a quarterly publication for the education community from the
Association for Childhood Education International

Focus on
Inclusive Education vol. 7, no. 4

A Comparison of the Orthographic Knowledge of Low-Achieving Readers With Typically Developing Learners

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Aiden, a 5th-grader, is a struggling reader in an inclusion classroom. His ability to understand spoken language, as measured by standardized tests, is excellent, placing him in the upper 20% of children his age (11 years old). However, his word reading accuracy places him with the lowest 10% of children his age and his decoding knowledge, as measured by nonword reading, places him in the lowest 5%.

Teachers work with children like Aiden on a daily basis. They need evaluation tools that help them locate where their students are having difficulty, so that they can plan appropriate instruction. The current study compares the orthographic knowledge of low-achieving readers with typically developing learners using a word recognition assessment that identifies students' knowledge of features in the developmental phases of reading.

Purpose

Development of word recognition knowledge that supports reading English words is commonly described as following a series of overlapping phases or stages (Chall, 1996; Ehri, 1995; Frith, 1985). Simple relationships between print and sound are taught and learned before complex ones. Lessons connecting sounds and symbols are organized by variations of the phase model in supplemental instructional materials designed for all readers (Bear, Invernizzi, Templeton, & Johnston, 2008; Ganske, 2003). Employing assessments to monitor children's progress through developmental reading phases provides test-elicited evidence teachers can use to adjust their instruction to improve students' learning (Brookhart, Moss, & Long, 2008).

Using phase model-based instructional products in the classroom requires criterion-referenced assessments that establish students' mastery of spelling-sound correspondences in the phases. Norm-referenced standardized tests, such as the nonword decoding section of the WIAT-II (Wechsler, 1992), are used to locate decoding difficulties but do not provide teachers with knowledge about their students' understanding of language patterns. Popular criterion-referenced reading tests used for screening, such as the nonword fluency subtest of Dynamic Indicators of Basic Early Literacy Skills (DIBELS) (Good & Kaminski, 2002), also do not provide sufficient detail (Deeney, 2010), as they only include short vowel-consonant-vowel-consonant items. Information about patterns known and not known is needed to plan instruction for children with word recognition difficulties. Has a child mastered alphabetic phase features, such as short vowels, r-controlled vowels, and consonant clusters? Has a child mastered orthographic phase features that include the regular and irregular spellings of long vowels?

The current study measures students' understanding of features in the developmental phases of reading, using the *Assessment of Decoding and Encoding Progress Test* (ADEPT) (Sawyer, 1998/2001). The performance of two groups of children in grades K-5 is compared on the first two phases of the ADEPT lists. A sample of students enrolled in a public elementary school identified as typically progressing learners were tested and compared with a large sample of archival data from children who had been assessed at a university reading center.

Theoretical Framework

This study tested the first two phases of literacy development, labeled *alphabetic* and *orthographic* in Ehri's (1995) terminology and also called the *letter name* and *within word pattern* phases (Bear et al., 2008; Bloodgood & Pacifici, 2004). In the alphabetic phase, children learn print-sound relationships, which include short vowels, single consonant sounds, consonant digraphs (two letters that make one sound, such as the *sh* in ship and the *ch* in chair), and consonant blends (two letters standing for two sounds, such as the *bl* in blue and the *sm* in small). In the orthographic

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Focus on Inclusive Education

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Focus on Inclusive Education (ISSN 1548-9132) is published quarterly by the Association for Childhood Education International, 17904 Georgia Ave., Ste. 215, Olney, MD 20832.

Articles published in ACEI's Focus Quarterlies are peer-reviewed at the determination of the field editor. Articles published in *Focus on Inclusive Education* represent the views of the authors and do not necessarily reflect positions taken by the Association for Childhood Education International.

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phase, children learn long vowels spelled with a final *e* (as in time and cake), long vowels spelled with two letters (keep, Spain), and common suffixes, such as *ed* and *ing* (helped, running).

Sawyer and Bernstein (2008) conducted a study of archival data from 100 students in grades K through 10 whose assessment data indicated they had reading difficulties. Children's knowledge of letter-sound correspondences in reading and spelling was assessed and progress was monitored with ADEPT. Although most students were in grade 4 or higher, they had not yet mastered alphabetic phase items in reading and spelling. Only 24% of the learners mastered any orthographic features within three years of progress monitoring. The current study extends the archival sample of low-achieving students and compares their decoding knowledge with typically developing learners in grades K-5. This work will help establish when features included in the alphabetic and orthographic phases are mastered by typically developing learners.

Methodology

Participants. The study involved comparing the performance of typically developing readers with an archival sample of struggling readers who had received services in a university reading center. The control group consisted of 61 students enrolled at an elementary school in a medium socio-economic district, as measured by the average percentage of students receiving free and reduced-price lunch. The experimental group consisted of 210 low-achieving readers whose performance on standardized reading, spelling, decoding, and phonemic awareness tests fits the pattern specified by Pennington's (1991) algorithm for learning disorders. Children's grade in school ranged from 1-5 at the time of testing.

Materials. The *Assessment of Decoding and Encoding Progress Tests* (ADEPT; Sawyer, 1998/2001) were developed at a university-affiliated reading center for use with students experiencing severe decoding problems. ADEPT has been administered to over a thousand struggling readers. The current study used the first two out of six levels of the developmental phase reading subtests from ADEPT—the alphabetic and orthographic level lists—and adapted them for classroom use. The grouping of features in the phase lists corresponds to the order that reading features are commonly introduced in commercial classroom materials across grade levels.

