Sight Word Literacy: A Functional-Based Approach for Identification and Comprehension of Individual Words and Connected Text

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Abstract: Reviews of the research on literacy for students with moderate intellectual disability indicated that sight-word instruction continues to be their primary mode of reading instruction. Reported in this article are data supporting the Sight-Word Component of the larger Integrated Literacy Curriculum for Students with Moderate to Severe Intellectual Disabilities. This component consists of three word sets of controlled vocabulary and two sets of functional vocabulary selected to remediate deficits reported in the current body of published research. Remediative features include motor demonstrations of comprehension and systematic instruction of both individual words and connected text. From the four years of data of this funded project, illustrative data for individual and small group instruction are presented. A functional relation is demonstrated between student performance and the curriculum component through use of changing-criterion designs embedded with multiple-baseline designs.

Current curriculum development efforts and legislative impetus have placed the teaching of literacy skills to all students, including students with moderate to severe intellectual disability (MSID), at the forefront of the nation’s educational agenda. For years, many educators assumed that students with intellectual disability were not capable of learning to read (Katims, 2000). Yet three significant reviews of the reading research literature for students with moderate to severe disabilities suggest otherwise (Browder & Lalli, 1991; Browder et al., 2006; Browder & Xin, 1998). Two important findings from these reviews are that instruction in word identification is successful when systematic instructional procedures are used, and that the primary format of reading instruction for students with MSID is sight-word instruction (Browder et al., 2006). However, as noted in these reviews sight-word instruction is not without significant limitations.

Comprehensive reviews of the research literature (Browder & Lalli, 1991; Browder et al., 2006; Browder & Xin, 1998) found that of 128 studies 44 met criteria of quality implementation and effect. This sparse quantity is combined with a limited breath. Sight-word reading research with students with MSID “has focused on the acquisition of a specific set of skills (e.g., recipe sight words) in a short time period” (Browder et al., 2006, p. 404). This limitation is highlighted when viewed within the context of the five essential elements of reading instruction proposed by the National Reading Panel (2000) – phonemic awareness, phonics, vocabulary, fluency, and comprehension. To date the primary focus has been on only one of these components, vocabulary, specifically within instruction of sight words (Browder et al., 2006). This sparseness of database research leaves many instructional questions unaddressed. For sight-word instruction to be functional for students with MSID, researchers need to focus on individual words and connected text that allow students to access information, directions, and leisure from...
their environments. To achieve this goal, reading instruction must continue for longer periods of time than is typical for this population (Browder et al.).

Guided by the limitations of sight-word instruction and research, we created the Sight-Word Component of the Integrated Literacy Curriculum for Students with Moderate to Severe Disabilities (ILC). The ILC is a comprehensive literacy program that includes visual literacy (Alberto, Fredrick, Hughes, McIntosh, & Cihak, 2007), sight word, and phonics components (Fredrick, Davis, Alberto, & Waugh, 2013). While our work and that of other recent researchers (Allors, Mathes, Roberts, Jones, & Champlin, 2010; Browder, Ahlgren-Delzell, Courtade, Gibbs, & Flowers, 2008) indicate that certain students will benefit from instruction that includes phonics, it is also true that there are students in the range of moderate to severe intellectual disabilities for whom a longitudinal sight-word program remains an important educational option (Connors, Rosenquist, Slight, Atwell, & Kiser, 2006; Flores, Shippen, Alberto, & Crowe, 2004). The purpose of this study was to determine the effectiveness of the Sight-Word Component of the ILC. Three critical aspects of preparing sight-word instruction are selecting the words to be taught, insuring students can demonstrate comprehension of those words, and providing instruction that leads to reading and comprehending connected text.

**Word Selection**

Sight words selected for students with MSID have been drawn from a variety of sources. For preschool students Doyle, Wolery, Gast, Ault, and Wiley (1990) used common objects as well as names of classmates. Collins and Griffen (1996) taught elementary students to read words on product warning labels. For older individuals selected words included grocery words (Gast, Doyle, Wolery, Ault, & Farmer, 1991), cooking words, and product labels (Collins & Stinson, 1995; Gast, Wolery, Morris, Doyle, & Meyer, 1990). Gast et al., (1990) taught students to read “environmental sight words” such as closed, doctor, enter, nurse, and push. Cuvo and Klatt (1992) taught students to read warning and safety signs. As these examples indicate a limited set of very specific words were taught.

Words selected for studies in which students demonstrated comprehension in the form of response generalization were based on the activities needed in the natural environment. Browder, Hines, McCarthy, and Fees (1984) taught words in instruction booklets for completing cooking, laundry, and telephone skills. Participants learned sight words such as “stir” and “spread” in the context of making sandwiches, “cold” and “hot” for laundry tasks, and “ambulance” and “fire” for telephone skills. Collins, Branson, and Hall (1995) taught participants to use recipe words (e.g., add, cup, stir, milk) to prepare recipes from box mixes. Browder and Minarovic (2000) taught sight words to students for assisting a cook in a cafeteria (e.g., racks, dishwasher, trays), and for working in a clothing factory (e.g., fold, punch-out).

To date, word selection lacks a logic or plan beyond analyses based on immediate setting requirements. Such a lack of structure provides no mechanism for longitudinal selection of future sight words, or for partnering with phonics. Demonstrations of reading lists of single words are not sufficient because they lack a logical sequence leading to the reading of connected narrative or connected environmental text which make use of various grammatical structures.

