

THE SPELLING SKILLS OF STUDENTS WITH DYSLEXIA
IN A THIRD-GRADE CLASSROOM

by

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Submitted in partial fulfillment of the
requirements for Departmental Honors in
the Davies School of Communication Sciences and Disorders

Texas Christian University

Fort Worth, Texas

May 8, 2023

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Project Approved: May 8, 2023

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ABSTRACT

Purpose: Spelling is important for academic and vocational success (Putman, 2017). Spelling skills are particularly difficult for individuals with dyslexia (Dyslexia at a Glance, 2018). Although spelling is difficult for individuals with dyslexia, students are expected to meet state standards can be used as a further marker of academic success in spelling. The purpose of this study was to compare the spelling skills of third-grade students with dyslexia to the grade-level spelling expectations set by the state of Texas.

Method: Six participants were selected from a local, private elementary school, Starpoint Elementary. Five participants had dyslexia or specific learning disability, and one without dyslexia served as the control participant. Each participant in this study completed a spelling test. Their attempts at spelling were compared to the state standards for education in Texas. Each time a student's spelling was deemed to have met the given standard, they earned a point. Those points were averaged to determine whether the student had successfully mastered the standard.

Results: Students with and without dyslexia were found to have strong phonological skills. When presented with second and third-grade standards related to orthography and morphology, students struggled to meet the standards, including the control student.

Discussion: Although students with dyslexia are typically shown to struggle with the phonological aspect of spelling, the students in this study met the 1st through 3rd grade TEKS standards for phonological awareness. This could be attributed to the specialized instruction they are receiving at school. Fifty percent of the participants met second-grade TEKS standards relating to orthography in multisyllabic words. These results demonstrate that there is a need for these students to increase their knowledge of orthographic patterns in words with more than one syllable. Four of the six participants met 2nd grade TEKS for morphology. These results suggest that students with dyslexia learned to accurately apply rules and spelling inflected morphemes, such as past tense –ed and plural –s. However, the 3rd grade TEKS standards for morphology and orthography were the most difficult for the students with only one participant meeting the standard. These results suggest that students need additional instruction in spelling derivational affixes, such as –ion.

INTRODUCTION

Spelling is important for academic and vocational success (Putman, 2017). Kim and Schatschneider (2017) report that spelling is necessary for writing. They state that “lack of accuracy... in transcription skills” can interfere with “higher-order skills” such as planning in writing (Kim & Schatschneider, 2017). As students approach the third grade, they begin to use spelling to write more essays and send emails to their teachers. Spelling also is needed in many professional settings (Masterson & Apel, 2010). Job and college applications are used to make decisions regarding the future of young adults. In digital communication, spelling and grammatical errors are found unacceptable by adults in educational or professional contexts. Further, the ability to write without errors such as spelling protects a person’s reputation and productivity (Conti-Ramsden et al., 2011).

Spelling skills are particularly difficult for individuals with dyslexia (Dyslexia at a glance, 2018). Bourassa and Treiman (2003) state that dyslexic students make spelling errors due to below-average phonological skills. Students with dyslexia sometimes rely on the mental graphemic images of words; however, when given a novel word to spell, they often have difficulty spelling them (McArthur et al., 2018; Komesidou, 2018). It is unknown if students with dyslexia meet specific state-level expectations for spelling, which outline spelling skills that are meant to be achieved at each grade-level. Spelling skills of students with dyslexia are often analyzed holistically as words are marked correct or incorrect, but analyzing spelling this way does not provide information about the specific spelling patterns that students with dyslexia are using (Bourassa & Treiman, 2003). Instead, students’ spelling can be analyzed by applying the multiple linguistic aspects the individual uses to spell, which provides further insight into their specific language abilities (Masterson & Apel, 2010). Therefore, the purpose of this study was to compare the word-level spelling skills of third-grade students with dyslexia to the grade level expectations set by the state of Texas. The results of this study will help to compare grade-level expectations for spelling to the specific spelling patterns that students with dyslexia are and are not using, which in turn will inform instruction.

