

北九州市立大学

# 外国語学部紀要

---

第 156 号

2023年3月

---

## 目 次

### 【論文】

Supporting Students with Dyslexia in the EFL Classrooms

… 雪丸尚美 … 21

北九州市立大学

# BULLETIN

FACULTY OF FOREIGN STUDIES  
THE UNIVERSITY OF KITAKYUSHU

---

No. 156

March 2023

---

## CONTENTS

### 〈Articles〉

Supporting Students with Dyslexia in the EFL Classrooms

… Naomi Yukimaru … 21

THE UNIVERSITY OF KITAKYUSHU

Kitakyushu, Japan

# Supporting Students with Dyslexia in the EFL Classrooms

Naomi Yukimaru

## **Abstract**

Since the signing of the United Nations Convention on the Rights of Persons with Disabilities in 2007, Japan has been working toward a symbiotic society. The country has advocated the need for English language education that incorporates a special-needs perspective and is based on a universal design that considers students' diverse needs. Several Japanese learners of English do not encounter significant problems in reading and writing in Japanese, but they find it difficult to read and write in English after they start learning the language. Meanwhile, scholars have not actively addressed issues surrounding English reading and writing difficulties among Japanese learners of English. Therefore, this paper aims to discuss the challenges encountered by students with dyslexia in English as a foreign language (EFL) classrooms. It provides an overview of dyslexia and its mechanism and how it manifests in different languages. Then it will discuss the methods through which teachers can support students with dyslexia in EFL classrooms.

*Keywords:* dyslexia, EFL, Japanese, in-service teachers, preservice teachers

## **Background of the Study**

Japan has been striving to achieve a symbiotic society since signing the United Nations Convention on the Rights of Persons with Disabilities in 2007. With regard to English language education, studies have highlighted the need to deliver education from a special-needs standpoint and that is founded on a universal design that considers students' diverse demands.

Scholars have revealed that some Japanese learners of English do not show significant problems in reading and writing in Japanese but struggle in reading and writing in English after they start learning it (Ijima, 2020; Murakami, 2021). Considering the dyslexic population in English-speaking countries, Japanese EFL learners who experience difficulties in learning English are assumed to include those with dyslexia in English (Murakami, 2018). However, research on English reading and writing difficulties and English dyslexia<sup>1</sup> among Japanese learners of English is only in its early stages and has not actively addressed such challenges in English education settings.

One reason for the lack of an active discussion of dyslexia in English is that teachers have insufficient knowledge of it. Surveys of elementary, junior high, and high school teachers' perceptions of English learning stumbling blocks, including reading and writing difficulties (e.g., Kagata, et al., 2015; Otani et al., 2015; Yukimaru, 2020, 2022), found that elementary, junior high, and high school teachers have a low awareness of English reading and writing difficulties or dyslexia in English. In addition, many teachers believe in the urgent need to be trained in English dyslexia and its relevant teaching methods.

In December 2022, for the first time in 10 years, the Ministry of Education,

---

<sup>1</sup> This paper uses the term “dyslexia” in the same sense as “developmental dyslexia.”

Culture, Sports, Science, and Technology (MEXT) released survey findings on children with special educational needs who are enrolled in regular classes. The results showed that 6.5% of children in regular elementary and junior high school classes “show significant difficulties in learning” (MEXT, 2022).<sup>2</sup> Compared with the 2012 survey results, which showed that 4.5% of the children “show significant difficulties in learning,” the recognition of teachers in charge is thought to have increased.

In addition, the survey revealed that only 28.7% of these children were actually assessed by the school committee as requiring special educational support, although teachers in charge considered that the children had “no intellectual developmental delay but show significant difficulties in terms of learning or behavior.” This result indicates that while several children have teachers who recognize their significant difficulties in learning or behavior, they have not received sufficient support.

This can be attributed to the lack of resources such as classroom teachers, support staff, and other personnel who provide individualized attention and support and the expertise of regular classroom teachers who can develop methods to address these students’ difficulties (Kikuchi, 2022). Improving the lack of resources within a short timeline is not easy, but in light of this situation,

---

<sup>2</sup> The results of the MEXT survey are based on responses by classroom teachers and others and are not based on the assessments of a developmental disability specialist team or a diagnosis made by a physician. Therefore, it should be noted that the results of this survey do not indicate the percentage of students with developmental disabilities but rather the percentage of those who need special educational support. Also worth noting is that this survey is not simply comparable with the 2002 and 2012 surveys because its target areas and some of its questions are different.

we could promote education that incorporates the concept of universal design<sup>3</sup> to facilitate the learning of more students and secure the necessary resources.

Therefore, this paper aims to discuss issues and possible solutions surrounding students with dyslexia in EFL classrooms. It provides an overview of what dyslexia is and describes its mechanism and how it manifests in different languages. Then it will discuss how teachers can support students with dyslexia in EFL classrooms based on a universal design mindset.

