

# Instructional Methods that Foster the Reading Development of Students with Significant Intellectual Disabilities

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**Abstract:** Educational legislation has made reading a priority for students with significant intellectual disabilities (ID) and associated speech, language, sensory, or physical impairments. Historically, reading instruction for students with significant ID has focused on sight word instruction, with limited exposure to other essential reading skills. This article focuses on the evidence-based instructional methods that effectively and efficiently foster the reading development of students with significant ID. The authors reviewed the literature from the past 20 years on reading interventions for students with significant ID. In spite of access and opportunity barriers that have inhibited the reading development of students with significant ID, a synthesis of the empirical research on reading instruction suggests that students with significant ID and associated disabilities can learn phonemic awareness, phonics, vocabulary, fluency, and comprehension skills with direct instruction. Implications for providing reading instruction that effectively promotes reading development are discussed and areas for future research are identified.

**Keywords:** Intellectual disabilities, sight word instruction, reading instruction, speech and language impairment, physical impairments.

Sight word recognition and comprehension provides a foundation for reading as it enables struggling readers to access text [1]. Research indicates that students with significant ID can learn grade level, high frequency, and functional sight words in a variety of contexts, using a variety of instructional techniques [2-4]. For some students with significant ID, identification and comprehension of isolated sight words may serve as the student's only reading skill [3]. However, sight word instruction does not expose students with ID to all the words they will need to meaningfully interact with the print material they encounter in daily life, nor does it foster the ability to read novel words [5].

Sight word instruction for students with significant ID typically focuses on visual word recognition confining the word reading skills of students with significant ID to the pre-alphabetic phase of word reading [6]. Limited exposure to phonemic awareness and phonics instruction affords little opportunity for progression to the partial-alphabetic phase of word reading. Further, as much of the research examining sight word instructional methods fails to include a comprehension component, the sight word reading of students with significant ID is frequently restricted to word naming [2, 3, 7]. Despite the late demonstration of reading readiness, and the need for extended time to learn

reading skills, research indicates that the number of students with significant ID who achieve minimum literacy skills in word recognition, reading comprehension, and phonemic awareness increases from elementary to high school [8]. Moreover, recent advances in promoting reading development and advances in the available assistive technology provide new methods for providing reading instruction [9]. This article focuses on the evidence-based instructional methods [10] that effectively and efficiently foster the reading development of students with significant ID. First an overview of the factors that have influenced the reading development of students with significant ID will be discussed. Next, a synthesis of the empirical research on reading instruction for students with significant ID is presented in the following order: phonemic awareness, phonics, fluency, and text comprehension. Finally, implications for providing instruction that effectively promotes reading development are offered.

To identify reading interventions that promote the reading development of 5- to 18-year-old students with significant ID, students with moderate to severe/profound ID, empirical research studies published from the past 20 years were located through an electronic search of peer reviewed journals in the Education Research Complete, Education Full Text, Eric, PsychARTICLES, PsychINFO, and Academic Search Complete databases. This publication time frame was utilized to reflect the shift from a functional

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to an academic curricular emphasis propagated by reauthorizations of educational legislation (e.g., NCLB, IDEA) which occurred during this period. Research studies targeting reading interventions for students with ID associated with specific genetic syndromes such as Down or Williams syndrome were excluded from the review due to the distinct reading and language skill profiles associated with these syndromes. To illustrate, research indicates that individuals with Down syndrome demonstrate strong word identification skills and weak decoding skills [11]. Meanwhile, individuals with

Williams syndrome demonstrate difficulty with reading comprehension [12]. When research studies included participants of mixed ID etiology, results associated with participants with identified genetic syndromes were excluded from the discussion of the reported findings when possible.

