analytic training was provided, these students were able to generalize their learning to untrained words.

Working with adults with mild mental retardation, Saunders and DeFulio (2007) found similar results to those of Cupples and Iacono. The researchers conducted several assessments across three or four 20- to 30-minute sessions. They found that measures of phonological awareness and rapid naming were significantly and positively correlated with measures of word reading for these learners. This study, along with those conducted by Cupples and Iacono, provides evidence that learners with cognitive disabilities can benefit from phonological awareness skills instruction. More specifically, for learners with cognitive impairments, phonological awareness training is correlated positively with word reading. These studies add to the literature base regarding teaching phonological awareness and alphabetic knowledge to learners with cognitive disabilities. Other authors have conducted research on broader aspects of literacy instruction for this population of learners.

For instance, Al Otaiba and Hosp (2004) addressed each of the NRP's five areas of literacy instruction (phonemic awareness, phonics, vocabulary, comprehension, fluency) when designing a study to assess the effects of individualized reading strategies using a tutoring program paired with curriculum-based measurement on reading outcomes for four 7- to 12-year-old students with Down syndrome. Results showed that each student evidenced gains in reading skills, although not in the same areas of reading. For instance, two students showed gains in word identification, whereas all four experienced gains in word attack. Because assessments were curriculum based and individualized, students were assessed differently on measures of vocabulary and fluency. Two students were assessed on passage fluency, but neither evidenced gains. Three students were assessed on sight word fluency and all showed gains in this area. Furthermore, although instruction was given in each of the five NRP areas, comprehension was not assessed. Notably, although this study offers insight into the possibilities that a comprehensive approach to reading instruction may afford students with cognitive disabilities opportunities to improve their reading skills, the participants began the study reading only 1 to 3 years below their same-age peers. Most students with moderate to significant cognitive disabilities experience more significant delays as compared with their same-age peers.

In a comprehensive review of literacy instruction research for students with significant cognitive disabilities, Browder et al. (2006) examined 128 peer-reviewed studies published from 1975 to 2003. The authors found that most studies targeted sight word instruction (which can be loosely subsumed under vocabulary instruction). Only 4% of the studies examined phonemic awareness instruction, 10% examined phonics, 28% examined fluency, and 10% examined comprehension of connected text. All studies explored only one or two of the NRP's five reading components. This is the first review to separate findings according to the NRP's recommended five areas of reading instruction. Thus, this work helps to identify specific areas in which more research is necessitated. The authors concluded that sufficient evidence exists to support teaching sight words (vocabulary), especially when paired with systematic prompting, to students with moderate and significant cognitive disabilities. However, research on teaching the other four components (phonemic awareness, phonics, fluency, and comprehension) is lacking for this population of students. Notably, of those few evidence-based studies examining the effects of phonics instruction for students with moderate to severe disabilities, significant effects were obtained, indicating that explicit phonics instruction may be effective for these students. Regarding the lack of research on phonemic awareness and phonics instruction for this population, the authors conclude that this gap in the literature might reflect the view that these individuals are capable of acquiring sight word vocabulary but do not have the capacity to learn to read. Although studies of fluency instruction with students having mild disabilities supports the use of repeated, timed readings, most of the high-quality (as defined by the authors) fluency studies identified as part of this review simply measured error rate, whereas a few (four studies) counted words read correctly from a passage. There were 11 high-quality studies that measured comprehension, none of which involved the use of connected text. Although the research reviewed included only quasi-experimental (i.e., single subject design) and experimental research, the authors note that several case studies provide evidence of potential effectiveness of broader literacy skills for students with moderate to severe cognitive disabilities. In closing, the authors call for research addressing comprehensive literacy instruction for this population, the authors argue for the use of ongoing data collection for educational decision making.

Case Studies

In addition to experimental approaches to examine outcomes of various literacy interventions for persons with cognitive disabilities, a few case studies have documented literacy outcomes under various conditions. These are highlighted in this section to provide additional, qualitative information about teaching literacy skills to persons with cognitive disabilities and to summarize important information gathered from case studies.

Ryndak, Morrison, and Sommerstein (1999) present the results of a 7-year case study documenting the literacy and behavioral progress made by a student, Melinda, with moderate to severe disabilities. Melinda spent her first 10 years of schooling in self-contained special education classrooms. At age 15, she was transferred to her home school and spent most of her school days in inclusive settings. Regarding her literacy skills development, the authors expressed concern that during her 10 years in self-contained special education, she did not use literacy skills effectively; she was only expected to read at approximately the mid-second-grade level. Once included, however, her literacy skills blossomed. Although standardized assessments were not given to Melinda, two informal assessments showed that Melinda was reading at approximately the sixth- to seventh-grade level. One of these was a miscue analysis conducted on a videotaped session in which Melinda was reading orally. The second measure involved Melinda's college education team; the team noted that she was able to read and comprehend college material that was written at approximately the seventh-grade level. Notably, the authors stress throughout the article that the use of formative assessments related to motivating instructional activities was a key component of success for Melinda.

Greenberg (1997) documented the progress of an adult nonreader, Betsy, in learning to read. Although Betsy did not have a documented disability, the case is relevant in that the sequence of instruction and the unique challenges associated with teaching an adult nonreader share similarities with the present study. In fact, Greenburg summarized the difficulties inherent in getting adult nonreaders involved in research studies (e.g., participants' reluctance based on uncertainty and previous lack of success) and thus argued for the use of case studies with these individuals. Greenburg summarized specific instructional approaches and outcomes related to phonemic awareness, alphabetic knowledge, confidence in reading, word recognition, and spelling. Similar to the current study, Greenburg changed instructional interventions based on the results of ongoing assessments of Betsy's progress. Greenburg worked with Betsy for 4.5 months. During this time, Betsy progressed from recognizing 1 letter to identifying 22 letters (a mixture of upper and lower case). She began the study unable to complete any phonemic awareness tasks but with instruction demonstrated the ability to recognize or produce beginning and ending sounds in simple words (e.g., dog, cat), recognize pairs of rhyming words, and substitute

beginning sounds in simple words (e.g., *meet* to *feet*). She also developed a small sight-word vocabulary and began to recognize words that she saw in everyday print (e.g., *milk*). At each session, Betsy was asked to write a sentence. Her spelling consisted of a letter or small groups of letters to represent words. At the beginning of the study, there appeared to be little correlation between the letters she wrote and the words they represented. By the end of the study, she was able to write at least one letter that occurred within each word, although most words were not readable without interpretation.

