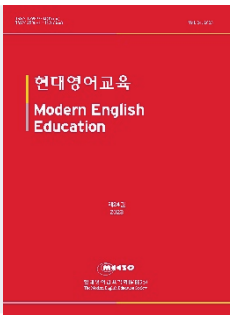
Modern English Education, Vol. 24, (2023) pp. 305-316
doi: https://doi.org/10.18095/meeso.2023.24.1.305



Modern English Education

ISSN: 1598-0782 / e-ISSN: 2586-6141
http://journal.meeso.or.kr

Exploring the English Spelling Characteristics and Error Patterns of a Korean Middle School Student at Risk for Dyslexia: A Longitudinal Case Study

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Received: 11 November 2023
Revised: 25 November 2023
Accepted: 29 November 2023

Kim, Eun Joo. (2023). Exploring the English spelling characteristics and error patterns of a Korean middle school student at risk for dyslexia: A longitudinal case study. *Modern English Education*, *24*, 305-316.

Keywords
Dyslexia, dyslexic students, English spellings, dyslexic English language learners
난독증, 난독학생, 영어 철자, 난독 영어 학습자

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*This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2022S1A5B5A17047061).

Abstract

Previous research reported that 5% of elementary students in Korea face developmental dyslexia challenges. However, due to emphasis on oral communication in English education, students struggling with English reading may be mistakenly perceived as lacking motivation or being influenced by environmental factors. Accordingly, this study investigates the English spelling proficiency of a Korean student at risk of developmental dyslexia over two years, spanning from 6th grade in elementary school to 1st grade in middle school. The analysis, based on the student's school-related writing materials and private school assignments, revealed consistent patterns of errors over the two years. In the sixth-grade year, 2,509 words were examined, with 60 (2.39%) misspelled words. In the first-grade middle school year, 15,592 words were assessed, with 313 (2.01%) misspelled words. Persistent errors included vowel deletion, consonant deletion, vowel substitution, vowel insertion, consonant insertion, homonym errors, and letter reversals (e.g., b/d and p/d), albeit with variations in order. These findings highlight a need for targeted interventions in teaching English spelling to Korean students at risk of dyslexia or reading difficulties. The study emphasizes the importance of recognizing error patterns and tailoring instructional approaches to address the challenges faced by these students.

INTRODUCTION

Currently, Korea is displaying a high level of interest in basic education at the national level. In 2015, the “Elementary and Secondary Education Act Amendment (Slow Learner Support Act)” was proposed, and in 2017, the “Basic Education Guarantee Act” was introduced to ensure an equal start for all students completing the regular curriculum in schools (Lee & Lee, 2019). Additionally, 17 city and provincial education offices across the country have established special education support centers for students with learning disabilities. Eight education offices and nine cities and provinces have enacted “dyslexic student support ordinances” to provide comprehensive assistance to children facing difficulties in learning Korean (Lee & Lee, 2019).

Despite possessing normal intelligence, dyslexia, a learning disorder characterized by difficulties in the phonological

processing area of the brain (Shaywitz, 2003), affects about 10% of US population (American Psychiatric Association, 2013), and about 5.1% of elementary school students in Seoul (Educational Broadcasting System [EBS], 2014) and approximately 5% of elementary school students in Jeju in 2018 (Yoo et al., 2018). Dyslexia is categorized into developmental dyslexia and acquired dyslexia. Acquired dyslexia results from factors like stroke or brain injury (Lee & Kim, 2020), while developmental dyslexia is linked to inherent structural abnormalities or density in the brain's "brain volume or perisylvian area" (Kim et al., 2009, p. 273).

However, diagnosing students with developmental dyslexia in English education can be challenging if they do not exhibit significant difficulties in learning the Korean language. Scholars suggest that when students struggle with reading in their first language (L1), these difficulties often extend to second language learning (L2) (Kim, 2009) because phonological skills, the key predictor of reading development, are strongly correlated between L1 and L2 (Wang et al., 2006) and sub. The difficulty of Although the English education curriculum in Korea, as emphasized by Lee et al. (2001), focuses on listening and speaking skills during the initial four years spanning from the third grade of elementary school to the sixth grade, issues in English reading and writing may not become apparent until the first year of middle school. This delay in identification can lead to the emergence of what is known as "English abandoners," referring to students who give up on learning English.

Currently, there is still no established set of criteria for accurately diagnosing dyslexia. Furthermore, speech-language pathologists have limited exposure to individuals with dyslexia, leading to a lack of widespread understanding regarding diagnosis and procedures for dyslexia (Lee & Kim, 2020). This situation is even more uncommon within the context of English education. Despite this phenomenon, the prevailing belief among experts is that struggling English students in Korea often exhibit low motivation for learning, inadequate study habits, or unfavorable learning environments (Kim & Park, 2020). Meanwhile, the possibility of developmental dyslexia is frequently overlooked, complicating the diagnosis of such cases. However, prior research suggests that analyzing English spelling can provide insights into diagnosing struggling readers (Carlisle, 1987; Invernizzi & Worthy, 1989; Kałdonek-Crnjaković, 2015; Wydell & Butterworth, 1999). Therefore, the present study aims to examine the spelling characteristics and patterns of dyslexia in a student at risk for developmental dyslexia over a two-year period, addressing the underreported issue of English learning difficulties among at-risk students in the current landscape of English education in Korea.