### **What Is Dyslexia?**

Dyslexia is a neurodevelopmental disorder characterized by severe reading difficulties. An estimated 6%–10% of the world’s population have this predisposition regardless of country or race, depending on diagnostic criteria (Ishii, 2005; Shaywitz, Shaywitz, Fletcher, & Escobar, 1990). People with dyslexia often encounter difficulties in phonological processing (Bradley & Bryant, 1978; Pugh & Verhoeven, 2018) and experience specific challenges in reading (and often writing) despite having average intelligence and sensory functions (The International Dyslexia Association, 2021). The International Dyslexia Association (IDA) (2002) defines dyslexia as

a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is

---

<sup>3</sup> Inclusive education that involves and educates all children, including those with disabilities, in the same place has become a global trend, and curricula for children with special needs are being developed. Japan has also been conducting practical research to incorporate a universal-design perspective to formulate education that is easy to understand and easy to learn for all learners regardless of their disability status.

often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.

From a medical and educational perspective, the definition and nomenclature of learning disabilities and dyslexia have several differences. Two systems in the form of codes and manuals for diseases provide medical informatics regarding diagnosis definitions: the 2013 revision of the American Psychiatric Association's diagnostic criteria (DSM-5) and WHO's International Classification of Diseases 11th Revision (ICD-11). Both systems use standardized tests and describe the severity of such diseases.

The DSM-5 (APA, 2013) defines specific learning disorder (SLD) as a type of neurodevelopmental disorder that impedes one's ability to learn and use specific academic skills, such as reading, writing, and arithmetic, on which most other academic learning is founded. Alternatively, the DSM-5 allows the use of the term "dyslexia" to describe symptoms of limited reading within SLD (so-called learning disabilities).

Meanwhile, the ICD-11, which is a global standard for diagnostic health information developed by the World Health Organization, defines dyslexia as [d]evelopmental learning disorder with impairment in reading is characterized by significant and persistent difficulties in learning academic skills related to reading, such as word reading accuracy, reading fluency, and reading comprehension. The individual's performance in reading is markedly below what would be expected for chronological age and level of intellectual functioning and results in significant impairment in the individual's academic or occupational functioning. Developmental learning

disorder with impairment in reading is not due to a disorder of intellectual development, sensory impairment (vision or hearing), neurological disorder, lack of availability of education, lack of proficiency in the language of academic instruction, or psychosocial adversity.

The Japanese government, through the MEXT (n.d.), follows the ICD-10 classification and defines a learning disability as

a condition in which a child has no intellectual developmental delay in general, but faces various learning difficulties due to difficulty in acquiring or demonstrating one or more specific skills among the basic skills necessary for learning, such as listening, speaking, reading, writing, calculating, and reasoning.

Although not defined only for dyslexia, “reading” and “writing” fall under the dyslexia category. In the coming years, this definition will change along with the switch from ICD-10 to ICD-11 although the Japanese government is yet to advise when it will make the switch.

### **Factors that Cause Dyslexia**

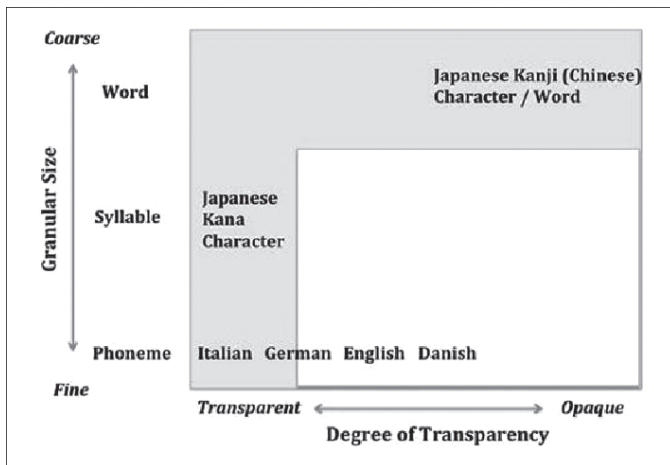
While the causes of dyslexia remain unclear, the IDA defines it as “a specific learning disability that results from a neurobiological cause” (IDA, 2002). Studies using neuroimaging techniques, such as functional magnetic resonance imaging (fMRI) and positron emission tomography, have demonstrated a correlation between functional and structural differences in the brains of children with reading difficulties (Japan Dyslexia Research Association, 2014). Several genes have also been associated with dyslexia (e.g., Doust et al., 2022; Fisher & DeFries, 2002).

Orthographic complexities also play a role. A growing number of studies has shown that language-specific orthographic complexities influence reading



difficulties and reading acquisition (Seymour, 2005; Seymour et al., 2003; Ziegler & Goswami, 2005; Ziegler et al., 2003). Differences in orthographic features explain the varying proportions of people with dyslexia who speak different languages (see Figure 1).

**Figure 1**  
*The Granularity and Transparency Hypothesis*



*Note.* From Wydell & Butterworth (1999). A case study of an English-Japanese bilingual with monolingual dyslexia. *Cognition*, 70(3), p. 280. [https://doi.org/10.1016/S0010-0277\(99\)00016-5](https://doi.org/10.1016/S0010-0277(99)00016-5)

Wydell and Butterworth (1999) suggested that language can be classified along two dimensions: transparency and granularity. That is, opaque/deep orthographies, such as English, produce a higher incidence of dyslexia than more transparent/shallow orthographies, such as Japanese, whereas more transparent orthographies such as Japanese, Italian, and German experience less difficulty in decoding written words (Ijuin & Wydell, 2015).