Research studies were located using one or more of the following descriptors: significant disabilities, intellectual disabilities, cognitive impairment, mental retardation, reading, literacy, sight word instruction,

**Table 1: Research on Reading Instruction for Students with Significant ID**

Authors	Intervention	Design	Population	Results
Browder, Ahlgrim-Dezell <i>et al.</i> (2008) [22]	Early Literacy Skills Builder Reading Program (ELSB)	Random assignment, treatment and control group design	Twenty-three students with moderate and severe/profound ID; 11 students in intervention group	Large treatment effect size (1.35) on phonemic awareness/phonics measures; medium treatment effect size for control group students. Both groups demonstrated large treatment effect sizes on comprehension measures (treatment group 1.57; control group 1.24)
Connors <i>et al.</i> (2006) [23]	Phonological skill intervention (sound blending, letter-sound association, and sounding out)	Random assignment, treatment and control group	Forty students with moderate ID	Significant main effect for the intervention group on post-test sounding out measures, but variability was noted. No significant treatment effect on sight word reading measures.
Bradford <i>et al.</i> (2006) [5]	Corrective Reading Program, Level A	Pretest and Posttest design	Two students with moderate ID	Students demonstrated 97% or greater accuracy on oral letter sound correspondence, written letter sound correspondence, and word recognition posttest measures. Fluency increased from zero words per minute at pretest to 46 and 39 words correct per minute with intervention.
Browder <i>et al.</i> (2007) [25]	Twenty-five step storybook task analysis	Multiple-probe across participants	Six students with moderate to severe ID	Correct responses to comprehension questions increased from a mean of 14% during baseline (range 7% -36%); to a mean of 39% during intervention phase (range 21% -36%) Sound identification improved from a mean of 1% during baseline (range 0% - 6%) to a mean of 50% during intervention (range 33% - 72%)
Coleman-Martin <i>et al.</i> (2005) [27]	Computer-assisted instruction and the Nonverbal Reading Approach	Pretest and Posttest	Two students with moderate ID	Use of PowerPoint slides to introduce and teach decoding of new sight words was effective; students reached criterion in 3 and 13 sessions.
Hanser & Erikson (2007) [28]	Literacy Through Unity: Word Study program	Nonconcurrent multiple baseline	One student who used an AAC system with Unity®	Word identification skills increased from 68% at pretest to 96% at posttest; developmental spelling increased from 4 words at pretest to 22 words at posttest
Alfassi <i>et al.</i> (2009) [31]	Reciprocal teaching instruction	Random assignment, treatment and control group design	Thirty-five students with mild and moderate ID	Treatment group demonstrated significant differences between pre- and post-test comprehension measures and the use of summarization and question generation strategies.
Browder, Mims <i>et al.</i> (2008) [32]	Shared storybook reading using adapted storybooks and a 16-step task analysis	Single subject, multiple probe design across participants	Three students with multiple disabilities and profound ID	Independent student completion of task analysis steps ranged from a baseline mean of 2 to 7.3 steps (range 0 to 8 steps) to an intervention mean range of 8.5 to 13.09 steps (range 6 to 15 steps)
Mims <i>et al.</i> (2009) [33]	Shared stories using adapted story books	Multiple probe across materials with concurrent replications	Two students with severe/profound ID and visual impairments	Students demonstrated a baseline mean range of 0.6 to 2.8 correct responses and an intervention mean range of 5 to 6.5 correct responses per story

phonemic awareness, phonics, fluency, decoding, comprehension, vocabulary, letter-sound correspondence, and phonetic analysis. Next, the reference sections of studies meeting inclusion criteria were reviewed to locate additional research studies. Finally, the following journals were hand searched to identify research studies not identified through the electronic or reference section searches: Education and Training in Developmental Disabilities, Exceptional Children, Focus on Autism and Other Developmental Disabilities, Mental Retardation, and American Journal on Mental Retardation. Table 1 provides a summary of the research studies identified and included in this review.

