Beyond Sight Words: Reading Programs for People With Intellectual Disabilities

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The Edmark Reading Program (ERP; Tague, Kidder, & Bijou, 1967; Pro-Ed, 2011) was the first reading program specifically designed for individuals with intellectual disabilities. The program effectively teaches sight-word reading using a programmed-instruction approach; however, the decoding skills taught in the program are limited. Because phonics and phonemic awareness instruction are missing from the ERP, students fail to learn a generalizable reading repertoire. Recently, there have been a few select programs developed that have successfully taught intellectually disabled people a generalizable reading repertoire. These programs are briefly reviewed.

Keywords: programmed instruction, Edmark Reading Program, intellectual disability, reading

The education and placement of intellectually disabled children are long-standing concerns in education. A dramatic shift occurred over the last 50 years from teaching developmental tasks (e.g., putting pegs in a pegboard) to teaching functional skills of daily living (e.g., ordering food at a restaurant; Knight, Browder, Agnello, & Lee, 2010; Powell-Smith, Stoner, Bilter, & Sansosti, 2008; Ruppar, Dymond, & Gaffney, 2011). Academic areas such as literacy have not traditionally been considered instructional priorities (Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006; Conners, 1992; Katims, 2000). However, the provision of effective academic instruction to intellectually disabled individuals can be traced back to the 1960s with early applications of behavior analysis and programmed instruction (Bijou, 2001). Sight-word reading was especially em-phasized within the applied research literature (Browder et al., 2006; Conners, 1992). Sight-word instruction involves teaching the individual to say the word upon its presentation. A variety of prompting and fading procedures have been found to be effective for teaching sight words to people with intellectual disabilities (Browder et al., 2006). Procedures include errorless learning strategies such as systematic prompt delay, stimulus-prompt fading, and stimulus shaping, but there are few reading programs to date that use these more basic shaping and fading strategies. One exception is The Edmark Reading Program (ERP; Tague, Kidder, & Bijou, 1967; Pro-Ed, 2011), an effective sight-word reading program originally designed for children with intellectual and language delays (Conners, 1992).

The ERP has historical and instructional significance in the reading literature, not only because it is the first reading program to use effective teaching strategies for intellectually disabled people, but because it provides an instructional framework for subsequent reading programs designed for this population. We review the history of the ERP, discuss how it teaches, and outline the strengths and limitations of the program (i.e., what it does and does not teach). More recently developed reading programs are also reviewed and compared with the ERP to provide a guide for

practitioners and researchers who are interested in reading instruction for people with intellectual disabilities.

Edmark Reading Program

The creation of the ERP originates from the early basic and applied operant research conducted by Sidney Bijou and his students at the University of Washington's Institute of Child Development (Bijou, 2001). On sabbatical to Harvard in 1961, Bijou learned the principles and techniques of programmed instruction from B. F. Skinner and James Holland. His experiences there inspired him to set up an experimental classroom to teach reading, writing, and mathematics to children diagnosed with intellectual disabilities. Ideally, all of the modules would consist of programmed instructional materials to ensure careful instructional sequences, immediate feedback, and self-pacing (Bijou, 2001). The ERP was developed for this purpose by Sidney Bijou and two teachers, Cecilia Tague and John Kidder, in the 1960s (Tague et al., 1967) at the Rainier School in Washington (Bijou, 1965). The children at the school had a mean IQ of 56 and made good progress in reading and other academic areas (i.e., mathematics, writing, and appropriate student behavior; Bijou, 1965).

A second edition of the Edmark Reading Program was released in 2011, but the core activities remain essentially the same and the words are taught in the same way and in the same order (Edmark Reading Program, 2011). The ERP includes many features of effective instruction, including assuming relatively little background knowledge of the students, simple response requirements, assessing and teaching of prerequisite skills, errorless learning, and individual pacing. The behavioral prerequisites for students are minimal. Students need to be able to point to provide answers, say or sign words, and understand language—that is, the students must be able to follow the teacher's cues and directions. The core components of the ERP consist of the following activities: word recognition, picture and phrase matching, and story reading. The word-recognition activity, which teaches recognition of sight words, is the primary component of the program.

Before starting the program, students are given a mastery test, which assesses skills taught in the program, and a discrimination test. The discrimination test is used to determine whether a student can scan a line of text on a page and find the matching letter or word. This skill is required for starting Lesson 1 of the word-recognition activity. Students start with the prereading activity if they do not pass the discrimination test.