Gallaher et al. (2002) presented a case study of Abby, a 19-year-old woman with Down syndrome. Based on initial assessments, reading and writing interventions were selected and implemented for 12 individual tutoring sessions. The authors also set out to compare Abby's progress with the developmental progress of emerging readers. Types of data collected included field notes; video and audio tapes; interviews with Abby, her mother, and the project director; and writing samples. Abby began the study having difficulty decoding words (she would guess at a word randomly). Although Abby was able to form letters at the beginning of the study, she was unable to connect the letters with their respective sounds. By the end of the study, Abby was able to discriminate letters, blend sounds, and associate letters with sounds. She also was able to recognize a few sight words and to write words using correct beginning sounds. From a developmental viewpoint, in some ways Abby's progress was similar to that of emerging readers (e.g., associating letters with sounds and developing a small sight-word vocabulary), whereas other aspects of Abby's learning were more similar to readers with intellectual disabilities (e.g., difficulty applying decoding strategies and making semantic errors while reading). The authors concluded by stating that their case study "provided evidence that there is a need for more research with longer time frames that focuses on the processes and strategies that can be used to support ongoing development in literacy" (pp. 65-66).

Pershey and Gilbert (2002) present a case study of Christine, an adult with developmental disabilities who had never been provided reading instruction. The authors worked with Christine for 7 years. They addressed three research objectives in their study: to describe the degree to which Christine, having no prior literacy instruction, was able to acquire some reading and writing skills; to critique the instructional approaches used to help Christine develop literacy skills; and to examine the impact that increased instruction with and use of print had on Christine's quality of life (social validation). Literacy interventions, offered for 30 minutes to 2 hours per week, included reading in unison, echo reading, language experience stories, sight recognition of letters and words, copying model sentences, writing what was dictated, and using invented writing for communication. The authors collected artifacts and documentation from 7 years of working with Christine, including progress notes, lesson plans, audio and video tapes, worksheets, writing samples, and language experience stories. In response to their first research objective, the authors found that despite an IQ in the 40s across her life span and the lack of prior reading instruction, Christine was indeed capable of learning to read and write. Her strongest skills were at the word level, with some progress also made at the sentence and paragraph levels. The second question examined the methods by which Christine was able to learn to read and write. Most interventions were whole-to-part-to-whole and this mix seemed to be effective in Christine's case. Finally, Christine reported that she enjoyed reading for pleasure, especially stories, poems, prayers, and song lyrics. She also enjoyed writing short notes to others. At the same time, Christine did not attain independent literacy skills to help with daily living skills. The authors conclude by noting that there is no specific sequence of tasks that can be recommended for use by other nonreaders because the interventions used in this case were designed to meet Christine's specific needs. Of importance, the authors argue that adults with developmental disabilities should not be considered incapable of literacy learning.

Morgan et al. (2006) describe their work with Gordon, an adult with Down syndrome. During Gordon's K-12 schooling, he attended special education classes for literacy instruction, where the emphasis was on functional reading and writing skills. Before beginning the intervention, the researchers interviewed Gordon regarding his interests, including his interests in reading various genres. They found that Gordon enjoyed reading football magazines and recipes but did not like reading books. Despite the focus on functional skills instruction during Gordon's formal schooling years, he was able to produce a writing sample, indicating that he possessed some phonics skills prior to the onset of the study. The researchers used the Four Resources Model (codebreaker, text participant, text user, and text analyst) as a guide for providing literacy instruction for Gordon. To extend Gordon's phonics skills, researchers used a variety of approaches, including thematic alphabet scrapbooks, sound cards (end sounds), soccer sounds, concrete cooking, and location letter looting. All of these strategies were designed with Gordon's needs, interests,

and abilities in mind. Gordon began the study knowing the names and sounds of 14 letters. By the end of a semester of study, Gordon knew most of the sounds of the letters of the alphabet; in addition, his use of consonant blends, words endings, and phonograms had improved. The authors conclude that getting to know each learner's needs, interests, and abilities, and using that information in conjunction with the *Four Resources Model*, allows educators to provide phonics instruction in the context of a balanced literacy program.

Summary of Literature Review

In sum, research on TBI concluded that persons experiencing a TBI prior to age 6 are likely to have difficulty acquiring reading skills as well as poor performance on tasks requiring sustained attention due to limitations on working memory. Because little published research exists regarding TBI and reading, and because cognitive and memory disabilities were Susan's greatest issues, we conducted a literature review related to literacy issues for persons with cognitive disabilities. Research related to effective reading instruction with this population of students is sparse. Most of the extant literature addresses functional reading skills and isolated sight word reading. Katims (2000b) suggests that educators have thus perpetuated "literacy pessimism" for these students. A few studies, however, found significant effects for explicit phonics instruction for students with moderate to severe disabilities, but the authors conclude that much more research is needed to determine effective reading instruction strategies for students with cognitive disabilities. Finally, several case studies suggest that adult nonreaders, including those with disabilities, can learn to read, although none of these studies refer to the NRP's findings related to effective reading instruction.

The purpose of this article is to document the reading progress of an adult nonreader with TBI using researchbased instructional methods and ongoing data collection to inform instructional decision making. Our goals were to address the five key reading components identified by the NRP, examine the effects of instructional approaches demonstrated as effective with other populations of students, and illustrate the power of formative assessments to make ongoing instructional decisions.

Getting Started

How We Met

Susan's dad and the first author, Yvonne, met via a common colleague. This colleague approached Yvonne,

asking whether she might be interested in working with an adult woman with cognitive disabilities who was quite motivated to learn how to read. Yvonne contacted Susan's dad and talked about Susan's issues and interests. They agreed to work together so an initial meeting was set up in which Susan and Yvonne were introduced and spent some time together. During that time and in a subsequent meeting, Yvonne interviewed Susan and conducted several assessments to determine Susan's current levels of academic functioning. Following those two meetings, which occurred over the summer, Yvonne completed an assessment report and met with Susan's parents to discuss the results and make suggestions for interventions. At that time, the parents expressed their wish for Yvonne to work with Susan during the coming academic year.