### **FACTORS INFLUENCING READING DEVELOPMENT**

Reading, the ability to make meaning of print through the application of phonemic awareness, decoding, fluency, prior knowledge, vocabulary, and text comprehension [13], promotes participation and independence in school, home, and community activities. However, students with significant ID, those with moderate to severe/profound ID with or without autism spectrum disorder, speech, language, sensory, or physical impairments, have experienced limited exposure to instruction that promotes reading development [2, 4, 9]. This instructional deficit stems from opportunity and access barriers that have minimized the importance of reading instruction for students with significant ID.

The opportunity and access barriers that have limited reading development arise from professional and societal attitudes, educational practice, instructional priority, lack of knowledge, and a paucity of research-based instructional methods [14, 15]. First, the belief that literacy skill limitations are “innate” [16] has influenced the instructional curriculum of students with significant ID. As identified by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* [17] the projected cumulative academic skill attainment for students with significant ID is second-grade or lower. The projected potential for students with severe ID is limited to “some” sight word acquisition, with little benefit derived from pre-academic skill instruction. These presumed limitations in reading potential and learning competence have encouraged differential instructional programming, programming that supports a disability rather than an academic curricular emphasis [14]. Accordingly, the curricular priority for students with significant ID has been that of

functional skill development [18, 19]. Consequently, access to the instruction needed to foster reading development has been restricted [14-16]. Due to limited knowledge, some parents and professionals lack the skills needed to understand children’s nonsymbolic communication, identify and use available assistive technologies, adapt literacy materials and provide alternative means for participation, thereby preventing access to activities that promote reading development [14, 15].

Despite the challenges that have historically constrained the reading development of students with significant ID, current educational legislation mandates (e.g., IDEA, NCLB) have made reading development an instructional priority [9]. According to Browder, Gibbs, and colleagues [9], this reversal in curricular prioritization is associated with advances in literacy and reading development, advances in available assistive technology, and increased educational expectations for individuals with significant ID. Although the cognitive impairments associated with significant ID may negatively affect skill development, some researchers have documented that children with significant ID demonstrate variable cognitive strengths and weaknesses [20, 21]. This suggests that students with significant ID demonstrate variable skill potential. Moreover, empirical research supports the contention that students with significant ID can learn some aspects of the essential reading skills identified by the National Reading Panel [10] including phonemic awareness, phonics, fluency, and comprehension.

### **PHONEMIC AWARENESS**

Phonemic awareness, the ability to recognize and manipulate the sounds of spoken words, fosters decoding, comprehension, and improves reading [10]. Although limited, the empirical research on phonemic awareness instruction with students with significant ID indicates that verbal and nonverbal students receiving phonemic awareness instruction as part of a multi-component reading instruction program demonstrate greater gains on phonemic awareness and phonics skill development measures than students who do not receive phonemic awareness instruction [22, 23]. For example, a random assignment, treatment and control group design was used to evaluate the efficacy of instruction using the *Early Literacy Skill Builder* (ELSB; [29]) reading curriculum as compared to sight word or picture instruction on the reading development of verbal and nonverbal students with moderate and severe ID [22]. Students in both the intervention and

control groups also participated in shared story lessons. ELSB word segmentation and beginning and ending sound identification skills were taught using a scripted, model, lead, test instructional method and the system of least prompts. Analysis of treatment and control group pre- and post-test scores indicated a large treatment effect size (1.35) on phonemic awareness/phonics skill measures for students participating in ELSB instruction. In comparison, a medium treatment effect size (.51) was identified for control group students, who participated in sight word or picture instruction and shared story reading lessons.

Although limited, the findings of this study suggest that verbal and nonverbal students with significant ID who receive phonemic awareness instruction as part of a multi-component reading intervention demonstrate greater gains on phonemic awareness measures than students who do not receive phonemic awareness instruction. However, it is difficult to assess the extent of phonemic awareness skill development with nonverbal students with significant ID as scores were not differentiated by skill, verbal status, or level of ID. Additionally, it is difficult to ascertain whether the phonemic awareness gains were related to the efficacy of the specific instructional methods employed, or to the integration of phonemic awareness and phonics skill instruction.