The prereading and word-recognition activities consist of match-to-sample tasks of increasing difficulty. In the prereading activity, students are initially shown a page with pictures of objects in rows. Each row contains four objects, with the left-most objects separated from the other three by a vertical line. The teacher points to the sample on the left and asks the student to point to it and to find the one like it. No verbal response is required. If a student points to a wrong comparison, that comparison is covered up and the task is repeated. If the student points to the other wrong comparison, that choice is also covered and the teacher says, "This one matches, point to it" and moves on to the next row. The student is physically prompted to point, if necessary, and the task is repeated. The 128 steps in the prereading activity move from the matching of objects to geometric shapes to individual letters, to two-letter words and finally to three-letter words. The sequence of examples is carefully designed from easy discriminations to more difficult ones. For example, the first two-letter discrimination uses the word "by" as the sample with the comparisons "xx," "xx," and "by." The final two-letter discrimination uses the word "oh" as the sample and "fr," "lm," and "oh" as the comparisons. Similarly, the first three-letter discrimination uses the word "car" as the sample and "car," "xxx," and "xxx," as the comparisons, essentially mirroring the incorrect alternatives from the first two-letter sequence. No additional teaching strategies are provided for students who fail to learn to match, but the matching of objects is a more basic skill requirement for students entering the program than most other reading programs.

The word-recognition activity follows an instructional format similar to that of the prereading activity. Sample words are presented on the left and three comparisons are on the right. When a new word is introduced, it is the only word in the row. The teacher first tells the student to point to the word. In lesson one, for example, students are told "Point to the word

horse." After the student points, the teacher says "Read the word horse." Praise is given for correct responses. The introduction of new words is very simple. Students are just expected to point to the only word that is available and to echo what the teacher says while looking at the word. Subsequent items require finer discriminations in terms of the number of letters in the words. The similarity of distractors to target words increases, but it appears to be only in terms of the number of letters, and not in specific letters or phonetic elements used by the distractors. Most of the items consist of those conditional discriminations in which the instructor says the word and the student points and reads the word from the array of three words. The rest of the items consist of "read-back" items, in which only the target word is shown on the line and the teacher says "Read." In later lessons, read-back items often consist of short phrases or sentences containing the words taught in the program. In addition to the correction procedures used in the prereading activity, incorrect responses on read-back items consist of the teacher telling the student the word and having the student read the word. Students are taught a new word each lesson with 150 words taught in Level 1 and an additional 200 in Level 2.

The picture-match and phrase-match activities are important comprehension activities, which may be essential to include in the reading instruction of intellectually disabled people. The picture-match activity teaches students to react appropriately to what they have read by matching pictures to instructions. Students are given cards with pictures on them and are asked to read brief phrases that increase in complexity over the lessons. For example, the first phrase students read is "A horse." The teacher then asks the students to find a picture of a horse. If the student does not know what a horse is, the teacher shows the student a picture of a horse. Some of the phrases students read in later lessons include, "A table and two chairs are on the paper" and "Put a flower and a long pencil with a blue airplane." These more complex instructions require the use of multiple picture cards. When students are able to do the activity successfully, they may work independently on the picture-match activity. If students make an error related to color, size, or position, specific correction procedures are used that involve asking the student to read the phrase again and then

asking about the incorrectly named property. For example, if the phrase mentioned a green car but the student put down a red car, the student would read the phrase again, the teacher would ask, "What color is the car?" then the teacher would point to the picture and ask, "Is this a green car?"

In the phrase-match activity, students are shown a board with multiple pictures and given cards with phrases. The students first read the phrase on the card and then point to the corresponding picture. One of the early cards contains the phrase "yellow fish." Students are supposed to point to a picture of yellow fish. Examples of later phrases include "A brown cat looks at us" and "The children eat with Mother and Father."

The story activity consists of 86 brief, illustrated stories that use the words taught from the word-recognition activity. Teachers discuss the title and pictures in the story with the student and follow along as the student reads. If the student misreads a word, the words around the word are blocked out and the student is prompted to read the word again. With each story, four or five discussion questions are included that primarily consist of who, what, where, why, and how questions, which can be answered based on the story; and a few questions that rely on background knowledge. When students make incorrect responses to discussion questions, they are prompted to review the text and illustrations.