**Demonstration of Comprehension**

Sight word instruction for students with MSID often lacks any demonstration of comprehension as part of instruction. Browder and Lalli (1991) reviewed 22 studies of which only 12 measured comprehension in some form, including matching words to pictures, using words in sentences, making a response to the target word, or filling in the blanks. Browder and Lalli expressed concern over the expenditure of time and effort on teaching word calling versus comprehension. In their meta-analysis, Browder and Xin (1998) found that over 90% of the studies they examined lacked functional comprehension measures as true measures of sight word comprehension are those in which participants demonstrate both stimulus and response generalization. Participants must be able to locate the learned sight word where it is typically found and perform...
“an activity that they could not master without knowing the words” (p. 151). Four studies measured functional use of sight words. These included reading instruction booklets and performing daily living tasks (Browder, Hines, McCarthy, & Fees, 1984), locating grocery items or initiating household chores (Lalli & Browder, 1993), preparing recipes (Collins et al., 1995), and demonstrating safe responses to product warning labels (Collins & Griffen, 1996). The concern for poor demonstration of comprehension was reinforced by Browder et al. (2006) when they found that of quality studies (i.e., those meeting the requirements of Horner et al., 2005) only four additional studies since 1998 required the use of sight words in the context of functional activity (Browder & Minarovic, 2000; Fiscus, Schuster, Morse, & Collins, 2002; Kyhl, Alper & Sinclair, 1999; Mechling & Gast, 2003), while most demonstrated comprehension through word-to-picture matching.

Connected Text

Often missing from sight-word instruction is the extension from reading individual words to reading connected text. Connected text is composed of a minimum of two words that present a coherent message. While it may be desirable for students to work with isolated words on occasion, students become readers by reading connected text, and therefore it should be included as a basic element of early literacy instruction (Alberto, Waugh, & Fredrick, 2010; Duffy, 2009; Snow, Burns, & Griffin, 1998). Using basal readers in isolation provides access to reading connected text but limit generalization to functional reading (e.g., direction following and/or reading common functional text). Students with MSID encounter connected text as environmental connected text and leisure connected text. Environmental connected text provides access to important directions (e.g., safety information, microwave cooking directions), and to useful environmental information (e.g., what is on sale in a store; where the bus stop is located). Leisure connected text provides complete thoughts (e.g., The cup is big.), access to information from a newspaper (e.g., rain today), and to pleasure reading such as comics and graphic novels (Alberto et al., 2010).

Multiword environmental phrases typically are taught as single units of information to memorize rather than as individual units which can be recombined into other phrases and generalized. For example, Gast, Wolery, Morris, Doyle, and Meyer (1990) taught phrases such as fire exit, employees only, no admittance, emergency exit, and fire escape. Cuvo and Klatt (1992) taught phrases including, shoplifters will be prosecuted, employees only, sorry we’re closed, garage sale, men’s fitting room, not an exit, no shoes-no shirt-no service. In addition to phrases such as private property, wet floor, and post office, Wolery, Ault, Doyle, Gast, and Griffen (1992) taught place names such as Tufland Mall, Festival Market, Commonwealth Stadium, and Triangle Park. One of the often-noted limitations associated with sight-word instruction is students’ limited ability to generalize the reading of words across contexts (Browder et al., 2006). Teaching phrases as a single unit increases this limitation of the sight-word approach by further limiting the generalization of individual words in different contexts. As noted by Alberto et al. (2010) learning to read the multisyllabic and highly abstract words included in many of these phrases, and words that do not appear frequently in and across environments, also limits generalization. Selecting words that are both high frequency and functional reduces the memory dependence and increases the generalization of the words taught. The only data-based study that investigated teaching reading of connected text (Alberto et al., 2010), used a subset of the data presented here and demonstrated instruction of reading and comprehending individual words and connected text through the use of simultaneous prompting. Instruction progressed through a series of phases which systemically introduced various parts of speech and combinations of parts of speech. Following acquisition, students demonstrated generalization across connected text found in community environments and leisure-reading materials.

Method

Participants and Setting

Participants included seven students, two elementary students and five middle school stu-
Students are reported to demonstrate the effectiveness of the component within a single-case research paradigm. They were in instructional groups in three classrooms with three teachers. The two elementary students were 8 and 11 years old. The five middle school students ranged in ages from 12–15 years. Each of the students had an eligibility of MoID and was served in a self-contained classroom. The classroom teachers collected data and provided instruction. Student demographic data are presented in Table 1.

Curriculum Description

The sight-word component is one of three components within the ILC. ILC is designed as an integrated program with bridges to assist with transition across the three components. The ultimate goal of the ILC is for students to progress through the three components sequentially. However, each component of the ILC also may be used as an independent curriculum for students who are not able to transition through all the components. The Sight-Word Component is designed to provide students with explicit and systematic instruction of both individual words and connected text. The component consists of two strands, Controlled Vocabulary and Functional Vocabulary.

The Controlled Vocabulary Strand is designed to teach students basic print concepts about individual words (e.g., words are strings of letters, words relay meaning) and that words can be strung together to relay information or direction. Providing a controlled vocabulary to beginning readers is well supported in the literature (Biemiller, 1994; Hall & Moats, 2006; Carthey & Hoffman, 1995). A controlled vocabulary strand allows for systematic introduction of parts of grammar and connected text with knowledge of receptive understanding of the individual words prior to embedding them into connected text. The controlled vocabulary also allows for the systematic progression of increasing length and difficulty of connected text. The Controlled Vocabulary Strand is composed of three word sets with a total of 57 individual words, 12 numerals, and 120 connected text phrases. Selecting the individual words is an important component of any literacy program. The goal of reading is not to have students read a list of individual words which convey little to no meaning in isolation, but to provide students with words which can be presented individually or combined and arranged in various sequences to relay messages with which the students can demonstrate comprehension. By providing a controlled vocabulary and the changing criterion single-case research design we were able to provide for interspersal of