Similarly, participation in a phonological intervention fostered higher post-test sounding out scores for verbal students with moderate ID as compared with those obtained by students in a control group who did not receive phonological skill instruction [23]. The phonological intervention included an oral sound blending component that targeted word and nonword, syllable, onset-rime, vowel-consonant, and consonant-vowel-consonant blending. Blending instruction consisted of the oral presentation of the individual sounds to be blended, student repetition of the individual sounds, and prompts directing the student to say the sounds "fast". Still, it is difficult to ascertain whether the phonemic awareness gains demonstrated were related to the effectiveness of the instructional method employed, or to the integration of phonemic awareness and phonics skill instruction.

## **PHONICS**

While phonemic awareness instruction provides a foundation for understanding and using the alphabetic system, phonics instruction provides the skills needed to decode novel words [10]. Consistent with empirical

studies examining phonemic awareness instruction, phonics instruction for students with significant ID was frequently provided as part of a multi-component reading intervention. However, the findings of phonics research document more substantial evidence that students with significant ID can learn letter-sound correspondences with direct instruction [5, 22, 23]. The results of research on direct instruction of phonics indicate that some verbal and nonverbal students with moderate ID can learn to blend sounds and decode words [5, 23]. In these studies, participating students' verbal ability and degree of ID were critical factors in determining instructional strategy and phonics skills targeted.

The research on phonics instruction suggests that verbal students with moderate ID can learn some letter-sound correspondence, blending, and decoding skills with intense, direct instruction. While students demonstrated difficulty blending sounds quickly, or telescoping sounds, the difficulties experienced may be associated with inadequate understanding of the blending task direction (e.g., "Say it fast.") more than the inability to learn decoding skills [23]. The phonics research is promising, but must be viewed with caution due to the small study sample size, lack of replication, and the limited breadth and depth of the phonics instruction provided.

Research targeting phonics instruction with nonverbal students with significant ID is limited. However, in contrast with a prior review of the reading research published prior to 2003 which failed to identify any phonics research including nonverbal students with significant ID [2], four studies including nonverbal students with significant ID were published between 2005 and 2009. Two of these studies evaluated the effectiveness of a multi-component, reading instruction intervention designed to accommodate the learning needs of verbal and nonverbal students with significant ID [22, 23]. First, the ELSB reading curriculum includes a phonics component that fosters letter-sound correspondence using easy to hard discrimination and the system of least prompts. Analysis of ELSB instruction treatment and control group pre- and post-test measures indicates that participation in the ELSB reading curriculum fosters greater gains on phonics skill measures than the control treatment [22].

The second reading intervention, use of a 25-step storybook task analysis, was developed to help educators plan and implement shared story reading instruction that promotes reading skill development with

verbal and nonverbal students with significant ID [25]. The phonics component of the task analysis fosters teacher identification of letter sounds to target during shared story reading. Constant time delay procedures, the system of least prompts, and praise are used to facilitate student acquisition of the targeted sounds. Resulting from teacher use of the 25-step task analysis, students' ability to identify target sounds, vocally or through the use of an augmentative and alternative communication systems (AAC) device, increased from a mean of 1% to a mean of 50%. Initial research indicates that students participating in the ELSB curriculum and the 25-step story reading task demonstrate gains in phonics skills. Still, as the study included verbal and nonverbal students with varying degrees of ID, it is difficult to differentiate skill gains by degree of ID, verbal status, and individual phonics skill.