About Susan

Susan was quite motivated to learn how to read. Her parents stated that in 21 years of schooling Susan had received reading instruction in school but had never learned how to read. They indicated that the emphasis throughout Susan's formal schooling was on functional reading, particularly sight words.

Susan was typically developing until the age of 2, when a closed head injury caused a developmental delay as well as accompanying physical disabilities. The injury caused her to be functionally blind in her left eye; therefore, she had balance problems and poor depth perception. Although she had good sight in her right eye, the visual disability would cause her to blink frequently and sometimes delay her ability to focus on a word. Other times, she would squeeze her eyes shut, open them, and roll them around before looking at a word. She had problems tracking across a page. The left side of her brain was damaged in the injury, and she had fine motor impairments on the right side of her body. Also affected were her short-term and working memories. Her IQ score has been difficult to determine due to her disabilities and her challenges establishing rapport with new individuals administering the assessment. The last assessment was completed when she was 17 years old. Susan had a verbal IQ score of 67, performance IQ of 63, and a full scale IQ of 61. The evaluation stated that she was able to perform at a higher level when she was allowed to give a verbal response and struggled with anything requiring visual-motor skills. In additional to IQ considerations, her lack of ability to generalize and her memory issues were similar to persons with mental retardation.

Susan had some independence in self-care and very good verbal communication skills. She required limited supports to function in society. Susan lived in a large Midwestern city and worked part-time in a local hospital, folding laundry. More important, Susan had a great sense of humor, enjoyed talking (especially about her family and her dog), took exercise classes, and had an active social life with friends and family. At the time of the study, she was 24 years old.

Our Team

Team members included Susan, her parents, the first author, and two graduate students in special education who were involved as tutors for this study. These students were working to obtain teacher credentials and a master's degree in special education. One student was already certified as a K–8 teacher and had spent several years teaching in a middle school. The other student, the second author, had prior teaching experience as an AmeriCorps volunteer with City Year Columbus in an inner city school in Columbus, Ohio.

Initial Assessments

The NRP (2000) identified five reading skills as being important to reading instruction: phonemic awareness, phonics, vocabulary, comprehension, and fluency. All of these components were addressed in this study, beginning with the initial assessments conducted with Susan. Following is specific information about the results of these initial assessments, which were conducted during the summer meetings. Yvonne conducted all initial assessments with Susan.

Phonemic Awareness

Phonemic awareness is the understanding that the sounds of spoken language work together to make spoken words. The focus is on manipulating sounds; sounds are not associated with letters when teaching phonemic awareness skills. Rather, the alphabetic principle, or phonics instruction, associates letters or groups of letters with their sounds.

Phonemic awareness skills were assessed informally via examiner-created materials. When presented with a letter sound, Susan was able to orally produce the letter name for 17 sounds (s, m, b, f, r, k, n, p, a, d, x, z, soft g[as in goat], h, l, t, and v). She was able to blend words having three phonemes when sounds were presented auditorily. For example, when the examiner stretched out the sounds in a word (e.g., *mmm-aaaaa-p*), Susan was able to say the word (*map*). She was unable, however, to blend larger, more complicated words (e.g., *pencil, read-ing*, and *making*). Although she demonstrated the ability to blend sounds into words, she was not able to segment words (e.g., break *map* into its component sounds *mmmmaaaa-p*). Finally, she was unable to rhyme words. When presented with a word, she could not produce words that rhymed. Also, when presented with pairs of rhyming and nonrhyming words, she was not able to state accurately whether the word pairs rhymed.

Letter and Word Knowledge

Letter and word knowledge were assessed using the *Brigance Diagnostic Inventory of Essential Skills*, selected subtests of the *Woodcock Reading Mastery Test* (Visual/Auditory Learning and Letter Identification and Supplementary Letter Checklist), the Matching Letters and Matching Words portions of the *Diagnostic Assessments of Reading*, and examiner-created assessments of letter/sound correspondence. Regarding letter knowledge, Susan was able to identify like and unlike pairs of letters and recognize 15 lower case and 21 upper case letter names but not letter sounds. She often confused letters that were visually similar (e.g., *u* and *n*; *b*, *d*, *q*, and *p*) when identifying letters and words.

Susan's word knowledge skills included her ability to read just two sight words: go and exit. These sight words provide evidence that Susan was able to read little environmental print. When she encountered words she did not know, she tended to guess words based on the first letter or two. She was able to identify seven of ten same and dissimilar word pairs. For example, she was able to identify like words day/day and dissimilar words guard/queen but incorrectly identified word pairs house/horse as the same and help/help as different.

Memory. Memory difficulties became apparent on the *Woodcock Reading Mastery Test* when the Visual-Auditory subtest was administered. This subtest requires the test-taker to associate symbols with oral responses. A "story" is merely a few symbols strung together. For instance, in the first story, one symbol represents a dog and another symbol represents a horse. The symbols do not appear visually similar to the words or concepts they represent. Although Susan was able to complete two stories, she did so with several errors. For instance, when presented with only four symbols in the first story, she was able to recall just one consistently.

Comprehension and Vocabulary

Comprehension and vocabulary skills were assessed using passages from the *Mann-Suiter Developmental* *Paragraph Reading Inventory* (Mann, Suiter, & McClung, 1987). Given Susan's limited ability to read letters and words, grade-level passages were read to Susan followed by orally posed questions to assess listening comprehension and vocabulary. Susan was able to recall some basic facts (e.g., the color of a dog) and define simple vocabulary (e.g., *fast*). However, she was unable to identify the main idea or answer inference questions.

On a preprimer level passage with 38 words, Susan was able to answer four of five questions correctly. When a primer level passage with 61 words was read to her, Susan answered three of five questions correctly. Finally, a 70-word Grade level 1 passage was read to her. Susan answered two and a half of the five questions correctly. The longer the story passage and the higher the grade level, the more difficulty she had answering questions.