LITERATURE REVIEW

Dyslexic Students' Phonological Awareness and Spellings

To engage in reading and writing, various language skills are essential, including phonological awareness (Adams, 1990; Goswami & Bryant, 1990; National Reading Panel, 2000; Snow, Burns, & Griffins, 1998), morphological awareness (Carlisle, 1988, 2000), and syntactic awareness (Layton et al., 1998), among others. Phonological awareness, recognized as a predictor of later reading development (Adams, 1990; Goswami & Bryant, 1990; Stanovich, 1986), holds a crucial role as it forecasts students'‘ word reading (Ziegler & Goswami, 2005), vocabulary knowledge, and reading comprehension (Bae & Joshi, 2017, 2018), transcending cultural differences (McBride-Chang & Kail, 2002) and extending to an English as a foreign language (EFL) environment (Kang, 2009; Zhang & Lee, 2017). Previous studies highlight that individuals with dyslexia encounter significant challenges due to brain differences compared to the general population (Liberman et al., 1989; Liberman & Shankweiler, 1985; Rack et al., 1992). They experience difficulties in phonological awareness and processing tasks (Vellutino & Scanlon, 1987), impacting not only reading but also spelling, which involves translating speech sounds into written form (Goswami & Bryant, 1990).

Scholars have also examined dyslexic students' spelling errors across various learning contexts. Moats (1983) identified typical spelling errors associated with dyslexia, including (a) issues in sound-letter analysis, (b) confusion with letter order, and (c) challenges in recalling sight words or specific letter sequences in words. Moats (1996) analyzed spontaneous writing samples from 19 English-speaking dyslexic adults, noting a higher frequency of inaccuracies in individuals with weak spelling skills, particularly when attempting to depict liquid and nasal consonants after vowels. In EFL, Kałdonek-Crnjaković (2015) researched dyslexic students from Croatia, utilizing a transparent character system. The study highlighted spelling difficulties, such as removing final silent 'e' (e.g., "fine," "orange") (p. 111) and omitting the intermediate consonant 'r' (e.g., "afternoon," "morning") (p. 111), along with challenges related to consonant clusters. Similarly, He and Wang (2009) investigated two kindergarteners and two first graders' spellings, native speakers of Taiwan Mandarin learning English as a foreign language. The analysis revealed that their spellings, influenced by both letter names and sounds, suggested systematic principles, akin to native English-speaking children, rather than random errors.

Hypothesis of Granularity and Transparency

Wydell and Butterworth (1999) directed their study towards a dyslexic and bilingual student, specifically a 16-year-old proficient in both English and Japanese. Intriguingly, the student's literacy skills in Japanese surpassed those of a Japanese college student, yet challenges arose in tasks related to reading, writing, and processing phonetic information in English. From their observations, Wydell and Butterworth (1999) introduced the *hypothesis of granularity and transparency* concerning dyslexia. This hypothesis suggests that identifying dyslexia might be challenging when an individual perceives spelling units coarsely or processes letters or words as wholes. Additionally, the level of agreement between consonants and vowels, termed transparency, could impact the manifestation of dyslexia. Higher transparency, characterized by a more consistent relationship between letters and sounds, might alleviate the impact of dyslexia.

In this context, the findings suggest that the dyslexic challenges faced by the bilingual student may be influenced by the linguistic structures of the languages they are learning. This involves the phonetic and visual characteristics of letters, words, and their corresponding sounds. As a result, individuals learning English, acknowledged as an opaque language, while having Korean as their first language, known for its relatively transparent nature, may encounter unique challenges. The language distance between Korean and English, the students' bilingualism, and/or developmental dyslexia could all interact and manifest issues worthy of exploration.

The Gap Between Korean and English Writing Systems

As exemplified in the case of Wydell and Butterworth (1999), identifying students with developmental dyslexia or those at risk in English classrooms can be challenging due to the distinctive writing systems of the Korean and English languages. Korean employs a transparent system where sounds and spellings closely correspond, and characters are written as they sound. For instance, combining the consonant 'ㄱ' and the vowel 'ㅏ' forms the sound '가', spelled consistently as '가' without exceptions. On the other hand, English follows an opaque system, meaning that sounds and spellings do not always have a one-to-one correspondence. For example, the letter 'c' can produce sounds like /s/ and /k/, leading to different pronunciations in words such as 'pencil' (pronounced with /s/) and 'cup' (pronounced with /k/). There is also a broad range of possible spellings for a single sound; the /f/ sound, for instance, can be spelled differently in words like 'frog,' 'phone,' 'stuff,' 'cough,' and 'calf,' despite all being pronounced as /f/. Moreover, numerous exceptions like 'the' and 'was' do not adhere to standard spelling rules, presenting challenges for learners of English as a second language (Youman, 2012).