Spelling Analysis

Traditional spelling tests require students to memorize a list of words and recite them. Then, teachers mark productions as correct or incorrect (Putman, 2017). Spelling, however, can be more complex than a word being correct or incorrect. Spelling is used to communicate through the written form (Bourassa & Treiman, 2008). In successful spelling, one segments a spoken word into individual sounds, or phonemes. Then, the appropriate letter or letter group is chosen to represent each phoneme. In English, this method of spelling can be more difficult in some words than in others. Many English phonemes have more than one spelling associated. In cases such as these, spellers must choose the appropriate grapheme(s) based on characteristics, such as place in the word and neighboring letters (Bourassa & Treiman, 2008). This method of spelling may be easy for some words, such as *hop*, where each sound in the word only has one

corresponding grapheme. In other words, such as *sleigh*, it may be more difficult to spell than *hop* because –eigh represents one sound (i.e., /e/).

Although the spelling skills of students are often analyzed as correct or incorrect (Putman, 2017), Bourassa and Treiman (2003) have found that evaluating in this way can be short-sighted. Rather, a method of evaluation that recognizes phonological and orthographic components of spelling better represents the accomplishments and errors individuals make in spelling. This broader view requires an understanding of the components of spelling. Phonology is the rules of a language's sound system. Phonological knowledge/awareness refers to the knowledge of sounds and sound patterns (Komesidou, 2018).

Orthography is the rules for writing within a specific language. Orthographic knowledge/awareness refers to the knowledge of letters and letter patterns (Komesidou, 2018). Once a student has learned the phonemes in a language, they begin to assign these to graphemes. Eventually, they will use these graphemes to spell. Specific graphemes can make combinations, but others cannot work together (McArthur et al., 2018). For example, *ck* can exist at the end of words in the English language, but this combination cannot exist at the beginning of English words. Orthographic and phonological knowledge must both be used for successful spelling to occur.

According to Masterson and Apel, morphological awareness is the “knowledge of the spelling of specific affixes and the alterations that occur to base words when those affixes are attached.” An individual's morphological awareness abilities may also be seen when they spell derived words. Their knowledge of a base word's spelling may be used to guide their spelling of a related derivative (Masterson & Apel, 2010).

Mental graphemic representations (MGRs) are mental images of words that are stored in our lexicon (Barber, 2013). Mental representations can be a complete image of a written word with all graphemes correctly placed, or they can be less complete, leading to misspellings of words that appear accurate (e.g., *tommorow* for *tomorrow*) (Wolter & Apel, 2010). MGRs allow individuals to fluently spell words while they think about other aspects of writing. As students learn to spell, MGRs are formed. MGRs work together with orthographic and phonological knowledge to develop spelling skills (Barber, 2013).

Spelling skills of individuals with dyslexia

According to the International Dyslexia Association (IDA) dyslexia is “a specific learning disability... characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities” (Definition of Dyslexia, 2018). Bourassa and Treiman (2008) elaborated upon this definition stating that dyslexia can cause “difficulty learning to read and write despite normal intelligence, adequate learning opportunities, and no serious emotional or personality disorders.” Dyslexia affects approximately 20% of people worldwide (The Yale Center for Dyslexia & Creativity, 2017). Texas state law (TEC §38.003) mandates that each student in the public-school

system must be screened for dyslexia at the end of kindergarten and again during the first grade prior to January 31 of each year (Texas Education Agency, 2022).

Dyslexia affects the ease with which individuals learn written language (Bahr et al., 2019). Students with dyslexia have poorer spelling skills compared to students without dyslexia. The International Dyslexia Association (IDA) claims that these spelling problems are due to “language learning weaknesses” (Spelling, 2017). More in-depth research showed that the mistakes students with dyslexia make are due to poor phonological skills. Students with dyslexia attempt to compensate for this by leaning on their orthographic skills (Bourassa & Treiman, 2003; Komesidou, 2018). For example, students with dyslexia are more likely to spell a word incorrectly by adding final *e* to a short vowel word than their peers without dyslexia. In addition, the students with dyslexia were more likely to use a single consonant when a double is required than those without. Both of these errors were attributed to a “lack of understanding of how English marks the difference between short and long vowels” (Bourassa & Treiman, 2003). Dyslexic students were found to first use a grapheme-phoneme correspondence strategy (sounding the word out) when unsure of how to spell a given word. Then, they applied known orthographic patterns in an attempt to spell a word correctly (Bahr et al., 2019).

Students with dyslexia are not always prepared for the same success as those without dyslexia. Students with dyslexia are at a higher risk of low academic achievement and school dropout. Students with dyslexia also have higher overall unemployment rates (Komesidou, 2018). The Texas Education Agency (TEA) states that a dyslexia diagnosis may lead to difficulties in the following: phonological awareness and manipulation, reading fluency, single-word reading, spelling, reading comprehension, written expression. (Texas Education Agency, 2021). Due to this challenge that many students face, educators are provided with informational materials on dyslexia and how to address students with the disorder via *The Dyslexia Handbook*.