Summary of Initial Assessment

Four of the five key areas of reading instruction, as identified by the NRP, were assessed prior to beginning instruction (see Table 1). Although fluency was not assessed initially because of her lack of basic skills, fluency instruction and assessments were included in the interventions implemented during the study.

In the area of phonemic awareness, Susan was able to produce 17 letter names (but not sounds) and blend basic, three-phoneme words presented orally. She was unable to blend longer words or to segment words. Identifying or producing rhyming words also was not in her repertoire. Susan's letter and word knowledge also were limited. She was able to discern between like and unlike pairs of letters, recognize several letters by name, and read two basic sight words. Her only strategy for reading unknown words was to guess based on initial letters. When passages were read to her, she was able to define basic vocabulary words and answer some factual comprehension questions but could not answer main idea or inference questions accurately. In sum, Susan's reading skills were quite limited in phonemic awareness, letter and word reading, vocabulary, and comprehension. Memory issues also were apparent throughout the initial assessments. Susan appeared to have difficulty with short-term and working memory.

Methods

This section will describe how data were collected and analyzed. A description of the tutoring sessions also is included in this section. Specific information about the interventions we used is documented in a later section.

Data Collection and Analysis

In addition to initial assessment data, which we used to inform our preliminary interventions, data were collected throughout the study. We relied on formative data, collected at every tutoring session, to inform the instruction we provided to Susan. The data we collected included tally marks, graphs, running records, and anecdotal notes. These data were maintained in a master folder that was kept in a secure storage area accessible to the primary researcher and tutors so that all parties could review data at any time.

Tally marks were collected on the backs of letter and word identification cards to indicate that Susan had read the card correctly. They were collected within anecdotal notes to record specific responses to instruction that could not be recorded directly on instructional materials. For instance, Susan's daily performance sorting rhyming cards was recorded anecdotally using a combination of tally marks for number of words placed correctly and anecdotal comments to indicate exactly what words were and were not mastered. Data were collected graphically, using simple line graphs, to provide visual records of Susan's letter-sound and word reading fluency. Researchers collected running records once Susan was reading connected text to gather data on the accuracy of Susan's reading. Anecdotal notes were recorded daily to record all aspects of the study, including detailed information about interventions used and Susan's responses that could not be displayed visually. Anecdotal records also included the sequence of instruction, Susan's reaction to and performance on each intervention, her responses to comprehension questions, and decisions made by the researchers regarding next steps. For example, when Susan participated in "rhyming walks," the tutor carried a clipboard and recorded the tutor's questions and Susan's responses and comments anecdotally. Our goals in collecting and reviewing data daily were to build in errorless learning for Susan and to document every aspect of the study for research purposes.

Tutors reviewed all data daily to inform the following session's lesson. Furthermore, the primary researcher and tutors met or communicated in writing frequently to review data and determine what interventions to continue and what to change. Decisions were recorded in the anecdotal notes. Susan's input was taken into account and adaptations were made. For example, one game that Susan loved to play was letter bingo. The original game included both upper and lower case letters together on one board. However, Susan was better able to identify upper case letters rather than lower case letters and

National Reading Panel Competency	Outcomes
Phonemic awareness	Able to produce letter names for 17 sounds $(s, m, b, f, r, k, n, p, a, d, x, z, soft g [as in goat], h, l, t, and v)$
	Able to blend words having three phonemes but could not blend larger words
	Unable to segment words into individual sounds
	Unable to produce or identify rhyming words
Letter and word knowledge	Able to read sight words go and exit
	Able to identify like and unlike pairs of letters
	Able to recognize 15 lower case letter names (but not sounds)
	Able to recognize 21 upper case letter names (but not sounds)
	Able to identify 7/10 same and dissimilar word pairs
	Memory issues when reading stories containing only symbols
Vocabulary and comprehension	Able to recall some basic facts and define simple vocabulary from stories that were read to her
	Preprimer story: 38 words, 4/5 questions correct
	Primer story: 61 words, 3/5 questions correct
	Grade level 1 story: 70 words, 2.5/5 questions correct
Fluency was not assessed due to her limited reading skills	· ·

 Table 1

 Summary of Initial Assessment Data

because the majority of letters seen in books are lower case, the game was adapted so that only lower case letters were used. The tutor would give a letter sound and Susan would place her token on the game board space with the corresponding letter. It was Susan's idea to switch roles, which gave her practice in producing the letter sounds.

Next steps were determined based on Susan's current progress and input. The data that were collected and graphed daily showed that for some skills, more time than expected was required for Susan to make progress. Conversely, Susan picked up some skills more rapidly, as evidenced by the data collected, and the team decided to move ahead. Similar to most teaching situations, plans were adapted daily. Of importance, learning activities were designed to be interesting and motivating for Susan. As Morgan et al. (2006) assert, instructional tasks for students with cognitive impairments need not be rote; instead, activities should be varied, with enough repetition to enable learning.

Tutoring

Tutoring sessions occurred with Susan for 1 hour per day, 4 days a week, from September through May following the university schedule (including winter and spring breaks). Sessions were held in a quiet conference room on the university campus. Although planning was a collaborative effort among the team, the majority of the sessions were led by the second author, at that time a graduate assistant in the special education department. The first author, a professor and head of the study, also attended a majority of the sessions, sometimes working with Susan and other times observing. A second graduate assistant also was involved in the study. Susan enjoyed spending time with all involved, and the feeling was reciprocated.

As described in the Methods section, daily, detailed notes were kept on what was completed during each session as well as the progress Susan was making and with what she was continuing to struggle. Susan was involved in the graphing of her progress on various skills and was motivated to watch her progress displayed visually.