More explicit evidence of phonics skill acquisition by nonverbal students with moderate ID is provided by research employing reading interventions typically used with students with severe speech and physical impairments who use AAC. These instructional methods include *The Literacy Through Unity: Word Study* program [26] and the Nonverbal Reading Approach [27]. *The Literacy Through Unity: Word Study* program is used with students who utilize AAC systems with Unity® [28]. Explicit, scripted word wall, making words with icons, and making words with letters lessons link "oral" and written language. Participation in the Unity making words with letters integrated phonics and "letter-by-letter" spelling lessons promoted improved developmental spelling skills for one nonverbal student with moderate ID who used an AAC device [28]. On the other hand, the Nonverbal Reading Approach is used in conjunction with a systematic reading program to teach students with severe speech and physical impairments, who are unable to verbalize, to use "internal speech" to sound out words [27, 29]. During the Nonverbal Reading Approach instruction, the student is taught to use internal speech to say and blend sounds in his/her head while the teacher models the skills aloud. Following instruction, diagnostic arrays, which include the targeted word and words of similar letter configurations, are used to evaluate the student's ability to apply the decoding skills learned and to identify errors in skill application. Word comprehension is assessed using picture arrays and sentence completion tasks. Coleman-Martin and colleagues [27] reported that two nonverbal students with severe speech impairments who received instruction in a class for students with moderate ID learned to decode novel

vocabulary after participating in computer-assisted, PowerPoint Nonverbal Reading Approach instruction.

In all, the phonics research provides some evidence that verbal and nonverbal students with significant ID can learn letter-sound correspondence and word attack skills. Still, while the research results are promising, they must be viewed with caution. First, only a limited number of letter-sound correspondences were targeted in some studies [23]. Next, only one study included a measure to assess comprehension of the words decoded [5]. Further, while phonics instruction fosters the ability to decode novel words [10] and decoding contributes to reading development, decoding does not ensure comprehension [23].

## FLUENCY

The literature provides some insight into methods that effectively promote phonics skill development. Conversely, there is a paucity of research on promoting reading fluency, the ability to read text quickly, accurately, and with expression [10], with students with significant ID. Nevertheless, Bradford and colleagues [5] reported that decoding skill gains improved reading fluency for two verbal students with moderate ID who participated in Corrective Reading Program, Decoding A instruction. Without a doubt, there is a need for research that identifies methods that effectively promote the reading fluency of students with significant ID. These methods may include improving sight word identification speed and accuracy [9].

## TEXT COMPREHENSION

Reading comprehension occurs when prior knowledge is used to interact with and make meaning of textual material [10]. Impairments in intellectual functioning, language, and integration of text and external knowledge due to limited life experiences, may negatively affect the reading comprehension of students with significant ID [22, 30]. Among the studies reviewed on comprehension, the majority of the research with verbal and nonverbal students with significant ID placed emphasis on listening comprehension. However, one study examined the effects of an 18-session reciprocal teaching intervention on the reading comprehension of 19 verbal students with mild to moderate ID [31]. With the reciprocal teaching intervention, an expository text passage was read in a group format to promote discussion and shared responsibility for text comprehension. During the initial text reading, the

instructor modeled comprehension strategies including question generation, summarization, word meaning, text clarification, and event prediction. Then, scaffolding, prompting, questioning, and remodeling was provided as students practiced the strategies. Pre- and posttest measure analysis indicated significantly improved experimental group performance, with a 10% gain demonstrated on the mean posttest standardized reading test measure score and a 22% improvement on the mean posttest standardized literacy reading assessment score. Comparatively, the control group demonstrated no significant difference on comprehension measures. Further, students participating in the reciprocal teaching intervention maintained the ability to ask relevant questions and summarize material at 12-weeks post instruction. The only identified drawback associated with reciprocal teaching was that time and effort were needed to promote participation in instructional discussions.