The Dyslexia Handbook includes specifications on common spelling characteristics associated with dyslexia. It states that people diagnosed with dyslexia often have difficulty blending, segmenting, and manipulating sounds within words. This is known as phonological awareness. Further, dyslexic individuals may struggle with holding information about words and sounds within their memory, which is known as phonological memory. Learning names and sounds of specific letters may also be a struggle for dyslexic individuals, and many of them struggle to rapidly recall letters as well as colors and familiar objects. *The Dyslexia Handbook* also discusses components of effective dyslexia instruction for teachers to review (Texas Education Agency, 2021). Educators in private schools, however, are not required to follow *The Dyslexia Handbook* and may utilize other teaching methods.

The Texas Essential Knowledge and Skills

Educational state standards are important as they clearly set milestones for students to reach during a school year. Learning expectations in Texas are set by the Texas Education Agency (TEA). The TEA has published the *Texas Essential Knowledge and Skills* (TEKS). This document lays out what should be accomplished by students within each grade level (Texas Education Agency, 2023). Private school educators in Texas are not required to follow the TEKS curriculum. The TEKS standards, however, still may serve as general milestones to measure private school success. If a student is unable to accomplish many of the expectations within one grade level, they may struggle to succeed in the next.

The Texas Essential Knowledge and Skills has established 1st, 2nd, and 3rd grade standards relating to phonology, orthography, and morphology. These skills build in difficulty as students progress in school. These TEKS are listed in Table 1. While these expectations have been set for first through third-graders in the state of Texas, students with dyslexia may struggle to be successful in meeting these goals.

Table 1

TEKS Standards

Grade	Type of TEKS	TEKS
1	Phonological Awareness	(The student is expected to:) (A) Demonstrate phonological awareness by: (vii) segmenting spoken one-syllable words of three to five phonemes into individual phonemes, including words with initial and/or final consonant blends.
2	Phonological Awareness	(The student is expected to:) (A) Demonstrate phonological awareness by: (ii) distinguishing between long and short vowel sounds in one-syllable and multi-syllable words...
3	Phonological Awareness	(The student is expected to:) (A) Use knowledge of letter sounds, word parts, word segmentation, and syllabication to spell...
1	Orthographic Knowledge	(The student is expected to:) (C) Demonstrate and apply spelling knowledge by: (i) Spelling words with closed syllables, open syllables, VCe syllables, vowel teams, and r-controlled syllables...
1	Orthographic Knowledge	(The student is expected to:) (C) Demonstrate and apply spelling knowledge by:

		(ii) Spelling words with initial and final consonant blends, digraphs, and trigraphs...
2	Orthographic Knowledge	(The student is expected to:) (C) demonstrate and apply spelling knowledge by: (i) Spelling one-syllable and multisyllabic words with closed syllables; open syllables; VCe syllables; vowel teams, including digraphs and diphthongs; r-controlled syllables; and final stable syllables...
2	Orthographic Knowledge	(The student is expected to:) (C) demonstrate and apply spelling knowledge by: (iv) spelling multisyllabic words with multiple sound-spelling patterns...
2	Morphological Knowledge	(The student is expected to:) (C) demonstrate and apply spelling knowledge by: (vi) spelling words with prefixes including un-, re-, and dis-, and inflectional endings, including -s, -es, -ed, -ing, -er, and -est....
3	Orthographic and Morphological Knowledge	(The student is expected to:) (B) demonstrate and apply spelling knowledge by: (i) spelling words with more consonant doubling when adding and ending; (ii) dropping final "e" when endings are added (e.g., -ing, -ed); (iii) changing y to i before adding an ending; (iv) double consonants in middle of words; (v) complex consonants (e.g. scr-, -dge, -tch); (vi) and abstract vowels (e.g., ou as in could, touch, through, brought).

Purpose

Students with dyslexia are expected to meet grade-level and age-level expectations spelling expectations. Students with dyslexia often have difficulty spelling due to their disorder despite having the same educational opportunities as their peers (Bourassa & Treiman, 2008). Though dyslexia affects the spelling abilities of students, many still progress in school with their age-based peers. The purpose of this study was to compare the spelling skills of third-grade students with dyslexia to the age-level spelling expectations set by the

state of Texas. The results of this study will help to identify spelling patterns that students with dyslexia are not using, which in turn will inform their instruction and provide insight on how they are spelling in comparison to their age-level peers.