Social validity data also were collected. Her parents' feedback was solicited informally several times throughout the study. Conversations were held over the phone, via e-mail, and in person regarding Susan's progress in tutoring and at home; her parents' concerns and celebrations of success; ideas for interventions; and issues arising in Susan's life that might affect her progress. More important, Susan was asked for continual feedback about the tutoring sessions. For instance, Susan would sometimes say that she did not feel like playing a game (e.g., Bingo) or doing a certain activity (e.g., word sorts) during a tutoring session. Other times, she would express an interest in these activities. Sometimes she would begin a tutoring session by saying what she would like to do first. Tutors also would ask her preferences or offer choices of activities. We purchased a computer program designed to improve phonemic awareness skills but Susan's response rate was too slow and she became easily frustrated; therefore, we discontinued using the program after a few sessions. Similarly, one tutor began using a mirror to help Susan watch her mouth as she pronounced /f/ and /th/, two sounds she was getting confused. Susan did not like the mirror so its use was discontinued. At all times, Susan's wishes were honored.

Instructional Progression

As discussed earlier, one of the goals for this study was to examine, for a person with moderate intellectual disabilities as a result of a TBI, the use of research-supported interventions that have been shown effective for other populations of learners. As Houston and Torgesen (2004) state,

The research evidence we have about effective reading instruction for typically developing students can be useful, even though the studies did not include students with moderate disabilities. These strategies for effective reading instruction may be an effective way to work with students with moderate disabilities. However, we do not yet know exactly which variations in the development process or instructional techniques . . . will lead to stronger reading skills for students with moderate disabilities. (p. 14)

In this section, we describe month-by-month the instructional procedures we selected, the outcomes for Susan, and our rationale for making instructional changes. Effectively, we unpack the instructional process as we examine the effects, for Susan, of approaches that have been shown effective for other populations of students.

We also use this section to show how we used formative assessments to drive our instructional decisions. Gil (2003) makes clear the importance of formative assessments:

Children and adolescents who sustained a TBI would be better served if assessment would be conceptualized in the form of assessment of the process of growth rather than assessment of growth at a particular point in time. Assessing the process of growth means that evaluations would take place in an ongoing manner, assessing the process of change intra-individually based on baseline evaluation and on serial outcome measurements. . . . It would also allow educators to be alert to subtle signs of difficulties and to set up preventive rather than remediative classroom and learning accommodations. (pp. 350-351)

September to October

As presented earlier, initial assessments determined that Susan lacked basic phonemic awareness skills. She

was not able to discriminate between rhyming or nonrhyming words and could not produce a word that rhymed with a given word. Because this skill is seen as a building block to other phonemic awareness skills (NRP, 2000), rhyming skills were the main focus of instruction at this point.

Various activities were used to help Susan improve her rhyming skills. Picture cards from the Phonological Awareness Kit (Robertson & Salter, 1995) were used to match short rhyming words. Two base pictures (e.g., cat and brick) were shown and Susan had to match a stack of pictures (e.g., hat, mat, bat, stick, lick, sick) with the base picture so that the base picture and the picture Susan placed with it rhymed. The number of cards in this activity was gradually increased until a total of five base words were used. Another activity involved a game similar to bingo using pictures of rhyming words (e.g., caller says "pig," Susan has to find "wig" on her board). Susan also enjoyed when she and the tutor would go on "rhyming walks" and try to rhyme words to objects seen on the walk. Books with specific rhyming patterns also were read to her and Susan was asked to predict what the next rhyming word would be. The practice of rhyming within context was difficult for Susan because many times authors (e.g., Dr. Seuss) make up nonsense words to fit the story.

To help Susan understand that words are made up of individual sounds, she was taught to segment words into sounds. For example, if given the word *shut*, Susan would move three transparent counter chips for each sound she heard (/sh/ /u/ /t/). The Phonological Awareness Kit (Robertson & Salter, 1995) was used for this activity. Susan would be presented with a picture and several blank boxes drawn on paper. She would place a chip into a blank box as she said each sound. Pictures began with only two to three phonemes and gradually became longer until words with five phonemes were used. This activity took her several sessions to grasp, but once her awareness of sounds was in place, this skill, along with letter-sound correspondence, allowed her to begin blending sounds into words.

A letter-sound correspondence bingo game was used to help Susan associate a grapheme with the spoken phoneme. Although Susan originally knew most of the letter names, she knew very few sounds. Because knowing the sounds is more important to reading than recalling the letter names, this was a skill to which much time was dedicated. Originally, a premade bingo board was used that had both upper and lower case letters side by side printed on it. This was a good beginning because Susan knew her upper case letters better than lower case. A sound was called out and she was to cover the corresponding letter on her board. When the whole board was filled (eight letters), she won. Once she was identifying at least 7/8 of the letter/sounds accurately, a different game board with only lower case letters was substituted. Eventually, based on her suggestion, Susan began picking a letter from the pile and producing the sound while the tutor would place a chip on the board, making occasional mistakes, ensuring Susan's attention to all aspects of the game.

Once a basic knowledge of letter sounds was established (i.e., greater than 90% accuracy over 3 days), tutors began to work on naming fluency with Susan. Although she could name a majority of the letter sounds, she was fairly delayed in her ability to name them rapidly. By practicing rapid naming fluency, the team hoped that she would process these basic structures of language quicker, helping her eventually put sounds together to make words quickly (Neuhaus & Swank, 2002). Susan was given a stack of lower case letters and was timed for one minute as she made the corresponding sound for each letter. The data were graphed daily and Susan seemed motivated to observe her ongoing progress chart showing how many letter sounds she produced correctly within a minute.

To work on Susan's comprehension skills, predictable books were read orally to her. Tutors would pause occasionally to ask literal questions of Susan. If she was not able to answer, the tutor reread the passage and Susan was given another chance to answer. When the story was over, Susan was asked to retell the story. She generally needed many prompts to recall the main events of the story.

November to December

Progression in these first months was slow at first. Learning the letter sounds was time consuming but enjoyable for Susan. Eventually she was able to recognize many lower case letter sounds consistently. However, she was having problems discriminating between visually similar letters such as p, b, d, q; k, x; and w, y. The tutors hypothesized that this difficulty with similar letters was due to Susan's vision impairment. Various activities were used to help Susan discriminate these letters, including working with modeling clay, tracing the letters with her fingers, tracing more tactile letters (colored glue dried to paper), and so forth. Each letter was repeated until mastery was achieved and a new and visually separate letter was introduced.