Efficacy of the ERP

Vandever, Maggart, and Nasser (1976) compared the ERP to the Sullivan (Buchanan, 1968) and Merrill (Fries, Wilson, & Rudolph, 1966) reading programs with three classrooms of students diagnosed with intellectual disabilities. Each classroom was randomly assigned to one of the three reading programs. The researchers compared the number of words learned from the first 150 words taught in each program. There was a statistically significant difference in favor of the ERP. On the end-of-year test, students receiving the ERP had learned to read approximately 35 words whereas those in the Merrill program acquired 24 words and those in the Sullivan program acquired 17 words. Walsh and Lamberts (1979) compared the ERP to a picture-fading instructional technique with 30 in-

tellectually disabled students. ERP students learned significantly more words.

Vandever and Stubbs (1977) studied the ERP with 21 students diagnosed with intellectual disabilities and very low IQs ($M = 46$). The students were taught with the ERP in the schools for 2 years, completed an average of 100 lessons, and learned to read an average of 41 words from the program, with most of these words retained over the summer break.

The ERP has also been used with students with reading difficulties, but not diagnosed with any intellectual disability. Andersen, Licht, Ullmann, Buck, and Redd (1979) randomly assigned first-grade students with reading difficulties to either the ERP, a flexible instruction method, or a control group. Trained undergraduate tutors provided all instruction individually, 3 times per week for 9 weeks. The tutors in the ERP group followed the scripted directions in the ERP. The tutors in the flexible instruction group taught the same words from the ERP but could use a variety of methods for instruction, such as flashcard instruction and word bingo. The control group participated in educational games. The ERP students significantly outperformed students in the other two groups. From pretest to posttest, ERP students gained an average of 79 words, flexible instruction students gained 55 words, and the control group gained 24 words.

Limitations of the ERP

The repertoires important to teach in reading are summarized in the National Reading Panel (NRP) report that was published in 2000 (NIH, 2000). The NRP report is a summary of research findings on reading instruction and the applicability of that research for use in classrooms. The NRP identified the following five areas in which instruction should occur: phonemic awareness, phonics, vocabulary, fluent reading, and reading comprehension. The ERP's picture- and phrase-match activities teach vocabulary and reading comprehension and provide additional practice in word reading. The story activity provides additional practice in reading connected text to promote reading fluency and includes comprehension questions. The word-recognition activity teaches sight-word reading, but it does not teach phonics or phonemic awareness.

Phonics skills are one of many atomic repertoires that are important for the development of complex human behavior (Palmer, 2012). An atomic repertoire is "a set of fine-grained units of behavior, each under control of a distinctive stimulus, that can be evoked in any permutation by the arrangement of corresponding stimuli" (Palmer, 2012, p. 61). At the time the ERP was created, there was not great appreciation for the teaching of phonics, in spite of the publication of *Why Johnny Cannot Read—And What You Can Do About it* in 1955 by Rudolf Flesch. Phonics instruction is important because written English is a "code-based," or phonetic, system in which the sounds of the language generally correspond with the letters that are written. Instructing students in the relationship between sounds and letters (i.e., phonics), along with spelling rules, allows them to decode and spell approximately 98% of the words in the English language (Eide, 2011). In short, there is a large generative benefit in teaching students phonics, because with instruction in a relatively small number of skills, students will be able to read a large number of words (Alessi, 1987).

A phonics repertoire is not the only atomic repertoire important for the development of reading. Some students can learn to say the sound each letter or letters make, but have difficulty blending the sounds together to make a word. Blending is another atomic repertoire that may need to be taught, and it can be taught in the absence of letters, which makes it a phonemic awareness activity. A beginning English blending repertoire consists of the learner being able to say a word after hearing the individual sounds of a vowel–consonant (VC) or consonant–vowel–consonant (CVC) word. So the learner would say *cat* after hearing the segmented sounds /c/, /a/, /t/. Another important phonemic awareness repertoire is segmenting, which is the opposite of blending. A segmenting repertoire consists of the student providing the individual sounds after hearing a complete word. Phonemic awareness and phonics are basic early literacy skills students need to learn to read (NIH, 2000).