Korean English Curriculum and Struggling, At-Risk, and Developmental Dyslexic Students

Research on Korean students struggling with poor reading skills in English education has consistently been conducted. Previous studies have noted that learning difficulties in reading and writing become apparent from the third grade of elementary school, where English subjects are first introduced in public education (S. Lee, 2016). These challenges tend to intensify as students progress to higher grade levels (Jeong & Kim, 2017). Y.-A Lee (2014) identified poor reading skills as the primary reason for learning difficulties in English subjects. Additionally, Choi (2013) highlighted that, among reading, writing, listening, and speaking, 'writing' poses the most significant challenge for Korean elementary students facing difficulties in English learning.

Identifying individuals with dyslexia or those at risk of dyslexia within the current English education curriculum in Korea poses a challenge. Currently, the emphasis in elementary school is on oral communication, with a focus on spoken language. It is only as students advance to higher grades that there is an increasing emphasis on reading and writing (Lee et al., 2001). Consequently, due to the predominant focus on learning English through listening and speaking in the first four years, starting from the third grade of elementary school until the sixth grade, students struggling with English reading and writing may only be identified after the first year of middle school. This delayed identification process often leads to a loss of interest in learning English among students in upper grades, potentially resulting in a significant number becoming what is referred to as "English abandoners" (Chang, 2023, p. 114). Despite the estimated 5% of Korean students facing dyslexia (EBS, 2014; Yoo et al., 2018), practitioners in the field often find it challenging to consider the possibility of developmental dyslexia. Instead, challenges are frequently attributed to low learning motivation, inadequate study habits, or unfavorable study environments (Kim & Park, 2020).

Invented Spellings

Invented spelling refers to a writing strategy where a writer spells a word based on its sound, even if the spelling deviates from the standard or conventional form. This is commonly observed in young or novice writers who may not have acquired all the correct spellings yet. The majority of research in first language (L1) writing indicates that young novice writers use invented spellings when they apply the phoneme-to-grapheme rules they have internalized to spell words for which they have not yet mastered the conventional spellings (Richgels, 2002).

Moreover, there are indications that the analysis of invented spellings can offer valuable insights into the identification of dyslexic students. Invented spellings are considered as the initial attempts of a child to navigate an alphabetic writing system (Gentry, 1982). Consequently, an examination of spelling patterns provides valuable information about the developmental progress of a student's ability to associate letters with sounds. According to S. Lee (2019), for instance, "an analysis of words like 'EN' (representing 'in') and 'THES' (representing 'this') reveals trends that suggest the student has not yet fully mastered the appropriate use of the grapheme 'I' to represent the sound '[ɪ]'" (p. 622).

In this regard, Gentry (1982, 2000) introduced invented spelling stages that enable teachers and researchers to assess the current level of students. These stages include: (1) *Precommunicative stage*: Children use random symbols and letters without a clear understanding of letter-sound relationships or conventional spelling, (2) *Semiphonetic stage*: Learners begin to associate some letters with sounds, attempting to represent spoken words using rudimentary phonetic knowledge, (3) *Phonetic stage*: Children demonstrate a stronger grasp of phonetics, employing more accurate letter-sound correspondences in their spelling attempts, (4) *Transitional stage*: Learners start to incorporate more conventional spelling patterns, although they may still resort to phonetic strategies for unfamiliar words, (5) *Conventional spelling*: Students display a solid understanding of standard spelling rules and conventions, demonstrating the ability to accurately spell a wide range of words. Children progress through these stages as they internalize spelling and develop their skills, and invented spelling analysis serves as a valuable tool for assessing the extent of a child's spelling development.

Korean Learners' Invented Spellings and Clues for Dyslexic or At-Risk Dyslexic Students

In Korea, research on invented spelling has been ongoing. Y. Lee (2004) conducted a study where she randomly selected 208 6th-grade students from four elementary schools in Seoul to assess their English phonemic awareness through word reading and writing. The study included an invented spelling test, where students listened to recorded words read by the teacher and then attempted to spell them. The average accuracy for seven target words (sunny, sick, green, time, help, robot, happy) was reported to be 53.2%. Lee noted that some Korean students particularly struggled with English vowels, often attempting to write them based on their sound (e.g., "taim" for time, "hepy" for happy, "grin" for green, "suni" for sunny, and "sik" for sick) (p. 124).

Subsequently, S. Lee (2010) conducted a study investigating sixty-one 5th graders and fifty-eight 6th graders' invented spelling. The study reported a notable observation, stating that "Many children wrote the letter 'j' in the opposite direction in their alphabet writing, and there were also a few who wrote the letter 'd' in reverse.... In the case of the word 'bird,' it was interesting to note that four students confused 'b' and 'd' and wrote the word as 'dirb' (p. 246)."