With all of this in mind, the following research question was developed for this study: do students with dyslexia who attend a private school achieve grade-level spelling expectations set by the state of Texas?

METHODS

Participants

The IRB at Texas Christian University has approved this study. Starpoint Elementary School is a private school in Fort Worth, Texas. Families must apply for their students to be admitted. All admitted students must have an IQ above 90, be diagnosed with a learning disability, and have finished Kindergarten at another institution. Starpoint has an average of 10 students per teacher, allowing for small class sizes (Admission & Aid, 2022).

Starpoint Elementary provides an “individualized curriculum for children with learning differences.” Starpoint uses “spiraling curricula within reading, English, and language arts” with the goal of students seeing a variety of uses for language. Starpoint also uses a “phonics-based approach” to help students in their language and spelling development (Curriculum & Learning, 2021). Harden and Stamper (1999) define a spiral curriculum as a curriculum “in which there is an iterative revisiting of topics, subjects or themes throughout the course.” Spiral curriculums do not merely repeat the same topic. Rather they deepen the understanding of a concept with each teaching, building on the previous encounter. Starpoint moves students through “levels” based on their rather than traditional grades. This ensures that students are grouped based on their academic progress, not just their age (Admission & Aid, 2022).

Five third-level students were chosen from Starpoint Elementary School for participation in this study. All participants use English as their primary language. Each student was administered a battery of spelling, reading, and language assessments as well as a non-verbal IQ test. Based on the results of these tests, participants 108, 111, 112, 113, and 114 have characteristics representative of dyslexia. Participant 118, while meeting the qualifications to be a student at Starpoint, does not show these characteristics based on test results.

Assessments

We administered a battery of assessments to the participants. The assessments were administered over the course of two hours in one or two testing sessions. All participants were given tests in a random order to limit bias. All administrators were trained as members of the

STAIR research lab at Texas Christian University. Administrators were required to complete CITI: Human Subjects Research Certification and train under other researchers until mastery. Reading and language were tested to determine if participants had characteristics typical of dyslexia. Further, a spelling test was used to gather data relating to the spelling abilities and strategies the students use.

Participants in this study were administered the Sight Word and Decoding subtests of the Test of Word Reading Efficiency-2 (TOWRE-2). The Sight Word subtest evaluates a participant's ability to read short words correctly and quickly. The Decoding subtest uses short "nonwords." These nonwords have similar patterns to words in the English language. Participants are awarded points based on their ability to correctly decode and pronounce a word under a time limit. The TOWRE-2 has a high degree of reliability across four different types of reliability: alternate forms (immediate), same forms (delayed), alternate forms (delayed), and scorer (Torgesen et al., 2012).

Four core subtests from the Clinical Evaluation of Language Fundamentals 5th Edition (CELF-5) were administered: Word Classes, Formulated Sentences, Recalling Sentences, and Semantic Relationships. The average reliability coefficient for each subtest is .90, .86, .94, and .89, respectively. The Core Language Score measures a participant's overall language ability in a quantity that can be compared to other participants (Semel et al., 2013).

The Phoneme Isolation subtest from the Comprehensive Test of Phonological Processing 2 (CTOPP-2) was used to assess the phonological awareness abilities of each participant. It evaluates a participant's ability to blend phonemes together as well as separate and identify phonemes within a word. This subtest has a reliability coefficient that exceeds .80 (Wagner et al., 2013).

The Kaufman Brief Intelligence Test 2nd Edition (KBIT-2) was administered to measure the nonverbal intelligence of participants. This standardized assessment has a reliability coefficient between .85 and .90, making it highly reliable (Kaufman & Kaufman, 2004).

The Gates-MacGinitie Reading Tests Fourth Edition (GMRT) was administered to evaluate the reading comprehension of the participants. It is a highly reliable test that can be used to identify students that may have dyslexia or another learning disability (MacGinitie et al., 2018).

All scoring took place in the Miller Speech and Hearing Clinic at Texas Christian University by those trained to administer the tests. To eliminate bias, administrators did not score the tests they facilitated. All assessments were scored twice to ensure accuracy. Results from these tests can be seen in Table 2.