### Table 1

<table>
<thead>
<tr>
<th>Student</th>
<th>Age</th>
<th>Educational Placement</th>
<th>IQ Score</th>
<th>IQ Assessment</th>
<th>AB Score</th>
<th>AB Assessment</th>
</tr>
</thead>
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<td>8</td>
<td>Elementary</td>
<td>40</td>
<td>SB-V**</td>
<td>70</td>
<td>VABS*****</td>
</tr>
<tr>
<td>Caleb</td>
<td>11</td>
<td>Elementary</td>
<td>42</td>
<td>RIAS**</td>
<td>68</td>
<td>VABS</td>
</tr>
<tr>
<td>Amy</td>
<td>13</td>
<td>Middle</td>
<td>40</td>
<td>SB-V**</td>
<td>29</td>
<td>VABS</td>
</tr>
<tr>
<td>Jess</td>
<td>14</td>
<td>Middle</td>
<td>40</td>
<td>WISC-IV***</td>
<td>52</td>
<td>ABAS-I******</td>
</tr>
<tr>
<td>Shane</td>
<td>15</td>
<td>Middle</td>
<td>40</td>
<td>WISC-III****</td>
<td>31</td>
<td>VABS</td>
</tr>
<tr>
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<td>12</td>
<td>Middle</td>
<td>40</td>
<td>SB-V**</td>
<td>56</td>
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</tr>
<tr>
<td>Tate</td>
<td>15</td>
<td>Middle</td>
<td>46</td>
<td>SB-V**</td>
<td>37</td>
<td>VABS</td>
</tr>
</tbody>
</table>

* Stanford Binet Intelligence Scale – Fifth Edition  
** Reynolds Intellectual Assessment Scales  
*** Wechsler Intelligence Scale for Children – Fourth Edition  
**** Wechsler Intelligence Scale for Children – Third Edition  
***** Vineland Adaptive Behavior Scales  
****** Adaptive Behavior Assessment System – Second Edition
known items across all phases except the initial noun phase.

In selecting words for the Controlled Vocabulary Strand the following criteria were employed (A) Sight words composed of sounds found in community functional words (e.g., the sight word ball contains the sounds found in bus and walk). This criterion serves as a bridge to the Phonics Component of the ILC, as students who may transition to phonics will have had opportunities verbalizing the sounds to be taught in the Phonics Component. (B) Initial sight words selected for instruction are within the receptive vocabulary of the students. Receptive understanding plays an important role in reading comprehension. In order for a student to identify a word in print and comprehend the meaning of the printed word, that word must be in the student’s receptive vocabulary. (C) Words which can be represented by real materials that can be easily manipulated by the student thereby allowing for immediate motor demonstration of comprehension. As noted, a recurring deficit identified in sight-word instruction is the lack of comprehension measures. In this program, students are required to read a word and then complete a motor demonstration of comprehension by selecting from an array an object that represents the word. The arrays included objects corresponding to the nouns and the various adjectival characteristics such as color or size (e.g., big and small cups of various colors). (D) Words which are inclusive of various parts of speech. The introduction of words and parts of speech within this program is designed to begin with the most concrete (i.e., nouns) and end with more abstract parts of speech (i.e., others which include articles). The curriculum systematically presents vocabulary, various parts of speech, and grammatical structure sufficient to provide students with early experiences reading connected text for the purpose of direction following based on information provided. Directional connected text allows students opportunities to read and demonstrate comprehension of strings of text. Within the Controlled Vocabulary Strand, students also learn a variety of other skills such as the concept and reading of plurals, prepositional/directional concepts, and number identification and number sense.

Table 2 provides the first word set of the Controlled Vocabulary Strand. The initial phase of instruction consists of four nouns. Students must demonstrate word identification and comprehension by selecting the object which relates to the written word. Each noun is presented three times during both probe and instructional sessions for a total of 12 trials per probe and instructional session. Mastery for the Noun Phase is reached when the students read 9.6 words (80%) correctly for two of three consecutive sessions. Once students demonstrate mastery of the four nouns, they are then taught four adjectives. Each adjective is displayed as an attribute of the four nouns previously taught (e.g., a ball that is red and big). During the Adjective Phase of instruction, the four previously mastered nouns are interspersed. Students must demonstrate word identification and comprehension to a criterion of 12.8 words read correctly for two of three consecutive sessions. After mastery of the Noun and Adjective Phases, the students are presented with two-word connected text phrases which contain one noun and one adjective from those pre-
viously mastered. Teachers are provided with examples of connected text phrases but encouraged to create their own. A total of 10 connected text phrases are taught during the Noun/Adjective Connected Text Phase. Students must demonstrate word identification and comprehension to a criterion of 8 phrases read correctly for two of three consecutive sessions. Once students have reached mastery of the Noun/Adjective Connected Text Phase, they are taught four verbs with the previously mastered nouns and adjectives interspersed. The verbs taught at this stage are action verbs. This allows for a clear demonstration of comprehension. Linking verbs are presented in the Others Phase of instruction. The rationale for not including linking verbs in the Verb Phase is based on the descriptive more abstract nature of linking verbs over action verbs which allow for a clear motor demonstration of comprehension. Students must demonstrate word identification and comprehension to a criterion of 16 words read correctly for two of three consecutive sessions. After mastery of the Verb Phase, the students are presented with three- to four-word connected text phrases which contain one verb, one noun, and one or two adjectives. A total of 10 connected text phrases are taught during the Noun/Adjective/Verb Connected Text Phase. Students must demonstrate word identification and comprehension to a criterion of 8 phrases read correctly for two of three consecutive sessions. Students progress through the five remaining phases of the Word Set in the same manner.