Jung and Bae (2014) explored spelling errors in an immersion school involving 206 lower (grades 1-3) and higher (grades 4-6) graders using a composition task. They found that spelling errors occurred most frequently in substitution, followed by omission, addition, and transposition. However, they also reported that some higher graders made errors such as using "along" for "alone," "hay" for "hey," and "than" for "then" in their writings (p. 269).

These studies suggest that Korean students exhibiting persistent spelling errors may be considered at risk for dyslexia or fall into the dyslexic group. Spelling errors, including phonological vowel errors (e.g., "bet for bat"), orthographic vowel errors (e.g., "bate for bait") (Bernstein, 2008, p. 307), spelling reversals (e.g., "dull for bull"), and sequence errors (e.g., "yuo for you"), are all indications of dyslexia (Treiman, 1997, p. 204). If these Korean students were followed up in a longitudinal study, it is likely that evidence related to dyslexia could have been identified.

The Present Study

Previous studies encountered limitations in their research methodologies, utilizing writing tasks (Jung & Bae, 2014; Moats, 1996) or spelling tests (S. Lee, 2010; Y. Lee, 2004) for data analysis. Spelling errors were gathered in an immersion school in Korea (Jung & Bae, 2014). Consequently, it is crucial to utilize naturally produced written materials in the learner's

environment for a comprehensive understanding. Consistently collecting writing samples generated by the learner over an extended period allows for the identification of specific spelling errors in various learning situations, enabling the discovery of error patterns. This study aims to offer detailed insights into spelling errors by closely examining the English writings of a student at risk of dyslexia. The goal is to provide guidance for English teachers and parents in EFL context. The three research questions are as follows:

(1) What are the stages of spelling development for C (pseudonym) in the 6th grade of elementary school and the 1st grade of middle school, respectively? Has there been a change in the spelling development stage over this period?
(2) Does C's English writing exhibit different forms of spelling errors across various data sources (e.g., English textbooks, handouts, assignments, word tests, and notebooks)?
(3) If so, do these spelling errors correspond to the spelling error patterns observed in the dyslexic group?

METHOD

Participant

C (pseudonym) is a native Korean student whose mother tongue is Korean. She was born in the USA and lived there until the age of 5.5 years. Upon returning to Korea, she participated in a two-hour English-medium afternoon kindergarten program following her attendance at a regular kindergarten from 9 am to 2 pm. Throughout her elementary school years, C, along with her mother, initiated a home-based English learning program involving English books, audio CDs, and worksheets, which continued for six years. Additionally, she spent an extra year between grades 4 and 5 in the USA.

C underwent a dyslexia assessment in the Korean language in Korea. Despite her early exposure to both Korean and English books, her mother noticed occasional difficulties in C's accurate reading of Korean vowels. Consequently, when C reached the third grade of elementary school, her mother arranged for her to undergo a dyslexia assessment at an educational institution specializing in dyslexia in Seoul. The assessment included various tests measuring cognitive processing abilities, as well as evaluations of vocabulary, phonological skills, and writing fluency in the Korean language. The results indicated that C demonstrated lower achievement in rapid naming, automaticity, and phonological memory compared to her peers. However, her abilities in word recognition, receptive vocabulary, expressive vocabulary, spelling, and writing fluency fell within the range of typically developing peers. The comprehensive assessment results also indicated that especially 'reading fluency' and 'reading comprehension' achievement levels were at a risk level, prompting suspicion of potential reading disorders and suggesting the need for continuous monitoring. However, in other areas, C performed similarly or slightly below average and possessed normal intelligence, which led to the exclusion of a dyslexia diagnosis.

Furthermore, C has not been diagnosed with Attention-Deficit/Hyperactivity Disorder (ADHD), despite the fact that 20-40% of dyslexia cases are known to coexist with ADHD (McGrath & Stoodley, 2019). There have been no teacher reports indicating specific disabilities or learning difficulties at school. Although her linguistic context is unique due to exposure to English-speaking cultural and environmental settings, and while her English listening and speaking skills present no challenges, a consistent pattern of spelling errors has become apparent.

Data

The data is divided into two primary categories: educational materials used in a conventional school setting and those utilized in a private English institute. Regarding the school-related data, C created an English textbook along with corresponding handouts. Additionally, she made use of English notes for self-study at home. On the other hand, the materials from the private academy included English textbooks, a workbook, supplementary handouts, vocabulary tests, and assignments. It is worth noting that the dataset for the sixth grade of elementary school is relatively limited, whereas a more extensive collection of materials is available from the English academy. This is because C began attending the private institution from the first year of middle school onward.