Table 2*Participant Assessment Scores*

	108	111	112	113	114	118 (Control)
TOWRE-2 (Sight Word) Standard Score	94	81	98	109	79	97
TOWRE-2 (Decoding) Standard Score	73	76	55	67	55	92
KBIT-2 (non-verbal IQ) Standard Score	93	N/A	120	109	103	97
GMRT (Reading Comprehension) Standard Score	66	25	66	77	48	57
CTOPP (phoneme isolation) Standard Score	3	4	12	10	10	10
CELF Core Language Score	105	80	93	105	100	102

Participant 108 is a white male. He had a chronological age of 9 years and 7 months (9:7) at the time of testing. The student has a dyslexia diagnosis and a secondary attention-deficit/hyperactivity disorder (ADHD) diagnosis. Participant 108 had below average word-level decoding skills and phonological awareness skills.

Participant 111, a white female, had a chronological age of 9:4 at the time of testing. She has a primary dyslexia diagnosis and a secondary ADHD diagnosis. Participant 111 had below-average word-level identification and decoding scores. She also had below-average reading comprehension abilities.

Participant 112, a white female, had below-average word decoding and reading comprehension scores. She had a chronological age of 10:11 at the time of testing. Participant 112 has a primary diagnosis of specific learning disability (SLD). While this is not a dyslexia diagnosis, dyslexia is categorized under the umbrella of Specific Learning Disability, so this participant was included in the study (Individuals with Disabilities Education Act, 2004). She had a below average word decoding score.

Participant 113 is a white female with a chronological age of 10:8 during testing. She had below-average word decoding skills. Participant 113 has a primary diagnosis of dyslexia and a secondary diagnosis of ADHD.

Participant 114, a white male, has a primary diagnosis of dyslexia. He has two secondary diagnoses: ADHD and expressive language disorder with an articulation

impairment. He had a chronological age of 10:5. Participant 114 had below-average word-level identification and decoding skills.

Participant 118 served as the control in this study as she did not have a dyslexia diagnosis. She did, however, have an ADHD diagnosis. Participant 118 is a white female with a chronological age of 11:8. Participant 118 had an average word decoding score, as highlighted in the chart above.

Spelling

Spelling requires that individuals utilize multiple facets of linguistic knowledge. It requires both phonemic awareness and orthographic awareness. Many traditional spelling tests utilize correct/incorrect scoring to determine an individual's spelling ability. This method, however, lacks the ability to capture changes in an individual's use of varying linguistic knowledge resources. A multilinguistic analysis can be used to find specific difficulties a student has with spelling such as problems using phonemic awareness, orthographic knowledge, and morphologic knowledge (Masterson & Apel, 2010).

Spelling accuracy can be measured by the Spelling Sensitivity Score (SSS). This measure of examination not only measures if a spelling attempt is correct, but it gives a score based on multiple aspects of linguistic knowledge (Masterson & Apel, 2010). The SSS accounts for not only morphological errors but also phonological and orthographic mistakes made. For example, a student that uses an "f" instead of a "ph" to spell the word "graph" will receive a higher score than a student who spells the "f" with the letter "p". This is because "f" and "ph" can make the same sound, even though they are used differently within the English language (Werfel & Krimm, 2015).

When using SSS, target words are segmented into individual elements: phonemes, affixes, and juncture (i.e., change in spelling when an affix is added to a word) changes. Once words have been divided into elements, the writer's spelling of each element is compared to the target elements and given a score on a scale from 0 to 3, three meaning that the element is spelled correctly. If an element has an incorrect spelling but that spelling plausible or "legal," it receives a score of 2. One point is awarded for an incorrect spelling without a plausible/legal spelling. No points are given when an element is omitted from the spelling (Masterson & Apel, 2010).

For this study, the spelling attempts made for each word were entered into the SSS system. The participants' spellings were compared to the target spelling. This allowed for each word to be scored individually so that their spelling abilities could be quantified. The *SSS-Words* (SSS-W) score was reported. The SSS-W is determined by dividing the number of word points in the sample by the possible word points. These scores show the sources of linguistic knowledge a student uses in their spelling (Masterson & Apel, 2010).