The Functional Vocabulary Strand is composed of two word sets. A total of 25 individual words and 10 functional connected text phrases are taught. Comprehension of the connected text phrases is measured when the student reads the functional phrase in context, and then performs an appropriate motor response (e.g., When presented with the phrase “out of order” on a vending machine, the student must read the phrase and then move to an alternative vending machine to make a purchase). Receptive understanding of phrases is measured prior to instruction of individual words.

Once students have completed the Functional Vocabulary Strand, teachers may look at transitioning their students into the Phonics Component of the ILC. If a student is not successful in the Phonics Component the teacher can establish instructional priority for additional functional words to be taught through a sight-word approach by using the Lexicon Development strategy. Lexicon Development provides a three-step systematic approach for generating and prioritizing additional functional sight words to be taught. The first step is to identify relevant environments, including current and future environments in which the student will participate. The second step is to survey the words within those environments. This process includes (a) engaging in the activities expected in the environment, (b) noting identification or directional words/phrases, and (c) noting the format in which the words appear (e.g., all lower case or capitals, etc.). The third step is to establish instructional priority. Instructional priority is established by creating a tally based on the frequency of occurrence across the identified environments.

**Instructional Strategy**

The instructional strategy used in the Sight-Word Component of this program is simultaneous prompting. Simultaneous prompting is a response prompting strategy designed to produce near errorless learning. During instruction, the instructional cue and controlling prompt are presented simultaneously with assessment probes conducted prior to the instructional session to measure skill acquisition (Schuster, Griffen, & Wolery, 1992). Simultaneous prompting has been used with students of various age groups (i.e., elementary, middle, and high school) and across various skills (i.e., reading, math, communication, etc.) with sight-word reading the most common skill taught with this strategy (Waugh, Alberto, & Fredrick, 2011a).

**Design**

Data for this program component are presented in two variations of the multiple baseline with embedded changing criterion design. One variation of this design is a nonconcurrent multiple baseline with embedded changing criterion across groups for the acquisition of Word Set 1, as seen in Figure 1.
The second variation of this design is a multiple baseline with embedded changing criterion across word sets, as seen in Figures 2 and 3 for one student. Due to the longitudinal nature of this research and the challenges associated with longitudinal repeated measures (i.e., students changing schools and students missing school due to illness) a method for graphing individual student data while demonstrating group membership was developed. In Figures 1–3, the icons represent the number of students in the group during each instructional session. For Figure 1, the icon represents the number of students in the group for that data point and the value on the Y axis represents the average number of words read correctly during the probes for each member represented in the group for that particular session. For Figures 2 and 3, the icon represents the number of students in the group during the instructional session associated with the data point and the numerical value represents the number of words read correctly by the individual student for the probe session. The changing criterion within the tier is represented in the individual word phases with the criteria for mastery increasing by an average of four words per phase. Embedded within the individual word phases are connected text phases in which the mastery criteria remains stable but the number of words within a phrase gradually increases across the phases of the tier.

Materials

Instructional materials included 77 individual word cards, 12 numeral cards, and 120 connected text word cards for the Controlled Vocabulary Strand and 25 individual word cards and 10 functional connected text word cards for the Functional Vocabulary Strand. Each individual word and connected text phrase was printed on a 5x8 inch index card in computer generated Comic Sans 100 font. Objects which represented each noun taught and contained characteristics of each adjective taught were presented on the table during both probe and instructional sessions (i.e., big and small red ball) for the Controlled Vocabulary Strand so that students could demonstrate comprehension of the word and connected text phrases read. During the Functional Vocabulary Strand comprehension was not mea-

Figure 1. A nonconcurrent multiple baseline with embedded changing criterion design across groups for Word Set 1. Changing icons represent group membership during instructional sessions.
sured during individual word phases due to the nature of the words, instead comprehension was measured during connected text phases in natural functional settings. Each student was provided with a set of word cards and comprehension materials during instructional sessions. The teacher was provided with both probe and instructional scripts to increase consistency in presentation of the trials across phases. Teachers also were provided with data sheets to record student responses during assessment probes.

Procedure

Teacher training. Prior to beginning instruction, the classroom teacher was trained on the implementation of the instructional procedures and data collection. A member of the research team met with the teacher to explain the procedures and to model instruction with one of the students. The teacher observed the procedures and then implemented the procedures with a student while receiving feedback from a member of the research team. The teacher was observed implementing procedures with students and had to reach 100% accuracy for two consecutive sessions as measured by the Teacher Behavior Checklist before continuing with unsupervised instruction.

Baseline probes. Baseline probes were conducted prior to beginning instruction. Each student individually was presented with the sight words to be taught in each of the word sets. The teacher presented the stimulus card, provided the attentional cue, “Touch the card. What word?” and provided wait time for the student’s response. Correct and incorrect responses were recorded. No feedback was given as to the accuracy of the student’s response. Verbal praise was provided for sitting and participating during the baseline probes. Baseline probes were collected until baseline stability was established for each member of the group and there were a minimum of three probes.