Data Analysis

After collecting the data, the researcher in this study entered all misspelled words from the dataset into Microsoft Excel. Each error word was assigned to its respective worksheet based on data types. In total, there were 10 worksheets, including

a G6 textbook, worksheets, notes, a G7 school textbook, worksheets, a G7 institution textbook, a workbook, handouts, vocabulary tests, and assignments.

For the quantitative analysis, the researcher manually calculated the number of handwritten words in the dataset. The word count for each page was entered into the worksheet to determine the total number of words for each data type in Microsoft Excel. There were no exceptions based on the type of speech (e.g., preposition), and repeated words were included, consistent with a previous study (Justicia et al., 1999). Subsequently, the misspelled words were counted to calculate the error ratio.

Regarding the qualitative analysis, the error words underwent a thorough examination. Gentry's developmental stages of spelling (1982, 2000) were utilized to address the first research question. For the second and third research questions concerning error types based on data types and error patterns corresponding to dyslexics, Justicia et al.'s (1999) analysis model of six categories (substitution, addition, omission, rotation, inversion of sequential order, fragmentation, and synthesis) was adapted and modified to include fourteen categories: vowel insertion (e.g., STAATION/station), vowel deletion (e.g., SPARATE/separate), vowel substitution (e.g., AMPOSSIBLE/impossible), vowel order (e.g., PEICE/piece), consonant insertion (e.g., NEWWER/newer), consonant deletion (e.g., BIGEST/biggest), consonant substitution (e.g., FIVTY/fifty), consonant order (e.g., STRENGHT/strength), left-right inversions (e.g., BADY/baby), upside-down inversions (e.g., APSENT-absent), suffix error (e.g., -OR/-er), vowel-consonant substitution (e.g., RELIGLON/religion), homophones (e.g., said vs. sad), etc. (e.g., ORVEN/dosen).[1]

FINDINGS

TABLE 1

Description of the Data and Misspelled Words

No.	Data types and quantity	Data source	Collected words	Number of error words (%)
1	1 English textbook	School	725	14 (1.93%)
2	47 handout sheets	School	412	3 (0.73%)
3	1 free writing note	Home	1,372	43 (3.12%)
	G6 Total		2,509	60 (2.39%)
1	1 English textbook	School	897	5 (0.56%)
2	37 handout sheets	School	871	12 (1.38%)
3	1 textbook	Private Institute	5,596	31 (0.55%)
4	1 workbook	Private Institute	1,952	29 (1.49%)
5	107 handout sheets	Private Institute	2,880	40 (1.39%)
6	55 vocabulary test sheets	Private Institute	1,521	172 (11.31%)
7	88 assignment sheets	Private Institute	1,875	24 (1.28%)
	G7 Total		15,592	313 (2.01%)
	TOTAL		18,101	373 (2.06%)

**Note*: G6 represents grade 6 in elementary school, while G7 corresponds to the first year of middle school.

Table 1 illustrates the types of data and the corresponding number of errors gathered for the present study. The data consisted of 2,509 words in G6, with 60 (2.39%) misspelled words. In contrast, for G7, there were 15,592 words, and 313 (2.01%) of them were misspelled.

The word count varied across different data types. In G6, free-writing notes had the highest word count at 1,372 words, with 43 (3.12%) errors. On the other hand, handouts had only 412 words, with a low error rate of 3 (0.73%). However, upon starting studies at a private institute in G7, the word count increased by approximately 6.2 times compared to G6. The

[1] The words in these 14 categories were extracted from the data authored by C.

workbook used at the English institute had the highest word count at 5,596 words, with 31 (0.55%) errors. In contrast, school handouts contributed only 871 words, with 12 (1.38%) errors.

Analyzing data types, G6 English textbooks contained 14 (1.93%) errors, while G7 had 5 (0.56%). Handouts showed 3 (0.73%) errors in G6 and 12 (1.38%) in G7. Notably, G6 free-writing notes had the highest error rate at 3.12%, while G7 did not use free-writing notes. After starting private institute studies, C used a textbook with 31 (0.55%) misspelled words. A workbook had 29 (1.49%), 107 handout sheets had 40 (1.39%), 55 vocabulary test sheets had 172 (11.31%), and 88 assignment sheets had 24 (1.28%) error words, respectively. In summary, different data types yielded varying misspelled word counts with distinct error rates, with G7 vocabulary test sheets having the highest error rate at 11.31%.

Table 2 illustrates the most frequent spelling error categories produced by C in G6 and G7. In G6, the error types and their respective percentages are as follows: 18 instances of vowel deletion (30.00%), 12 consonant deletion (20.00%), 7 vowel substitution (11.67%), 5 instances of both vowel insertion and homophones (8.33% each), and 4 consonant insertion (6.67%). Minor errors make up the remaining categories.