The book *Teach Your Child to Read in 100 Easy Lessons* (Engelmann, Haddox, & Bruner, 1983) was introduced to give Susan access to easily decodable words. This book used scripted mini lessons that were

adapted from the SRA DISTAR reading program. DIS-TAR has research support as an approach that is effective for students with cognitive disabilities (Joseph & McCachran, 2003). In a review of research, Joseph and Seery (2004) found that DISTAR was effective for teaching phonemic awareness and phonics skills to students with moderate mental retardation. Furthermore, Bowen (2005) supports the use of Direct Instruction as effective for students with TBI. Lessons progressively became more complex, beginning with basic "stretching" of words to blending individual sounds to make words to reading decodable word lists and sentences. One lesson was completed each day (with the exception of the first few lessons, which were covered quickly because they were mostly review of skills Susan already possessed). Each lesson included letter-sound correspondence practice and phonemic awareness skills such as blending sounds to make words (without the printed word in front of her) and continued practice with rhyming. Susan practiced word lists included in the book and she continued to improve her ability to make words by blending letters. However, the tutors noticed that when Susan decoded a word, she was not able to recognize the same word later on the same page, even if returned to within 10 seconds. For example, she would decode the word *mud* and if the word *mud* appeared soon after on the same page she would need to decode the word again.

The Engelmann et al. (1983) book had a variety of small sentences that Susan read. Each sentence had a picture that went along with it, but the picture was covered up by the tutor until after Susan had finished reading the sentence. After reading the sentence, she was asked what the picture would contain. If she was unable to make a prediction about the picture, she was asked to read the sentence again.

Because of Susan's need to decode every single word, the team decided to work on her sight word vocabulary. The use of sight words for persons with cognitive disabilities is documented in the extant literature (e.g., Browder & Minarovic, 2000; Browder & Xin, 1998). Many basic sight words were introduced through the Engelmann et al. (1983) text, such as I, is, it, we, the. Words were presented to Susan in a constant time delay, originally described by Touchette (1971), where a word was initially presented with the stimulus (in this case the oral presentation of the word from the tutor). Gradually, the prompt was faded by introducing a delay between the stimulus and the prompt, allowing time for Susan to respond correctly (Snell & Gast, 1981). After several initial presentations, the word was presented on a flash card followed by a 5-second pause during which Susan was

asked to say the word. If she did not know the word, she was told to wait and the word would be told to her. After 5 seconds had passed, she was given the word and was asked to repeat it. Time delay can be termed a near errorless procedure as it promotes correct responding by not allowing the participant to randomly guess at an answer (Browder & Lalli, 1991). Because Susan tended to guess words based on beginning letters, we chose to use time delay to help her improve her word reading accuracy. Susan had no more than five words at a time in the pile of words on which she was working. If she read the word correctly within 5 seconds, the date was placed on the back of the card. When the word had been read correctly three consecutive days in a row, she was able to color in a gumball on a picture of a gumball machine that was used to monitor progress. Mastered words were then placed in a separate pile and reviewed frequently. (These procedures were adapted from research on peer tutoring; see Heron, Villareal, Yao, Christianson, & Heron, 2006; Maheady, Mallette, & Harper, 2006; McMaster, Fuchs, & Fuchs, 2006.)

Although Susan amassed a collection of mastered sight words from the note cards, very few of the words generalized into other readings. If the note cards with the sight words were arranged on the table in a sentence, she would read the sentence slowly, stopping to decode some words. However, she would need to reread the sentence three to four times before she was able to restate the sentence in her own words.

During this time, Susan continued reading predictable books with support, such as *Green Eggs and Ham* by Dr. Seuss. Susan also was reading short decodable sentences in Engelmann et al. (1983). Finally, tutors continued working on rhyming, segmenting, and blending.

January

After winter break, work continued on Susan's sight words, timings of letter sounds identified in a minute, and progression through Engelmann et al. (1983). As lessons in the book became more difficult for Susan, these lessons were repeated to give her extra practice until she achieved mastery before moving on to a new topic/letter/skill.

Another skill that the team decided to introduce was to have Susan identify words the tutor said by finding and pointing to the word from a word list in Engelmann et al. (1983). This was especially easy for Susan when there was only one word with the initial sound. If there were several words with the same initial sound, Susan would take some time to respond as she examined each letter sound in each word so that she could decode the word.

The Bob books (Maslen & Maslen, 2000), a series of decodable books with new letters introduced gradually and applied to words of increasing difficulty in each book, also were introduced to provide Susan with more contextual reading opportunities. The first book uses the letters m, a, s, and t. Sight words are on and and. Book two adds two more consonants. The books were enlarged to make the text more visible to Susan. She used her finger to help her track the words across each page and expressed excitement at reading "real books." Comprehension questions were asked following readings of these books. Susan would answer the questions but did not always use the text to support her answers. For example, in one of the books there is a picture of Mat sitting on Sam. In the book, it states that "Sam was sad." When Susan was asked what happened when Mat sat on Sam, she replied, "He got squashed," rather than saying that he was sad. When prompted, Susan would go back to the book to look for an answer by rereading a sentence. After several repeated readings, Susan generally got the answer correct.

February to March

Throughout February and March, Susan was asked to spell words using foam letters. This was not done with paper and pencil because her fine motor skills were poor and because (at the request of her parents) the goal of the tutoring sessions was to teach her to read rather than to write. When provided with foam lower case letters and given a word, Susan was asked to break the word into its component sounds and to place the appropriate letters in order of the sounds. Although she had been introduced to digraphs (/sh/ /ch/ /th/) in Engelmann et al. (1983), she struggled to make the connection of these sounds with this spelling activity. Next, similar to Cunningham's and Cunningham's (1992) Making Words activity, once Susan had formed a word, she was asked to change the word into a similar word by changing just one letter. For example, she was given the word *bat* and asked to change the word to sat. She did very well changing initial letter-sounds, recognizing that one phoneme can change the meaning of the word entirely. When tutors began asking her to change medial or final sounds, she continued to remove the initial sound but placed the new sound in the proper place of the word. For example, if asked to change sat to sam she would remove the s and put the m after the t to read atm. However, with repeated practice, she began to replace initial, medial, and final sounds correctly. This helped in her reading immensely. Whereas before she would look at the initial letter and guess at the word, she