Assessment probes. Assessment probes were conducted each day in a 1:1 format prior to the instructional session. The classroom teacher individually called students to the work area and presented each word targeted for instruction three times. The teacher presented the sight-word card, provided an attentional cue by having the student touch the sight-word card, and then provided the instructional cue “What word?” The teacher waited four seconds for the student to respond. If the student responded correctly the teacher recorded the response and prompted the student to demonstrate comprehension by selecting the corresponding object from an array of four or more objects. The teacher provided reinforcement for correct responses and error correction if the student selected an incorrect comprehension response. Both the word identification responses and comprehension responses were recorded on the data sheet. If the student read the word incorrectly the teacher provided error correction with a second opportunity to read the word (e.g., No, this word is ___. What word?) and did not ask the student to demonstrate comprehension. Comprehension was not measured if the student read the word incorrectly because of the error correction procedures for word identification. If the teacher provided error correction in the form of supplying the correct word then the comprehension response would be a measure of listening comprehension not reading comprehension. While standard simultaneous prompting procedures do not provide error correction during assessment probes, recent research has indicated that error correction during probes may increase the effectiveness and efficiency of the strategy when teaching sight words to students with MSID (Waugh, Alberto, & Fredrick, 2011b).

Instructional session. Once assessment probes were conducted, the teacher assembled the students for group instruction. Group instruction was employed to reduce the amount of instructional time required for teachers, and to increase student engagement and opportunities to respond through the use of choral responding, and to increase rate of learning (Kamps, Dugan, Leonard, & Daoust, 1994; Wolery, et al., 1992). Group membership consisted of two or three students. During instructional sessions, the teacher simultaneously provided the instructional cue and the controlling prompt. The teacher provided an attentional cue (i.e., “Everyone, touch your card.”) while ensuring that all students were attending to their card, the teacher called on
a target student (which varied among trials within a session), provided the instructional cue paired with the controlling prompt (i.e., Jon. What word? Ball). The target student read the word and the teacher provided verbal reinforcement. The teacher provided the instructional cue and the controlling prompt to the entire group (i.e., Everyone, what word? Ball). The students responded together by reading the word. Once the students responded the teacher asked the students to demonstrate comprehension by selecting the corresponding object from an array of objects. Based on the group of students and their ability to manage materials, the teacher determined if each student had his or her own set of materials or if one set of materials was used for the group. When the teacher used one set of materials for the group the target student chose the object and the other students confirmed the choice.

**Storybooks.** Storybooks containing the vocabulary to be taught were created for each Controlled Vocabulary Word Set. The use of storybooks was a multipurpose activity which allowed for (a) previewing words in the word set to ensure receptive understanding of the words, (b) exposing students to receptive vocabulary not in the word sets as a way to increase vocabulary, (c) expanding verbal language and social interactions among the students in the group, and (d) teaching of emergent literacy skills, such as pointing to title of the page, demonstrating how to hold a book, and answering comprehension questions. During storybook time, the students took turns tracking text as the teacher read, stopping periodically at previously mastered words and asking the students to identify the word. During these activities students were asked wh-questions about the text.

**Automaticity/Fluency.** “Automaticity refers to fast, effortless recognition of words in isolation or in lists. Fluency refers to fast, effortless reading of words in sentences or passages” (Carnine, Silbert, Kame‘enui, & Tarver, 2004, p.182). Automaticity and fluency play important roles in reading comprehension. If retrieval of each individual word requires an extensive amount of time or cognitive processing, then the likelihood of remembering words from the beginning of the phrase once the student finishes reading the entire phrase is greatly reduced thereby impacting the student’s ability to comprehend what was read as an entire unit of thought or direction. Once students reached mastery of a phase of instruction, they continued to practice reading all mastered words through one-minute timed readings of automaticity and fluency charts. The automaticity/fluency charts also served as generalization practice, as the words were presented in a different format. During automaticity readings, the students read words presented in lines on the page with six words on each line and four lines on a page. Each line alternated the color of the text (red and black lines) to assist the student with tracking of the words. During fluency reading, the students read connected text phrases presented in two columns on the page. Automaticity and fluency provided additional opportunities for the students to read words learned on index cards in a different context. They also provided practice and instruction with emergent literacy skills, such as tracking and text directionality.

**Generalization**

Generalization occurred across the Controlled Vocabulary and Functional Vocabulary Strands. During the Controlled Vocabulary Strand generalization occurred during the connected text phases where the previously taught individual words were presented in newly constructed phrases, as students were reading cards with multiple words versus individual words. Generalization also occurred during automaticity and fluency readings as students were reading the same words in a different context. Students were also presented with words in different contexts within the individual activity folders. Activity folders consisted of matching words with pictures representing the individual words, reading connected text phrases, and finding the picture which represented the text read. During the Functional Vocabulary Strand generalization occurred during the connected text phases when students read the previously taught individual functional words in a functional phrases in the natural context (e.g., out of order sign on a vending machine) and then demonstrated comprehension of the func-
Procedural Fidelity and Interobserver Agreement

Procedural Fidelity was measured using a Teacher Behavior Checklist. A member of the research team observed the classroom teacher during 20% of probe and instructional sessions and recorded the teachers’ adherence to the steps of the instructional procedures. Procedural fidelity for teacher implementation ranged from 90% to 100% with a mean of 98%. During probe sessions, a member of the research team recorded student responses and compared them to the primary data collector’s (i.e., classroom teacher) data. Interobserver agreement was calculated using the point-by-point method. The total number of agreements was divided by the total number of agreements plus disagreements and converted to a percent. Interobserver agreement was calculated for 20% of probe sessions and ranged from 85% to 100% with a mean of 99%.

Social Validity

Upon the completion of the study, the classroom teachers completed a questionnaire. The questionnaire addressed issues of student acquisition of word identification and comprehension skills, time to implement the instruction within the day, manageability of materials, and continued use of the program. Across the three teachers who implemented the program in the sample data provided, each teacher reported a response of agree strongly for each of the five questions. The teachers have continued to use the program in their classroom with students who have not been enrolled in the research.