In G7, a different pattern of spelling errors is observed. The error categories with the highest occurrences include 68 vowel substitution (21.73%), 63 vowel deletion (20.13%), 47 consonant deletion (15.02%), 31 consonant insertion (9.90%), 29 vowel insertion (9.27%), 21 consonant substitution (6.71%), 14 consonant order (4.47%), 11 instances of both vowel order and 11 homophone (3.51% each), 8 vowel-consonant substitution (2.56%), 6 left-right inversion (1.92%), and 2 instances of upside-down inversion and others (0.64% each).

TABLE 2
Ranking of Spelling Error Categories by Grade Level

	G6			G7	
Ranking	Error categories	Number of error words (%)	Ranking	Error categories	Number of error words (%)
1	vowel deletion	18 (30.00%)	1	vowel substitution	68 (21.73%)
2	consonant deletion	12 (20.00%)	2	vowel deletion	63 (20.13%)
3	vowel substitution	7 (11.67%)	3	consonant deletion	47 (15.02%)
4	vowel insertion	5 (8.33%)	4	consonant insertion	31(9.90%)
	homophone	5 (8.33%)	5	vowel insertion	29 (9.27%)
5	consonant insertion	4 (6.67%)	6	consonant substitution	21 (6.71%)
6	vowel order	2 (3.33%)	7	consonant order	14 (4.47%)
	consonant substitution	2 (3.33%)	8	vowel order	11 (3.51%)
	vowel-consonant substitution	2 (3.33%)		homophone	11 (3.51%)
7	consonant order	1 (1.67%)	9	vowel-consonant substitution	8 (2.56%)
	left-right inversion	1 (1.67%)	10	left-right inversion	6 (1.92%)
	others	1 (1.67%)	11	upside-down inversion	2 (0.64%)
8	upside-down inversion	0 (0.00%)		others	2 (0.64%)
9	suffix	0 (0.00%)	12	suffix	0 (0.00%)
		60 (100%)			313 (100%)

DISCUSSION AND CONCLUSION

This study aimed to investigate whether the student, despite prolonged exposure to an English environment and demonstrating proficiency in listening and speaking, exhibited specific difficulties in English spelling. To achieve this, natural data, including all English writing materials from the sixth grade of elementary school to the first year of middle school over two years, was compiled and analyzed. The study sought to understand the student's patterns of spelling errors and determine if the student belongs to the dyslexia risk group.

In addressing the first research question, five key discussion points have been identified. Firstly, according to Gentry's model (1982, 2000), evidence of mixed orders and substitutions indicated that C was in the midst of development between the transitional and conventional stages. In the transitional stage, individuals are expected to adhere to English spelling structures. For example, each syllable should contain a vowel (e.g., "EGUL" instead of the phonetic "EGL" for 'eagle'), nasals should precede consonants (e.g., "BANK" instead of the phonetic "BAK" for 'bank'), and both consonants and vowels should be used simultaneously. However, with a new visual strategy in this stage, students may write some reversed words (e.g., "TAOD" for 'toad,' "HUOSE" for 'house,' "OPNE" for 'open') (Gentry, 2000, p. 321). As evidenced, C included a vowel in a syllable, such as in "BIGER" for 'bigger,' although one consonant letter was missing. For a nasal before a consonant, she wrote "LISENING" for 'listening,' demonstrating her understanding of this rule, albeit missing the letter "T." However, as Gentry (2000) pointed out the order of spellings, C included "REPROT" for 'report' and "RESREACH" for 'research' in her writing.

Furthermore, Gentry (2000) explained that in the conventional stage, spellers should display firmly established English spelling knowledge, such as prefixes, suffixes, contractions, and compound words, etc. Observing the data, C had not produced any suffix errors for two years. It is plausible that she has not yet reached the stage of actively utilizing affixes. The affixes commonly used at the G6 and G7 levels, including plural '-s,' past tense '-ed,' present participle '-ing,' nominal suffix '-tion,' agent suffixes '-er,' '-or,' and superlative '-est,' were not utilized frequently, indicating a limited incorporation into her words. In addition, considering that C produced 18,101 words over two years, and among them, 373 (2.06%) errors were included, the remaining 17,728 (97.94%) words were correctly used, indicating that C has already entered the beginning of the conventional stage. While definitive conclusions cannot be drawn at this point, further longitudinal research on C's English writing over the next few years may yield intriguing results.

Secondly, in addition to tracing the stages of C's spelling development, another noteworthy observation is the correlation between grade level advancement and a decrease in the rate of spelling errors. C's overall spelling errors reduced from 2.39% in G6 to 2.10% in G7. This finding aligns with a previous study by Jung and Bae (2014), which indicated that Korean students in an immersion school made fewer errors as they progressed to higher grades. This suggests that as C accumulated more learning experience in English, spelling errors were likely to decrease. One contributing factor to this reduction in errors is that, in G6, the student primarily studied independently at home, whereas in G7, she began attending an English academy. This change led to a significant increase in time devoted to English reading and writing. The weekly tasks of memorizing English vocabulary and completing worksheets would have played a role in contributing to this improvement.