Data Analysis

A spreadsheet was created for each participant to compare the students' spelling to the TEKS standards. The spreadsheet included the target word, the students' spelling of the words, the SSS-W score, and the TEKS standards that were listed in the table above. The first author and research mentor coded each spelling word as met the TEKS standard (1) or did not meet the TEKS standard (0). The students correct spelling of each element of the word (e.g., affix or vowel) was given credit. For example, if a student spelled *shipping* as *shiping*, the student was given credit for –ing and the base word but was not given credit for the TEKS standard that was specific to rules associated with adding an affix. The SSS-W was used to identify words that had a plausible spelling (i.e., score of 2) and implausible spelling (i.e., score of 1).

A sum score was computed for each TEKS standard. The sum score was divided by the total number of words to obtain an average score for each TEKS standard. If a student had an average of 70% or above for a TEKS standard, they were considered to have achieved the standard. The 70% marker was set because this is what is required to earn a “C,” a passing grade at most institutions. If a student fell below 70% accuracy for any given standard, they were found to have not met the standard.

Inter-rater Reliability

The first author and the thesis mentor coded the data independently. Their codes were then compared, and any discrepancies between the codes were discussed. Therefore, the coders reached consensus on 100% of the data.

RESULTS

In Table 3, Table 4, and Table 5, the averages for each participant are matched with each TEKS standard. An average is highlighted if the 70% was not achieved.

Table 3

Phonological Awareness Standards

	1st Grade TEKS Phonological Awareness	2nd Grade TEKS Phonological Awareness	3rd Grade TEKS Phonological Awareness
	Demonstrate phonological awareness by segmenting spoken one-syllable words of three to five phonemes into individual phonemes, including	Demonstrate phonological awareness by distinguishing between long and short vowel sounds in one-syllable and multi-syllable words.	Use knowledge of letter sounds, word parts, word segmentation, and syllabication to spell.

	words with initial and/or final consonant blends.		
108	28/28 (100%)	39/41 (95%)	39/41 (95%)
111	28/28 (100%)	36/41 (88%)	36/41 (88%)
112	28/28 (100%)	41/41 (100%)	41/41 (100%)
113	28/28 (100%)	40/41 (98%)	39/41 (95%)
114	27/28 (96%)	38/41 (93%)	39/41 (95%)
118 (Control)	28/28 (100%)	39/41 (95%)	39/41 (95%)

Table 4

Orthographic Knowledge Standards

	1st Grade TEKS Orthographic Knowledge Spelling words with closed syllables, open syllables, VCe syllables, vowel teams [including vowel digraphs and diphthongs], and r-controlled syllables.	1st Grade TEKS Orthographic Knowledge Spelling words with initial and final consonant blends, digraphs, and trigraphs	2nd Grade TEKS Orthographic Knowledge Spelling one-syllable and multisyllabic words with closed syllables; open syllables; VCe syllables; vowel teams, including digraphs and diphthongs; r-controlled syllables; and final stable syllables (-le).	2nd Grade TEKS Orthographic Knowledge Spelling multisyllabic words with multiple sound-spelling patterns.
108	38/41 (93%)	29/30 (97%)	39/41 (95%)	10/13 (76%)
111	32/41 (78%)	28/30 (93%)	31/41 (76%)	2/13 (15%)
112	36/41 (88%)	29/30 (97%)	36/41 (88%)	8/13 (62%)
113	40/41 (98%)	30/30 (100%)	40/41 (98%)	6/13 (46%)
114	25/41 (61%)	29/30 (97%)	25/41 (61%)	3/13 (23%)
118 (Control)	37/41 (90%)	29/30 (97%)	37/41 (90%)	6/13 (46%)

Table 5

Morphological and Orthographic Knowledge Standards

	2nd Grade TEKS Morphological Knowledge Spelling words with prefixes, including un-, re-, and dis-, and inflectional endings, including -s, -es,-ed, -ing, -er, and -est.	3rd Grade TEKS Orthographic and Morphological Knowledge Spelling words with more consonant doubling when adding and ending; dropping final “e” when endings are added (e.g., -ing, -ed); changing y to i before adding an ending; double consonants in middle of words; complex consonants (e.g. scr-, -dge, -tch); and abstract vowels (e.g., ou as in could, touch, through, brought).
108	13/14 (93%)	14/15 (93%)
111	4/14 (29%)	2/15 (13%)
112	11/14 (79%)	10/15 (67%)
113	13/14 (93%)	9/15 (60%)
114	7/14 (50%)	4/15 (27%)
118 (Control)	10/14 (71%)	9/15 (60%)

DISCUSSION

The purpose of this study was to compare the spelling skills of third grade students with dyslexia to the grade-level spelling expectations set by the state of Texas. Based on the data, assumptions can be made about the participants’ phonology, orthography, and morphology knowledge as it relates to spelling skills.