Results

Data on student learning during this curriculum development program were gathered using single-case methodology. The following data are a subset of the complete data generated during the four years of the project. Presented here is a sample of the data representing the results of group instruction, in this case three groups of students learning Word Set 1; and data representing an individual student’s data across all five word sets. These data demonstrate a functional relation between acquisition of sight words and this ILC curriculum component.

Data for student performance on acquisition, maintenance and generalization of sight words in Word Set 1 are presented in Figure 1 within a nonconcurrent multiple baseline design with an embedded changing criterion across groups of students. The changing criterion within each tier is represented in the individual word phases (e.g., nouns, adjectives) with the criteria for mastery increasing by an average of four words per phase while maintaining 80% accuracy. Embedded within the individual word phases are connected text phases in which the mastery criteria remain stable, but the number of words within a phrase gradually increased across the phases of the tier. Figure 1 has three tiers, one for each group of students. A functional relation is substantiated in two ways. First, there is documentation of successful student learning in Group A that is replicated vertically on the graph for Groups B and C. Second, there is replication of successful student performance horizontally within each tier as seen in the repeated mastery at increased performance criterion across phases of individual words and connected text.

Table 3 presents the numbers of sessions to mastery of word identification and demonstrated comprehension for each individual word phase. For individual word Phases 1–6 the number of sessions required to reach mastery for word identification and for comprehension within the individual word phases were the same, except for Group A at Phase 6 (prepositions) in which the students required three additional sessions for mastery of comprehension; for Group B at Phases 2 (adjectives) and 6 (prepositions) in which the students required two additional sessions for mastery of comprehension; for Group C at Phases 1 (nouns) and 4 (verbs) in which the students required one additional session for mastery of comprehension. It should be noted that at Phase 8 for all Groups the discrepancy between mastery of word identification and comprehension is because words classified as “other” do not allow for isolated motor demonstrations of comprehension. Table 4 pres-
ents the number of sessions to mastery of word identification and demonstration of comprehension for phases of connected text. For connected text phases (e.g., Phases 3 and 5), in which phrases consisted of two and three strings of words, the number of sessions required to reach mastery for word identification and for comprehension were the same for Groups B. Group A required one additional session to mastery of comprehension for Phase 3 (Noun/Adjective Connected Text) and Group C required one additional session to mastery of comprehension for Phase 5. For Phases 7 and 9 in which connected text phrases consisted of strings of 5 or more words, the number of sessions required to reach mastery of comprehension exceeded the number of sessions required to reach mastery of word identification. This demonstrates a point at which word identification exceeds a student’s ability to comprehend the words being read.

Maintenance of student learning is seen incorporated within the data as once words are mastered they are distributed and probed across phases to insure distributed practice and learning. Maintenance also can be seen within each phase of connected text as these are composed of previously learned words.

Generalization of student learning is demonstrated in phases of connected text as words are presented in longer strings, new word orders, and in some cases different formats.

For an individual student’s performance on acquisition, maintenance, and generalization of sight words in the Controlled Vocabulary Strand are presented in Figure 2 within a multiple baseline design with an embedded changing criterion across the first three words sets (controlled vocabulary). Figure 2 has three tiers, one for each word set. A functional relation is demonstrated in two ways. Successful student performance in Word Set 1 is replicated vertically on the graph in Word Sets 2 and 3. Additionally, there is replication of successful student performance horizontally within each tier as seen in the replication of mastery of word identification and comprehension across phases of individual words and connected text.

Table 3 presents the number of sessions to mastery of word identification and demonstration of comprehension for each individual student’s ability to comprehend the words being read.
word phase. For individual word phases the number of sessions required to reach mastery of word identification and of comprehension were the same for Phases 1, 2, 4, and 6 of Word Sets 1 and 2 and for Phases 1, 2, and 4 of Word Set 3. In Phase 8 of Word Sets 1 and 2 Dalton demonstrated mastery of comprehension in half the number of sessions required to demonstrate mastery of word identification. As previously noted the other phase (i.e., Phase 8) does not require a new comprehension measure as these words do not allow for a motor demonstration of comprehension. In Word Set 3, Dalton required four additional sessions to mastery of comprehension for Phase 8 (i.e., others) because of the requirement of a motor demonstration of numerals 4–12. Table 6 presents the number of sessions to mastery of word identification and of comprehension for phases of connected text. For the first two phases of connected text across the three word sets, Dalton required additional sessions to mastery of comprehension in Phase 3 (Noun/Adjective Connected

<table>
<thead>
<tr>
<th>Groups</th>
<th>Phase 3 NA CT</th>
<th>Phase 5 NAV CT</th>
<th>Phase 7 NAVP CT</th>
<th>Phase 9 NAVPO CT</th>
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<tbody>
<tr>
<td></td>
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<td># Sessions to Mastery (Comp)</td>
<td># Sessions to Mastery (Word Id)</td>
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Figure 2. A multiple baseline with embedded changing criterion design across three words sets of the Controlled Vocabulary Strand for Dalton. Changing icons represent group membership during instructional sessions.
TABLE 5
Phase Data Individual Words for Dalton

<table>
<thead>
<tr>
<th>Phase</th>
<th>Nouns</th>
<th>Adjectives</th>
<th>Verbs</th>
<th>Prepositions</th>
<th>Others</th>
<th>Plurals 1</th>
<th>Plurals 2</th>
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<tbody>
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Discussion

The purpose of this study was to examine the effectiveness of the Sight-Word Component of the ILC. This component consists of a Controlled Vocabulary Strand and a Functional Vocabulary Strand. Functional relations demonstrated as the student’s learning of Word Set 4 is replicated in Tier 2 with his learning of Word Set 5. The goal of literacy instruction for students with MSID is to provide the skills necessary to read individual words and connected text phrases in the context of their natural classroom setting with generalization into the community.
needed to gain information from the environment with which to make decisions and choices, alter the environment, and/or gain pleasure (Alberto, Fredrick, Hughes, McIntosh, & Cihak, 2007). The presentation of a controlled vocabulary allows for (a) an understanding of the purpose of reading (i.e., to gain information), (b) the structured intro-

<table>
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<tr>
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</table>

Figure 3. A multiple baseline with embedded changing criterion across word sets of the Functional Vocabulary Strand for Dalton. Changing icons represent group membership during instructional sessions.