Thirdly, during G7, C's spelling strategy underwent a notable change. In G6, the most frequently employed strategy was deletion, with 30% involving vowel deletion and 20% consonant deletion. However, in G7, the predominant strategy became vowel substitution (22%), followed by vowel deletion (20%), and consonant deletion (15%). The observed order of error rates in C's case aligns with previous studies. Justicia et al.'s (1999) research on 972 Spanish children, aged between 8 to 10, indicated a predominant error rate in substitution (67.6%), followed by omission (19.7%), and then addition (9.77%). C's case also parallels the findings of Jung and Bae (2014) in their analysis of spelling errors among 206 Korean students in an immersion school, where a higher incidence of substitution (62%) was followed by omission (47%), addition (29.1%), and transposition, involving the inversion of sequential order (16.5%). In C's case, considering the fact that deletion strategies were primarily used in G6, it can be inferred that there has been significant growth over the past year, with substitution strategies being employed most frequently. This implies that deletion is an easier strategy than substitution, suggesting an improvement in C's phonemic awareness during this period.

Fourthly, it is crucial to highlight the vowel errors demonstrated by C. In G6, errors related to vowels, such as vowel deletion (30%), vowel substitution (12%), and vowel insertion (8%), accounted for 50% of her total errors. This struggle with vowels persisted into the following year. In G7, vowel errors, specifically substitution (22%), deletion (20%), and insertion (9%), constituted 51% of the total errors. This indicates that vowel errors comprised half of her spelling errors for two consecutive years. For example, C inserted the vowel "E" in "NATUREAL" for 'natural,' deleted "E" in "EVRYONE" for 'everyone,' and substituted "A" with "I" in "PRAVATE" for 'private'. Additionally, vowel deletion, specifically the omission of the final silent "E" as in "PAG" for 'page,' occurred frequently. According to Y. Lee (2004), Korean elementary school students commonly struggle with vowel spellings, and C was no exception.

Fifthly, it is noteworthy that C's overall error rate was comparable to that of previous research examining cases of native speakers of English. C's error rate was 2.39% in G6 and 2.01% in G7, respectively. However, in Moat's (1996) study, which investigated the case of 19 dyslexic adolescents' spontaneous writing samples, the five lowest-performing participants produced an average of 13% errors in their writings. In C's case, although her data was not a free writing sample, the natural data reveals that her overall error rate was less than 3% for two years, and the rate decreased over time. These differences may stem from the fact that, in C's case, the emphasis was predominantly on learning at the word level rather than engaging in composition that requires a more substantial grasp of grammatical knowledge. Additionally, given C's early exposure to

an English-rich environment, the error rate in word-level learning may not have stood out significantly compared to typical students.

As for the second research question regarding error rates in different writing data (i.e., English textbooks, handouts, assignments, word tests, and notebooks), it was observed that the highest error rate was found in free writing notes at 3.13% in G6, and in G7, it was spelling test sheets with an error rate of 11.31%. The low occurrence of errors in textbooks may be attributed to the process of directly copying words from the blackboard onto her notes, which does not require much mental processing to produce words. However, errors observed in the word tests could involve challenges related to phonological processing and difficulties in encoding visual information, as the task requires retrieving words from one's mental lexicon and transcribing them in writing. This result implies that students' writing samples that do not receive external assistance can provide significant insights into a student's spelling development.

Regarding the third research question, the findings of the present study suggest a high likelihood that C's spelling errors closely align with those typically associated with dyslexia. Specifically, instances of left-right inversions such as "BO" for 'do' (Figure 1) and "TROUDLE" for 'trouble' (Figure 2), as well as an upside-down inversion as seen in "APSENT" for 'absent' (Figure 3), indicate that C may exhibit characteristics indicative of a mild form of dyslexia. The fact that C grew up in a rich English-speaking environment and spent the 3rd and 4th grades in a U.S. elementary school suggests that any inversion issues should have been addressed during early childhood or, at the latest, in the early school years. However, the occurrence of reverse spelling errors in English and the persistent difficulties observed in dyslexic children suggest possible indications of dyslexia in C. Additionally, based on the dyslexic test results in the Korean version, it showed that she fell behind in rapid naming, automaticity, and phonological memory compared to her peers in the third grade. Serrano & Defior (2008) reported that dyslexics experience speed-related issues in transparent languages. Bowers and Ishaik (2003) also noted that rapid naming serves as a significant predictor in understanding dyslexia, as it closely correlates with both reading fluency and orthographic skills. Additionally, recent research suggests that in languages with consistent spelling systems, there is a reduced prevalence of purely phonological weaknesses (Wimmer, 1993; Wimmer & Mayringer, 2001). Furthermore, difficulties in phonemic awareness may extend to second language learning (Kim, 2009; Wang et al., 2006), as observed in dyslexic cases across different languages (Katzir et al., 2004).