The lack of phonemic awareness and phonics instruction is the greatest weakness of the ERP. Although Bijou and colleagues did teach the students at the Rainier School the names and sounds of individual letters (Bijou, Birnbrauer, Kidder, & Tague, 1966), this instruction did not

make it into the ERP. Sight-word instruction, usually with an emphasis on safety and functional words, is the most common method for teaching reading to intellectually disabled people (see Browder et al., 2006; Browder & Xin, 1998; Conners, 1992 for comprehensive reviews), but studies have found that teaching sight words alone has limitations in terms of both maintenance and generalization (Browder & Xin, 1998; Conners, 1992; Smeets, Lancioni, & Hoogeveen, 1984). For example, Browder and Xin (1998) concluded that studies on sight-word instruction failed to demonstrate that children who effectively acquired sight words used those reading skills in functional contexts. One reason for lack of generalization to the natural environment could be that children who have an intellectual disability tend to demonstrate stimulus overselectivity; that is, restricted stimulus control to only one letter or property of the word (Schneider & Salzberg, 1982; Smeets, Hoogeveen, Striefel, & Lancioni, 1985; Wilhelm & Lovaas, 1976). Overselective attending has been shown to occur in the context of sight-word instruction, impeding both the establishment of stimulus control of taught words in natural settings and the maintenance of skills over time (Smeets et al., 1984).

With sight-word instruction, each word must be taught as a separate unit. Teaching sight words does not facilitate the development of phonics skills, even when words that contain corresponding phonetic components are taught concurrently. For example, Barudin and Hourcade (1990) found that when teaching words with phonetically similar components, children who had an intellectual disability were not able to read untrained words containing these same phonetic properties (e.g., teach *fan* and *dish* to generalize to *fish*). Also the participants did not isolate the sounds within the words they recognized.

Evidence that the ERP produces a generalized reading repertoire is limited. The Vandever and Stubbs (1977) study discussed earlier also tested participants on a list of high frequency words not taught in the program, and although the growth on this list was statistically significant, the average gain was only 2.9 words. Similarly, although Vandever et al. (1976) found the ERP superior to the other two reading programs in terms of the words learned from each program, there were no statistical differ-

ences among programs on a test of transfer words. Likewise, Andersen et al. (1979) found no significant differences among groups on a 40 word reading test (Gates–MacGinitie Reading Test, Gates & MacGinitie, 1965) that contained only nine words taught in the ERP. Overall, the research on the ERP shows that it is effective in teaching difficult to teach students the words in the program, but that it does not teach a phonetic or generalizable reading repertoire.

Phonics-Based Reading Programs

Despite the historical focus on sight-word instruction, recent research has demonstrated that many intellectually disabled children can learn basic phonics and successfully use those skills to sound out words (Bradford, Shippen, Alberto, Houchins, & Flores, 2006; Conners, Rosenquist, Sligh, Atwell, & Kiser, 2006; Joseph & Seery, 2004). Bradford et al. (2006) demonstrated that three students with moderate intellectual disabilities were able to read novel words after completing Level A of the *Corrective Reading Program,* a direct-instruction, phonics-based remedial reading program. Similarly, Conners et al. (2006) found that students diagnosed with intellectual disabilities were better able to sound out transfer words than a matched control group after receiving phonemic awareness and phonics instruction.

Allor, Mathes, Roberts, Cheatham, and Champlin (2010) studied the longitudinal effects of a direct-instruction reading program with intellectually disabled students. Students were randomly assigned to the treatment or control group. Students in the control group received a variety of reading programs, which were commonly used at their schools. The intervention group received *Early Interventions in Reading* (Mathes & Torgesen, 2005), which includes phonemic awareness, phonics, word reading, repeated reading of connected text, and vocabulary and oral language activities. Students with particularly low initial prereading skills first received 60 lessons focusing on segmenting, blending, and letter–sound correspondence. These lessons have been expanded and now comprise the Kindergarten level of *Early Interventions in Reading* (Allor & Mathes, 2012). The instruction took place over 105 weeks of daily instruction with highly trained teachers. The intervention group made signifi-

cant, but relatively small gains compared with the control group on reading measures of phonemic awareness, phonics, and oral reading fluency, but some students made no gains. For example, it took 105 weeks of instruction for students in the intervention group to meet the mastery criteria on an early literacy measure of phonemic awareness, *Dynamic Indicators of Basic Early Literacy Skills* (DIBELS Phoneme Segmentation Fluency; Good & Kaminski, 2002), a finding the authors called "sobering" (p. 458). *Early Interventions in Reading* appears to be a promising program for students with intellectual disabilities, even though it is primarily designed for typically developing beginning readers. However, like all direct-instruction programs, *Early Interventions in Reading* requires extensive training to implement.