National Reading Panel Competency	Outcomes
Phonemic awareness	Able to identify and produce most letter-sounds, consonant blends, and some digraphs Able to blend words having three and four phonemes
	Able to segment compound words and syllables but struggled with segmentation of individual phonemes within words
	Able to discriminate between rhyming words with 80%–95% accuracy, and able to produce rhyming words with 67%–80% accuracy
Letter and word knowledge	Able to recognize all lower case letter names and sounds
	Able to recognize all upper case letter names and sounds
	Able to produce letter names for all upper and lower case letters with occasional confusion between x and z
	Able to read simple consonant blends (pl, br, etc.) and consonant digraphs (sh, th)
Vocabulary and comprehension	Able to read basic sight words (<i>the</i> , <i>I</i> , <i>up</i> , <i>me</i> , <i>it</i> , <i>a</i> , <i>go</i> , <i>is</i> , <i>we</i> , <i>can</i> , <i>and</i>) but continued to rely on decoding for most words
	Able to recall basic facts and define simple vocabulary from stories that were read to her
	Able to answer factual questions from stories that she read herself (with repeated readings) at a primer level
	Continued difficulty with inference questions
	Comprehension suffered due to need to continually sound out words
Fluency	Able to produce 20 letter sounds in one minute (an increase from 3 sounds per minute)
	Up to 27 words correct per minute after repeated reading of a text

Table 2Summary of Final Outcomes

began now to look more closely at each letter before pronouncing the word. Although this slowed down her reading, it increased her accuracy.

Tutors began keeping running records of Susan's readings in the decodable books. Furthermore, her fluency rate of correct words read per minute was graphed. Each day, she would read one book several times, trying to improve her initial reading score. Tutors also began to use the dry erase board in the conference room to write words in large print, both in isolation and within various sentences so that Susan's vision problems did not hinder her from accessing a selection.

Although she was able to answer questions about a passage that was read to her, the focus of the tutoring sessions turned to having Susan answer questions based on passages that she had read herself. Comprehension skills were addressed by asking Susan basic factual questions from the decodable books that she read. If she could not answer the question, she was asked to reread the page and try again. Also, the tutors would cover the pictures in the decodable books and then ask Susan to read a sentence and make a prediction about what she would see once the picture was uncovered. If her prediction was correct, the picture was asked to reread. This skill was difficult for her because she was still spending so much effort on decoding the words and struggled to keep words in her working memory while reading other words.

April to May

During the final months of the project, the tutors built on or modified previous strategies. The team continued to time Susan's readings of decodable books and use repeated readings of the books to build fluency. Comprehension activities continued with Susan making predictions about what would be in pictures based on what she read as well as answering factual and vocabulary questions. Basic phonemic awareness activities continued with rhyming and segmenting. However, the one-minute timings of Susan giving as many letter sounds as possible were discontinued. The team observed that she had reached a plateau and then began to decrease her performance. This could have been because of a lack of motivation for the activity after several months.

Results

In this section, we summarize the final outcomes of the study. Specifically, we present Susan's progress for phonemic awareness and phonics, vocabulary (defined here as sight words), fluency, and comprehension. These results are also summarized in Table 2.

Phonemic Awareness and Letter-Sound Correspondence

When she began the study, Susan was able to recognize 15 lower and 21 upper case letter names (but not sounds) and blend words having three phonemes, but she could not segment or rhyme words. By the end of the study, Susan was able to identify most sounds instantly when given an upper or lower case letter. She had continued difficulty with less common letters (x and z) and similar sounds (e.g., th and f). She was able to identify consonant blends (e.g., bl, gr) and some consonant digraphs (e.g., sh). With regard to rhyming, she ended the study with the ability to discriminate words that rhyme with 80% to 95% accuracy. Furthermore, when given a word, she began producing rhyming words with 67% to 80% accuracy.

Sight Words (Vocabulary)

Susan accumulated a small list of basic sight words (e.g., *the*, *I*, *up*, *me*, *it*, *a*, *go*, *is*, *we*, *can*, *and*, etc.) throughout the study. However, she relied mostly on sounding out words as she read. This could be an issue with her working and/or long-term memory or perhaps it might signal a need for continued repetition of basic sight words. Alternatively, given that most functional reading approaches for persons with moderate cognitive disabilities rely on sight word instruction, this finding may support a more phonemic/phonetic approach to teaching even functional vocabulary or reading skills.

Comprehension

When she was assessed prior to the study, Susan was able to recall some literal facts from stories that were read to her. She was not able, however, to determine the main idea or answer inferential questions about a passage. By the end of the study, Susan was able to recall more facts from a story that was read to her than from a story that she read herself. Significantly, however, she had acquired the ability to read on her own and to answer comprehension questions based on her independent reading. To answer comprehension questions from her own reading, she required several repeated readings and occasional modeling of how to find and/or remember facts. Her need to sound out words resulted in lower comprehension as well, especially for initial readings of a passage. She continued to have difficulty with inferential questions throughout the study.

Fluency

Because she began the study unable to read connected text, fluency was not assessed initially. As Susan acquired

the ability to read text, however, fluency became a focus for assessment, with repeated readings every session. Due to her memory issues, and the fact that she sounded out every word she encountered, Susan's reading rate (words read correctly per minute) varied from as low as 8 words per minute to as high as 27 words per minute.

Summary

In sum, Susan began the study as a nonreader and, 9 months later, was able to read short stories at approximately a primer level. She will require continued intensive work to make further progress, most especially in fluency and comprehension. Susan's excitement at being able to read was notable in her marked self-esteem improvements (noticed by family members and tutors) as well as her hard work and delight in attending tutoring sessions. Of note is an anecdote shared by Susan's dad toward the end of the study. Susan's sister-in-law sometimes took Susan to karaoke nights at a local pub (an ageappropriate activity for a 24-year-old). Susan loved singing and her sister-in-law noticed a change in Susan's approach to karaoke. Prior to our study, Susan would do her best to remember the words in songs. Toward the end of the study, Susan noticed that the words were displayed on a screen and began reading the words as she sang. Her family members and tutors saw this as a positive change in her awareness of environmental print.