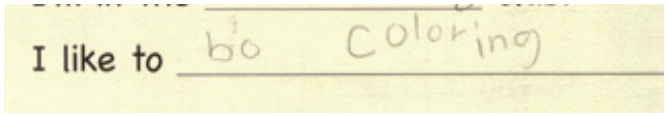

FIGURE 1
Sample of Left-Right Inversion: "bo" Instead of 'do' in G6

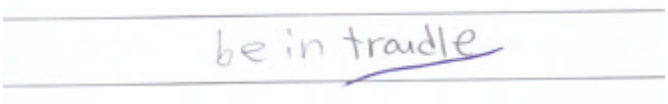

FIGURE 2
Sample of Left-Right Inversion: "troudle" for 'trouble' in G6

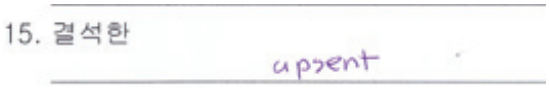

FIGURE 3
Sample of Upside-Down Inversion: "apsent" for 'absent' in G7

It is known that these spelling errors are associated with poor spelling ability in dyslexic students due to their weak phonological awareness (Shaywitz & Shaywitz, 2005). However, Moats (1996) insists that "the gap between reading and spelling increases over time when remediation is successful with dyslexics" (p. 106). The efforts that have been made since a very young age until G6, such as listening to English books, songs, and reading aloud English books, were presumed to have greatly benefited C's ability to manipulate English phonemes. Based on these sustained and dedicated efforts over an extended period of time, a lower error rate (2.06%) in English spellings for two years could have been possible. This is in contrast to spelling errors made by native speakers with dyslexia, who exhibit an average error rate of 13% in their final compositions (Moats, 1996). As seen in the results of this study, C's English spelling is still in development. With effective

guidance and diligent effort, C's English spelling may develop steadily, albeit at a slower pace.

This study has limitations as it analyzed data from a single student. Additionally, conducting research over a longer period with a more diverse range of learners with various levels and backgrounds could yield more objective results. Moreover, categorizing C as a dyslexic learner without an official diagnosis from a specialized institution poses challenges. However, the subpar scores in sub-measurements related to phonological awareness and the errors in vowel deletion, substitution, addition, spelling order, and reversal shown in the results of this study suggest the possibility that C, who has a rich English experience, falls within the dyslexia-risk group. Additionally, the present study fell short in comprehensively examining the transfer between L1 and L2 dyslexic components; however, follow-up research should address these aspects.

Based on the results of this study, various pedagogical implications are proposed. Firstly, teachers need to receive more education about the characteristics of dyslexic students. Particularly in the case of students exhibiting repeated reading/spelling errors in English subjects, attributing it to prerequisites learning deficits or low motivation may be considered, but the possibility of dyslexia, a neurological issue, should also be kept in mind and observed. Secondly, at the school and district levels, students diagnosed with dyslexia in elementary school should be monitored in their English language learning, as difficulties in their native language learning may transfer to second language learning. If they experience difficulties in English reading and writing, ways to provide assistance should be explored. Thirdly, as regulations and education regarding English dyslexia assessment and evaluation are still lacking, the help of parents or close teachers who can observe the student's English spelling and suggest the possibility of dyslexia is essential.

Sparks and Miller (2000) specifically noted that Multisensory Structured Language (MSL) can prove to be an effective teaching method for at-risk dyslexic learners acquiring a foreign language, as supported by their review of previous studies. The utilization of MSL dates back to the 1960s, where it was employed for at-risk dyslexic native English speakers (Gillingham & Stillman, 1960). Its effectiveness has been demonstrated with at-risk learners in various languages, including Spanish (Ganschow & Sparks, 1995; Sparks & Ganschow, 1993), French (Gordon, 1994), and Hebrew (Roffman & Teitelbaum, 1996). The MSL approach in foreign language teaching emphasizes the direct and clear instruction of the phonology/orthography (spelling-sound relationships), grammar (syntax), and morphology (meaning units) systems of the target language. This approach engages students' visual, auditory, and tactile-kinesthetic skills simultaneously, incorporating motor skills as students articulate sounds, syllables, and write on paper or a blackboard. Typically, lessons are conducted in both the students' native language and the target foreign language, with the teacher using both languages, such as speaking in both Korean and English. Despite the concept of dyslexia in English subjects not yet gaining widespread recognition in Korea, there is a need for interest and practical experimentation with the MSL teaching method. Moreover, training teachers to implement MSL could feasibly be carried out at the school or district level.

Despite its limitations, this study is significant in providing a diagnosis of dyslexic students, who constitute approximately 5% of elementary school students in South Korea. The diagnosis is based on two years of natural data collected from one learner in both school and private institution settings. The findings suggest that Korean EFL learners who have not been diagnosed with dyslexia may still be present in classrooms. A thorough examination of invented spellings could offer valuable insights into the diagnosis and instruction of students who are dyslexic or at risk of dyslexia.

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