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duction of words based on a logical progression which allows for a systematic increase in the number of words read within a connected text format, (c) implicit teaching of print knowledge skills (i.e., text directionality), and (d) the manipulation of words within phrases which alters the meaning of the phrases. The introduction of individual functional words in the Functional Vocabulary Strand allows for extended generalization of individuals words into functional connected text phrases found in the community. Although traditionally, functional phrases are taught as a single unit of text (Alberto et al., 2010), in this strand each word was taught separately thereby increasing the context or number of phrases students could read (e.g., do not enter, do not touch).

The Sight-Word Component of the ILC directly addresses three of the National Reading Panel’s (2000) five essential components of effective reading instruction: vocabulary, comprehension, and fluency with the two remaining components (i.e., phonemic awareness and phonics) presented in the Phonics Component of the ILC. Vocabulary is addressed through the teaching of the controlled vocabulary and the reading of storybooks which contain the controlled vocabulary and additional words and concepts. At each step of reading instruction, students are required to complete a motor demonstration of comprehension to ensure understanding of the word or phrases read. The Sight-Word Component was designed to ensure practice in reading fluency through one-minute timed readings of both individual words (automaticity) and connected text phrases (fluency). During the one-minute timed readings students learned and practiced text directionality and were taught to track within and across lines of text. Each line of text on automaticity and fluency charts alternated colors between red and black to assist students with tracking. The one-minute timed readings also served as a stimulus generalization, as the context and format with which the previously mastered words were presented were modified.

The ILC can be used with students of various functioning levels (e.g., MoID and SID) and multiple grade levels (e.g., elementary, middle, or secondary). While other programs are available for students with MoID, those programs often are designed solely for elementary age students. Additionally, the ILC can be adapted to use with students who are nonvocal. For instance, because all phases of instruction require a motor demonstration of comprehension, a teacher can present the card to the student, assure the student attends to the card, and then ask the student to find one. If the student is able to find the correct object, then the motor demonstration of comprehension can serve as confirmation of reading.

Research on literacy instruction for students with MoID highlights the instructional and research deficits concerning comprehension. The ILC addresses the deficit of lack of comprehension measures and emphasizes the importance of comprehension in reading instruction. For the purpose of this study, reading was defined as the combined act of word identification and a motor demonstration of comprehension. Analyses of the data show an increase in the number of sessions to mastery for comprehension over word identification of the connected text phases, in particular connected text phases made up of five or more words. While the students often demonstrated generalization of the word identification skills in the connected text phrases, the ability to then complete the task they read proved difficult for many of the students. Due to the difficulty with demonstrating comprehension during the connected text phases, the teachers had to structure student comprehension responses by prompting the student to find the first object in the sentence and then have the student read the sentence a second time to find what they needed to do with the object.

Browder and Xin (1998) define two types of comprehension: stimulus generalization and response generalization. Stimulus generalization is defined as the targeted stimulus presented in a different format or context (e.g., on a product label, in the grocery story, or in a newspaper). A response generalization is defined as making an alternate correct response in the presence of the target stimulus. Examples of response generalizations include matching the word to a picture or object and/or completing a task based on the written text. Only 46% of the studies in the Browder and Xin literature review required a measure
of comprehension. These measures of comprehension were identified as reading the words in the real setting, matching the word to a picture or object, giving definitions, or reading words in sentences (Browder & Xin, 1998, p.132). Many of the examples of comprehension measures reported by Browder and Xin illustrate stimulus generalization but not response generalization. Often when response generalization measures were collected they were used as a measure of incidental learning not of systematic instruction (Doyle et al., 1990; Gast et al., 1991; Gast et al., 1990). The ILC program is designed to require response generalization by reading the word and immediately selecting the described object from an array and/or selecting the object and performing a task. This allows students to make immediate connections between the printed word and the object, attribute, or action it represents. Stimulus generalizations are provided through the reading of previously taught words in different formats (i.e., storybook reading and/or automaticity/fluency charts). Both the Controlled Vocabulary and Functional Vocabulary Strands of the ILC meet the criteria for comprehension as identified by Browder and Xin (1998). In both strands the students are required to locate the learned sight word in a context in which it may typically appear and complete an activity that the student would not be able to complete without knowing the words.

Through the systematic presentation of words and phrases as seen in Word Set 1, students are exposed to concepts in addition to basic word identification and comprehension. For example, through the use of real objects and the systematic presentation of nouns and then adjectives, students learn that objects have attributes and multiple words can describe a single object (e.g., big blue ball). Each noun targeted for instruction contains attributes of the adjectives targeted for instruction, so there are big red balls, small red balls, big blue balls, and small blue balls. Similarly, during instruction of prepositions students are taught prepositional or directional phrases and concepts (e.g., “put ball in box” or “put ball next to hat”). Students also are taught to look at the entire word when reading through the initial presentation of two words that begin with the same consonant in Word Set 1 (i.e., ball and book) and the presentation of plurals in which a single letter changes the meaning of the word.