Early Literacy Skills Builder (ELSB) (Browder, Gibbs, Ahlgrim-Delzell, Courtade, & Lee, 2007) is a program specifically designed for students with moderate to severe neurodevelopmental disabilities, including nonvocal students. It teaches all of the reading repertoires identified by the NRP using effective instructional techniques, including constant time delay, least-to-most prompting, a model–lead–test instructional approach, and organizing instruction from easy to difficult discrimination. The initial researchers, who randomly assigned participants, compared ELSB instruction with sight-word instruction in some students receiving the ERP intervention (Browder, Ahlgrim-Delzell, Courtade, Gibbs, & Flowers, 2008). The participants were 24 kindergarten through fourth-grade students in self-contained classrooms for students with significant developmental disabilities. ELSB students made much larger gains in phonics, phonological awareness, and some other early literacy skills. A subsequent study with 93 participants in Grades 3 to 5 with significant developmental disabilities more tightly controlled the fidelity of instruction for students in the control group (Browder, Ahlgrim-Delzell, Flowers, & Baker, 2012). All students in the control group received ERP instruction. Teachers received equal training in ELSB and ERP, and fidelity of implementation was monitored throughout the study. ELSB students outperformed ERP students on all three literacy measures—vocabulary, phonics, and phonemic awareness.

More recent applications of programmed instruction to early reading skills are rare. One exception is Headsprout, a programmed instructional reading program delivered over the Internet (Headsprout, 2017). This program teaches phonemic awareness, phonics, and other important reading skills. Important prerequisite skills are also addressed, including instruction on how to use a mouse. Headsprout is designed for children from 4–7 years of age and research has shown that it is effective for typically developing children (e.g., Huffstetter, King, Onwuegbuzie, Schneider, & Powell-Smith, 2010). Although the online description of the program and for whom it was designed does not mention children with special needs (Headsprout, 2017), Headsprout, with modifications, was used with four children diagnosed with autism (ASD; Grindle, Hughes, Saville, Huxley, & Hastings, 2013), with two of the four children having IQs and adaptive behavior scores that fell in the range of intellectual disability. The modifications included having a tutor sit next to the child and provide prompts when necessary, adding reinforcement contingencies for appropriate behavior (necessary for two participants who engaged in escape/avoidance behavior during the program or when asked to use the program), and remediating learning problems through discrete-trial teaching. The four children in this study completed all 80 lessons over a 14-week period. The reading measures in this study were administered four times, but it is essentially a pre–post design with four participants. The reading scores improved on most of the measures. Another study found that children with ASD engaged in high levels of interfering behavior when Headsprout was implemented without additional reinforcement contingencies (Plavnick et al., 2015). A subsequent study on the use of Headsprout with three children diagnosed with ASD added a token economy and additional instructional procedures when students did not make progress on a particular segment of the program (Plavnick, Thompson, Englert, Mariage, & Johnson, 2016). The remedial instructional procedures taught the prerequisites necessary to learn that segment of the program. Using a multiple probe design, the researchers found that the number of correct responses was very low at baseline (i.e., before the modifications) but increased substantially after the modifications. The only reading assess-

ment conducted was a measure of the percentage of correctly read words from the books that accompanied the program. The results for two of the students were reported and showed that they read the books accurately, with an average of over 90% of words read correctly. Unfortunately, none of these studies on Headsprout with children with disabilities used a strong experimental design in regard to reading behavior, with reading skills measured infrequently or pre–post only. Therefore, the effectiveness or expected outcome of the use of Headsprout with children with disabilities is still unknown. Although the research with Headsprout is promising, it appears that a number of modifications are necessary to help intellectually disabled children or those with ASD make progress in that program.

Conclusion

The ERP (Pro-Ed, 2011) is a systematic instructional sight-word reading program that is effective with even very difficult-to-teach learners. The prerequisite skills necessary to enter the program are few, and visual discrimination skills are taught to students who need them. The program also includes comprehension and vocabulary activities that are likely to be important for students with intellectual disabilities. The program is also easy to teach. Unfortunately, the ERP does not include instruction in phonics and phonemic awareness, which are important for students to be able to decode new words, and there is little evidence that students who complete the program incidentally acquire these skills. Despite these limitations, the ERP provides an excellent model of programmed instruction that could be extended to instruction in phonemic awareness and phonics. A programmed instruction format would have advantages in terms of treatment fidelity over the scripted direct instruction programs we reviewed and over Headsprout, which is programmed but requires modifications for use with learners with intellectual disabilities. We believe there is a need for a programmed instructional reading program designed for students with intellectual disabilities that teaches the important reading components identified by the NRP.

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