Although the research on fostering listening comprehension with verbal students with moderate ID is limited, four research studies examined the listening comprehension instructional methods designed to accommodate the learning needs of verbal and nonverbal students with moderate to significant ID. Three of the instructional strategies designed for verbal and nonverbal students with moderate to significant ID used adapted books and the system of least prompts to promote listening comprehension [25, 32, 33]. Book adaptations included inserting sensory or concrete objects in the book, inserting pictures of key vocabulary above the vocabulary words, inserting a repeated story line, and abbreviating or reducing text complexity. For two students with significant ID and visual impairments, the use of adapted books with embedded concrete objects representing noun referents and the system of least prompts supported an increase in correct responding to 10 comprehension questions from a baseline mean range of 0.6 to 2.8 correct responses, to an intervention mean range of 5 to 6.5 correct responses per story [33]. Meanwhile, for verbal and nonverbal students with moderate to profound ID, teacher use of a story reading task analysis that fostered story topic identification and sentence completion comprehension skills in conjunction with adapted storybooks promoted increased responding to comprehension questions and increased independent response rates [25, 32]. On the other hand, ELSB curriculum instruction employed scaffolding and the system of least prompts to teach verbal and nonverbal students with moderate to severe ID to complete

sentences and answer questions about story material [22]. While both the treatment and control group effect sizes were large, 1.57 and 1.24 respectively, participation in the ELSB curriculum resulted in greater gains on comprehension measures, in comparison with control group scores [22].

The text comprehension research suggests that verbal and nonverbal students with significant ID can improve listening comprehension skills with explicit instruction and the use of adapted reading materials [22, 32]. Still, as skill gains were not differentiated by degree of disability, verbal status, or comprehension skill, it is difficult to fully evaluate the efficacy of these interventions. Due to the paucity of research on independent reading comprehension skill development, no conclusions can be drawn regarding skill potential in this area.

#### **IMPLICATIONS FOR PROVIDING INSTRUCTION THAT PROMOTES READING DEVELOPMENT**

The literature provides evidence that students with significant ID can learn some phonemic awareness, phonics, vocabulary comprehension, and reading comprehensions skills. However the preponderance of the research has focused on promoting the reading development of verbal students with moderate ID. While limited research suggests that nonverbal students with significant ID can learn some letter-sound correspondence and decoding skills [28], comprehension skills [22, 25, 28] and reading comprehension skills [22, 25, 32, 33], small study sample size and undifferentiated reporting of skill gains make it difficult to assess the true extent of skill development. Furthermore research on reading instruction for students with significant ID continues to focus on sight word identification, with only a superficial examination of phonemic awareness, phonics, fluency, and text comprehension skill development.

While sight word instruction provides a foundation for text comprehension, automatic sight word reading is fostered by phonemic awareness and knowledge of letter-sound correspondence, which assists in retrieving word pronunciations and meanings stored in memory [6]. To maximize reading development, students with ID must be taught to integrate, apply, and generalize all essential reading skills [34]. As the use of time delay procedures to teach sight word recognition has been identified as an evidence-based reading practice for students with moderate ID, and a promising practice for students with severe ID [22], there is a

need for research to identify how this evidence-based practice can be used to promote the development of integrated sight word vocabulary, phonemic awareness, phonics, and text comprehension skills.

One potential strategy for integrating the development of essential reading skills using time delay procedures is the use of incidental learning. Research suggests that embedding incidental information within sight word instructional trials enables students to learn target information and two pieces of incidental information [35]. However, there is a paucity of research examining the efficacy of inserting incidental phonemic awareness or phonics stimuli within the sight word instructional trial on the phonemic awareness and phonics skill acquisition of students with significant ID. Further, no research examining the use of incidental learning with nonverbal students with significant ID was identified through the review of the literature. Thus, there is a need for research to identify the efficacy of instruction employing time delay procedures and incidental learning in the development of phonemic awareness and phonics skills with verbal and nonverbal students with significant ID.

Reading is a functional skill that enhances participation and independence in home, vocational, leisure, and community environments [9]. According to Erickson, Hatch, and Clendon [36], intensive, comprehensive reading instruction that targets all essential reading skill components and provides meaningful engagement with print is vital for fostering the reading skill development of students with significant ID. In sum, students with significant ID may not learn the breadth and depth of reading skills needed to interact with the range of text material they encounter. Even so, the reading skills acquired allow students with significant ID to more independently and meaningfully interact with print materials in home, school, and community environments.

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