Discussion

In this section, we discuss the ways in which this study adds to the extant literature regarding reading and assessment for students with cognitive disabilities and TBI. Limitations to the study are presented, as are suggestions for future research and implications for practitioners.

This article adds to the extant literature by showing that addressing the five components of reading identified by the NRP may be an effective approach to teaching persons with TBI and/or cognitive disabilities to improve their reading skills. There is little current information regarding which reading interventions are effective for students with cognitive disabilities or TBI beyond a few studies examining sight word and phonological awareness instruction (Browder & Lalli, 1991; Browder & Minarovic, 2000; Browder & Xin, 1998; Conners et al., 2006; Cupples & Iacono, 2000, 2002; Joseph & McCachran, 2003; Lalli & Browder, 1993; Mechling et al., 2002; Mosley et al., 1997; Saunders & DeFulio, 2007). Browder et al. (2006) and Houston and Torgesen (2004), however, advocate the use of existing scientific research supporting reading instruction for other populations of students as a basis to begin assessing which reading interventions may work for students with cognitive disabilities. We adopted this approach in working with Susan, using research-based interventions that are effective for other populations of students, as a stepping stone for examining what may or may not work for Susan. Research with persons with cognitive disabilities indicates that there is a limited research base regarding effective instruction for this population of learners (Al Otaiba & Hosp, 2004). Furthermore, teachers should not make a priori decisions about the capabilities of persons with cognitive disabilities (Gallaher et al., 2002; Katims, 2000b), thus potentially limiting the extent to which these students learn to read. Instead, educators should consider using intensive, purposeful, data-driven reading instruction to teach specific reading skills such as those recommended by the NRP (phonemic awareness, phonics, vocabulary, fluency, and comprehension) in place of or as a supplement to functional reading skills (Joseph & Seery, 2004).

This article thus serves to prompt further empirical research to study the effectiveness of various reading interventions that may help learners with TBI to develop or improve their reading skills. Of importance, this article illustrates the power of formative assessments in making instructional decisions. In two of the case studies reviewed earlier in this article, assessments were conducted to document participants' progress. Ryndak et al. (1999) and Greenberg (1997) used informal assessment tools to measure progress. In neither case, however, were ongoing formative assessments used. Our approach to assessment for purposes of this study was to measure the process of Susan's growth on an ongoing basis as described by Gil (2003). Doing so allowed the researchers to adjust instruction on a continual basis to better meet Susan's academic and affective needs. Thus, our study adds to the extant literature in that it is the first case study to demonstrate the use of formative assessments for instructional decision making.

Limitations

Although the findings in this study are important, there are some notable limitations. One limitation relates to feedback we obtained from Susan's parents. We asked them to provide information about Susan's progress at home, changes in what she was reading, and their concerns and ideas for interventions. This information was obtained informally, however. The study would have been strengthened had we conducted more structured interviews. Therefore, we suggest that future research incorporate structured interviews as part of the study design so that researchers may have the potential to provide more detailed information about parental feedback.

Another limitation pertains to the nature of the study. This is a case study and thus the findings cannot be generalized to the population of persons with cognitive disabilities or TBI. However, this study does provide evidence, especially in conjunction with the extant literature, that persons with moderate cognitive disabilities and TBI may have the ability to learn to read.

Future Research

We used a single approach—time delay—to teach sight words to Susan. The literature on sight word instruction for students with cognitive disabilities supports other ways to teach sight words to learners with cognitive impairments, including time delay, picture (stimulus) fading, and picture integration (Conners, 1992; Ehri, Deffner, & Wilce, 1984; Mastropieri & Scruggs, 1998; Riesen, McDonnell, Johnson, Polychronis, & Jameson, 2003; Snell & Gast, 1981; Westling & Fox, 2004), Thus, future research should evaluate the effects of various approaches to teaching sight words in conjunction with phonemic awareness, phonics, fluency, and comprehension instruction. Notably, Susan's reading was slow and laborious, directly affecting her ability to comprehend what she read. Had she experienced improvement in her sight word reading, her ability to read fluently and comprehend what she read, thus allowing her to read more independently, may have improved (Koury & Browder, 1986).

Of importance, this study provides initial evidence that the five areas of reading identified by the NRP may be a useful framework from which to approach teaching students with cognitive disabilities, especially when paired with formative assessments designed to inform ongoing instruction. Future research should replicate and extend the work done in this study, especially using quantitative research. Given the dearth of research on reading instruction for students with cognitive disabilities relative to other populations of students, there is much work to be done to advance our knowledge and help educators begin to intervene early and effectively so that learners with cognitive disabilities can become more successful, independent readers.

Implications for Practitioners

It took several months of intensive tutoring to obtain these results for an adult learner. Susan's parents were certain that throughout Susan's schooling she was taught functional reading skills, focused on learning sight words. We cannot help but wonder if Susan had been instructed in phonemic awareness, phonics, vocabulary, fluency, and comprehension skills, using research-based instruction beginning in preschool or kindergarten, to what extent her literacy outcomes would have been different. Would she have been able to acquire more reading skills or to read independently? Imagine the implications such instruction may have had for her life outcomes-employment, reading for pleasure, access to a wide variety of media, and so forth. Browder et al. (2006) state that "educators limit future opportunities if they make an a priori assumption not to teach reading to some students because of the nature or severity of disability" (p. 393). We contend that educators also may limit future opportunities if the right kind of reading instruction is not provided to students because of assumptions regarding the nature or severity of disability. This study shows that there is potential for persons with significant disabilities to learn to read, perhaps more so at an earlier age than during adulthood. Research supports that intervening early after a TBI results in better outcomes than if interventions are delayed (Barnes et al., 1999; Gil, 2003).

At the same time, this is a case study and, as such, the results cannot be generalized to other learners. However, if considered in conjunction with the case studies presented in the literature review, as well as the few studies indicating the ability of students with cognitive disabilities and TBI to read, this study prompts a clarion call for empirical research to be conducted. In the meantime, practitioners who educate children with cognitive disabilities and TBI should consider using instructional approaches having research support for other populations of students, focusing on the five key areas identified by the NRP, and using formative assessments to drive instructional decision making.

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