This study further supports the use of simultaneous prompting for teaching sight words to students with MoID. While constant time delay was found to be the most common instructional strategy for teaching literacy skills to students with MoID (Browder et al., 2006), within the last five years there is a growing body of literature that supports the effectiveness and efficiency of simultaneous prompting for teaching reading skills (Waugh, Alberto, & Fredrick, 2011a). Simultaneous prompting may be a preferred strategy due to a limited number of possible student responses, fewer decisions that the teacher must make during instruction, the ease with which it can be implemented in a group setting, and its compatibility with the use of probe data collection.

The natural classroom teachers implemented instruction within classrooms as part of the daily schedule. Through the social validity instrument teachers reported the ease of implementation of the program and their intention to continue its use with students in their classroom. Several teachers decided to use the program with students in their class who may not have met our inclusion criteria due to alternate special education eligibility. As the program progressed the teachers and project staff developed an assortment of supplemental activities that provided the students with additional opportunities for distributed practice and rehearsal of the words in different formats and contexts. For example, the nouns and verbs were used to create instruction for various prevocational activities, such as sorting and packaging. In addition to use in the classroom, supplemental activities (e.g., file folder activities) were shared with parents and used as homework. Parents who never thought their children would read were now able to observe them complete a direction from written text. Students have asked their teachers when it was time to read and have asked for reading homework.

The current study adds to the literature by providing longitudinal single-case research to support literacy instruction with students with MoID. As a result of the duration of this re-
search, we had to devise a new method for graphing data that could illustrate a group’s average learning score or an individual’s score while explaining the number of students in group instruction during any given session. Group membership varied across sessions due to student illnesses, transitioning to new schools within a district (e.g., going from elementary to middle school), and students moving to other districts. For example, in the first tier of Figure 1, group membership throughout instruction for Word Set 1 of the Controlled Vocabulary Strand fluctuated between two and three students. This variance was due to illness experienced by one of the group members, Amy. While absences were periodic during the first four instructional phases, Amy was placed on extended medical leave. The two remaining students continued with instruction. Amy was able to return to school and receive individual instruction and was able to return to group instruction during the last phase of connected text for that word set. The new method of graphing allows anyone to look at the graph and know how many students were present in a given instructional session. This method of graphing also allows us to pull an individual student’s reading data and look at their individual progress while continuing to provide a picture of group membership across word sets. It should be noted that Groups A and B in Figure 1 initially included two additional students. However, they were unsuccessful with the sight-word program and transitioned to a more appropriate component of the ILC to meet their literacy needs. This demonstrates the flexibility of the ILC and the reality of implementation in natural classrooms.

Although recently there has been an increase in the number of published literacy programs available for students with MSID (e.g., Allor et al., 2010, Browder et al., 2008; and PCI Reading Program (2009), the ILC is currently the only program that provides a stated outcome goal of reading functional text for students with MSID. The programs published by Allor et al. and Browder et al. place an emphasis on phonetic principles with nominal exposure to sight-word instruction. The PCI Reading Program emphasizes sight word reading with the final level introducing initial phonics skills. The ILC, however, provides equal emphasis to modes of literacy, including visual literacy, sight-words, and phonics, to meet students at their current literacy level. Each of these modes of literacy can be implemented as an independent literacy program or in combination to allow for individual program design.

Programs that specifically focus on sight-word instruction for students with MoID (e.g., PCI Reading Program (2009), Edmark Reading Program (2002), and ILC) differ considerably in selection of words targeted for instruction. While no clear rationale is provided for selection of sight words in two of the three programs, all three programs include various parts of speech. The ILC provides an equivalent number of words based on parts of speech, while the two remaining programs provide words that are predominately nouns and others (i.e., articles). The equivalent presentation of various parts of speech provides for an array of samples of text which can be created. The ILC is the only program that requires that words selected for instruction are represented by real objects that can be manipulated in order to demonstrate comprehension; the two remaining programs employ the use of pictures to represent untaught words and/or as measures of comprehension. While pictures can serve as an initial measure of comprehension as with nouns and adjectives, there are limited distractors that can be created when measuring comprehension for more complex parts of speech or phrases that are more difficult to demonstrate with pictures. The ILC also is the only program that requires a measure of comprehension each time a word or phrase is read; the PCI Reading Program provides a comprehension measure in the form of a matching activity after every 10th lesson and The Edmark Reading Program Level 1 presents the first measure of comprehension at Lesson 16 and periodically after that. The verbs selected for instruction in the ILC ensure that the students must physically manipulate an object in order to demonstrate comprehension, while the two remaining programs present only one verb that could be physically demonstrated with the majority of verbs presented considered linking verbs which by nature are abstract and convey no true meaning in isolation. While all three programs increase the number of words the stu-
students must read, the ILC provides a systematic method for increasing the number of words that is repeated across word sets. The ILC also differentiates itself from basal reading programs by requiring a motor demonstration of comprehension at every phase of word identification (except Others). Programs which require the student to read extended text prior to asking for a demonstration of comprehension, often in the format of basic knowledge retrieval (e.g., who, what), may allow students to proceed without an understanding of what they are reading. This was demonstrated in the connected text phases when the students were able to read the phrases correctly but required additional sessions of instruction to demonstrate comprehension of what they read.

The data presented in this study substantiate the effectiveness of the Sight-Word Component of the ILC in teaching students with MSID to read individual words and connected text phrases and to follow directions from written text. This program differentiates itself from other basal reading programs in that students are learning to read text and complete a task. The focus of this program on reading and completing related tasks provides a true functional outcome of literacy for this population.

References


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