Although Bourassa & Treiman (2003) state that students with dyslexia are typically shown to struggle with the phonological aspect of spelling, the participants in this study met the phonological awareness TEKS with their spelling attempts. While the success of the students in morphology is not something found in prior studies, this could be attributed to the specialized instruction they are receiving at school.

The majority of the students succeeded in meeting the 1st grade TEKS relating to orthography. However, the students demonstrated less knowledge related to achieve the 2nd grade TEKS. Specifically, the 2nd grade TEKS standard required students to spell multi-syllabic words, which the participants had difficulty doing. For example, Participant 113 spelled “lazily” as “lazeily.” While this word is misspelled, this spelling still has merit. The spelling attempt met the 1st grade orthographic knowledge standards as the student correctly represented the syllables, vowel teams, and consonant blends. This spelling met one 2nd grade standard as it correctly closed off syllables and there are no vowel teams. The second standard states that students must spell “multisyllabic words with multiple sound-spelling patterns. Participant 113 does not meet this standard in her attempt as she does not successfully spell

the word and put together the syllables. These results suggest that students need instruction to support their orthographic knowledge to spell words with more than one syllable.

Only two of the participants struggled with 2nd grade morphology, participants 111 and 114. These participants misspelled words such as “noises,” “traced,” and “omission.” These mistakes primarily resulted from the inability to put together morphemes correctly. These mistakes often correlated with the 2nd grade orthographic standard regarding spelling multisyllabic words. The 3rd grade morphology and orthography TEKS was most difficult for the students with only one participant meeting the standard. This means that the students were having difficulty knowing the correct letter patterns to use for a word. Further, the students struggled to add affixes such as –ing as they did not understand the rules associated, such as dropping the “e” at the end of a word.

While this study showed that the students with dyslexia struggled with their morphological and orthographic skills in their spelling attempts, the participant without dyslexia (i.e., 118), had difficulty with the same skills. It is possible that instruction related to orthography in multisyllabic words and affixes in multimorphemic words may not be emphasized in the curriculum. Spelling instruction can be changed to include more orthographic and morphological emphasis. For example, teachers may put more time into working on morphemes that can be connected. A teacher may teach several verbs and then practice adding –ing to them to expose students to multisyllabic words. Further, a teacher may present a single word such as “success” and ask students other words that have success in it, showing them that one word can make others such as “unsuccessful” or “successfully.”

Limitations

This study was completed on a very small scale. All of the participants come from the same school, Starpoint Elementary, which specializes in the education of individuals with learning disabilities. This school also provides small class sizes, allowing for more interactions between teachers and students than the average Texas public school. With this in mind, this study cannot be generalized to the larger state of Texas, where students are not getting this type of education. For generalization to occur, a larger sample size taken from a variety of schools is necessary. Generalization also cannot occur as there is only one control participant. There could be outside factors affecting the student’s performance, and the data of one student cannot be generalized to an entire control population. All of the participants were given the assessments on one day in the second semester of class.

All of the students in this study are white. It is unknown whether their racial backgrounds could have impacted this study, but a representative slate of racial backgrounds is necessary to generalize this study to the state of Texas. This also cannot be generalized due to the curriculum of the private school. Starpoint Elementary uses a “spiraling” curriculum as previously discussed, but that may not be seen in the public school system. Further, a more specific curriculum was not provided, so this study could not compare the Starpoint

curriculum to that at public schools. Some of the topics in the It is also important to note that all but one of the participants had an ADHD diagnosis. This could have impacted their scores on tests as many were given at a time, and maintained focus was necessary. If a student was unable to focus, they may not have completed the tests to the best of their ability. It is unknown whether, and if so, how much ADHD may have affected the results of this study. All of the participants were given the assessments on one day, and it is unknown how this could have affected the results of their testing. Any student could have an off day due to outside circumstances, and these can be amplified by ADHD. Finally, the TEKS are not followed exactly in the private school setting. While they were used in this study as markers for age-based success, it cannot be guaranteed that the participants had learned everything listed in the TEKS.

Conclusion

Teachers can use the results of this study and this way of analysis to evaluate the spelling abilities of their students with and without learning disabilities. In the future, the analysis created for this study can be used on a larger scale to find differences that can be generalized to the state of Texas, which in turn will further educate teachers and the TEA.

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