The alphabetic list contains single-syllable, short vowel items (jet), as well as some consonant blends (snack). The orthographic list contains two-syllable items with short vowels (sudden), the regular plural (boxes), the present participle (running), and the final-e long vowel pattern (rose). Even though children typically master these features by grades 2 or 3, children in grades K-5 were tested to provide comparison data for struggling readers, who often have difficulty with these features through much higher grade levels.

Procedure. Assessment began with the alphabetic list. If children read 22 out of 25 words and 20 out of 25 pseudo-words correctly, they were tested with the orthographic list. Examiners read each word, used it in a sentence, and repeated the word. Pseudo-words were read twice and not used in sentences. The assessment criteria were specified in the ADEPT instructions.

Data Sources

Experimental group data were retrieved from the reading center assessment archives. Selection was restricted to participants enrolled in grades 1-5 at the time of testing and met the center's assessment criteria for children with learning disabilities. Children with co-morbid conditions (e.g., developmental language disorders and ADHD) were

excluded from the sample.

Control group data were collected in late spring at one elementary school. In order to get an unbiased view of development within each grade level, students were only excluded if they failed to return permission slips. That is, the sample included everyone in a typical classroom.

Results

The following analyses report the percentage of participants in each group that reached mastery of each list of 25 items, which is defined as accuracy of 90% or higher. The value specified for mastery in the ADEPT manual is similar to the Betts (1946) comprehension criterion of 90% accuracy or higher for independent level word recognition performance, which is also currently used in informal reading inventories (Bader & Pearce, 2009; Johns, 2008).

For alphabetic word reading, a Pearson chi-square test for independence was calculated to test the null hypothesis that the distribution of individuals reaching mastery was identical in the experimental and control groups. For the other tasks, insufficient numbers of children with learning disabilities met mastery to meet the minimum frequency of five observations per cell of the design to allow analysis with the chi-square test for independence.

Alphabetic Level Word Reading. The distribution of control group participants reaching mastery was significantly different than the distribution of experimental group participants reaching mastery, chi-square (4) = 15.40, $p < .01$. While all of the control group participants mastered this list by 3rd grade, only one-third of the children with learning disabilities mastered this list, and then not until 5th grade.

Alphabetic Level Pseudo-word Reading. Most control group participants, 80% of the children, mastered this list by 2nd grade, 95% mastered it by 4th grade, and 93% by 5th grade. Most children with a learning disability never mastered this list. That is, only 7% had mastered the list by 5th grade.

Orthographic Level Word Reading. Most control group participants (86% of the students) mastered this list by 2nd grade, with 100% mastery in grades 3 and 4, and 83% mastery in grade 5. Only one-third of the children with a learning disability ever mastered this list, and then not until 5th grade.

Orthographic Level Pseudo-word Reading. Just under one third of control group participants (29%) had mastered this list by 2nd grade; this number rose to 40% in grade 3, 38% in grade 4, and 67% in grade 5. Not a single child with a learning disability mastered this list by grade 5.

Educational Significance of the Study

Low-achieving readers with characteristics that fit the profile of having a reading disability, as well as typically developing learners, in elementary classrooms were assessed, with the first two developmental phase lists from ADEPT (Sawyer, 1998/2001) to document differences in the mastery of patterns within the phases and to determine if this type of classroom assessment is useful in identifying word recognition difficulties. The results of this study confirm differences between children assessed with a learning disability and typically developing students in the progression of letter-sound knowledge, as described by phase models (Ehri & McCormick, 1998). Although the control group is relatively small compared to the experimental group, the differences between groups were statistically significant.

Alphabetic phase relationships include short vowels, consonants, consonant digraphs, and consonant clusters. More than half of typically progressing children mastered these patterns by the end of kindergarten—capabilities that are unmatched by low-achieving readers identified with a learning disability through 5th grade. Orthographic phase relationships include long vowels with final e, vowel digraphs, and some suffixes. One-third of the typically developing children mastered these patterns by the end of 1st grade and almost all of the children mastered these by the end of 2nd grade. This performance was unmatched by children identified as learning disabled through 5th grade.

There are two implications of these findings for practice in inclusion classrooms. The first is a confirmation of reading difficulties. The low-achieving readers in this study who had been assessed at the reading center were identified as being learning disabled. PL 108-446 (2004) defines a learning disability as "a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in an imperfect ability to listen, think, speak, read, write, spell. . . ." Learning disabled children in inclusion classrooms commonly have a reading difficulty that includes severe problems in word recognition, based upon their pattern of performance on literacy assessments (Shaywitz, 2003; Snow, Burns, & Griffin, 1998). The reading scores of the low-achieving students on the ADEPT indicated relatively weak performance in word and nonword reading, compared to their spoken language comprehension and full-scale IQ.

The second implication of this study is instructional. The ADEPT assessment locates individual students' specific knowledge of sound-symbol relationships. Teachers can use the data from the assessment to drive instruction. Letter patterns their students have mastered can serve as entry points to identifying multi-syllable words. Materials can be created and instructional packages can be purchased by teachers to assist their students in learning sound-symbol relationships that were not mastered on the ADEPT. Meaningful progress monitoring is needed to point out whether the literacy program or approach chosen by the teacher is working or

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needs to be changed. In conclusion, this study indicates that data from the ADEPT is useful in identifying children's knowledge of letter-sound relationships and for planning instruction in an inclusion classroom, based on students' word recognition strengths and target areas for growth.

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