Transparency and granularity differences between a learner's first (L1) and second language (L2) or foreign language (FL) affect their ease of learning L2 or FL. Therefore, a native speaker of Japanese, which is transparent and coarse, who learns English, which is opaque and fine, could find English language learning significantly more challenging than vice versa.

### **Comorbid Disorders with Dyslexia**

Dyslexia frequently co-occurs with other developmental disorders such as attention-deficit/hyperactivity disorder (ADHD) (Carroll et al., 2005). Studies on ADHD and dyslexia are more abundant than those on autism spectrum disorder. Studies on co-occurring developmental disorders revealed that 40% of children with ADHD have dyslexia and that 30% of those with dyslexia have ADHD (IDA, 2020; Kelly & Phillips, 2022).

Particularly in English-speaking countries, research has reported overlaps in clinical symptoms, cognitive function, and genetic levels for ADHD and dyslexia (Pennington, 2006). Carrol et al. (2005) found that among ADHD symptoms, inattention affects reading ability, but hyperactivity is not necessarily associated with reading ability. Many reports have also been published on working memory deficits and processing speed related to dyslexia in English-speaking countries (Kormos, 2017), suggesting that inattention is as deeply involved in dyslexia as in ADHD.

### **How Does Dyslexia Manifest in Different Languages?**

Dyslexia is widely known and investigated in English-speaking countries, but only a few related studies have been conducted in the Japanese EFL context. In addition, Japan recognizes fewer people as dyslexic and pays little attention to them, and there are two potential reasons for this. First, the Japanese syllabic kana

and morphographic *kanji*, which are first learned in elementary school, are more transparent in their orthography, and the granularity of the smallest orthographic unit is coarser than in English (Wydell, 2012) as shown in Figure 1. Conversely, English has often been considered as having deep/opaque orthography since its phonology from print is not always consistent (Ijuin & Wydell, 2015).

The frequency of occurrence is not always constant because of the use of various cutoff values, but this is generally reported to be 10% or more in English-speaking countries. Meanwhile, in Italian and Finnish, frequency is reported to be about half of that in English-speaking countries (Lindgren et al., 1985). An estimated 1%–8% of the population in Japan is dyslexic in the Japanese language (Uno et al., 2009), which reflects the generally low interest in dyslexia.

When learning L2 or FL, people may display dyslexic symptoms in the target languages despite appearing to be average readers in their L1 (Meara et al., 1985). Notably, if learners' L1 is a “transparent” language like Japanese, in which letter–sound correspondence rules are easy to understand, students with dyslexia would experience difficulties learning a “less transparent” language like English (Kormos, 2017). One can therefore predict that certain challenges are likely to arise for Japanese students with dyslexia, especially in learning English.

The second reason for the weak focus on dyslexia is that learners with dyslexia exhibit fewer difficulties in verbal communication than those with apparent behavioral and social problems (Ishii, 2005). Because of this, teachers and parents who lack knowledge of dyslexia may not realize that students are experiencing difficulty in reading and writing because of their dyslexia.

When learning English in Japan, students with dyslexia who officially start studying English in elementary school (Grade 3) may encounter challenges in reading English despite not exhibiting severe difficulties in verbal communication

and in reading and writing Japanese. These students may face more difficulties than their classmates and could develop negative attitudes toward learning English.

### **Effective Ways to Support Students with Dyslexia in EFL Classrooms Teachers' Perceptions of Dyslexia in English Learning**

With respect to Japanese EFL learners with dyslexia, only a few studies have been conducted on dyslexia in Japan, and diagnosis methods for Japanese EFL learners are scarce. Schools in Japan have also shown a low recognition of dyslexia. A survey by Moriwaki (2007, cited in Murakami, 2012) revealed that more than 50% of English teachers in junior high school and high school have never heard of dyslexia, and although approximately 40% have known about it, they did not have a thorough understanding of the disability.

Kagata et al.'s (2015) survey of 70 elementary school and junior high school teachers regarding their perceptions of their students' difficulties showed that regardless of whether students had developmental disorders, teachers experienced difficulties conducting classes and communicating with students who struggled in the primary stages of reading and writing the alphabet. One limitation of the study is that despite investigating elementary and junior high school teachers, it did not specify the difficulties observed at each level, which have different aims for English language teaching. This highlights the need to separately examine how teachers in each school type perceive their students' difficulties.

Yukimaru (2020, 2022) conducted a series of paper-based survey to investigate elementary, junior high, and high school English teachers and identify their apparent needs and the problems they face when educating students with reading and writing difficulties in English language learning. The results of a

series of questionnaire surveys and interviews revealed that teachers, despite being familiar with students' difficulties when learning English, have shown a low awareness of dyslexia in English learning. On the contrary, teachers are clearly trying to find ways to teach students who are struggling to learn English although some of their methods may not be ideal for learners with dyslexia.

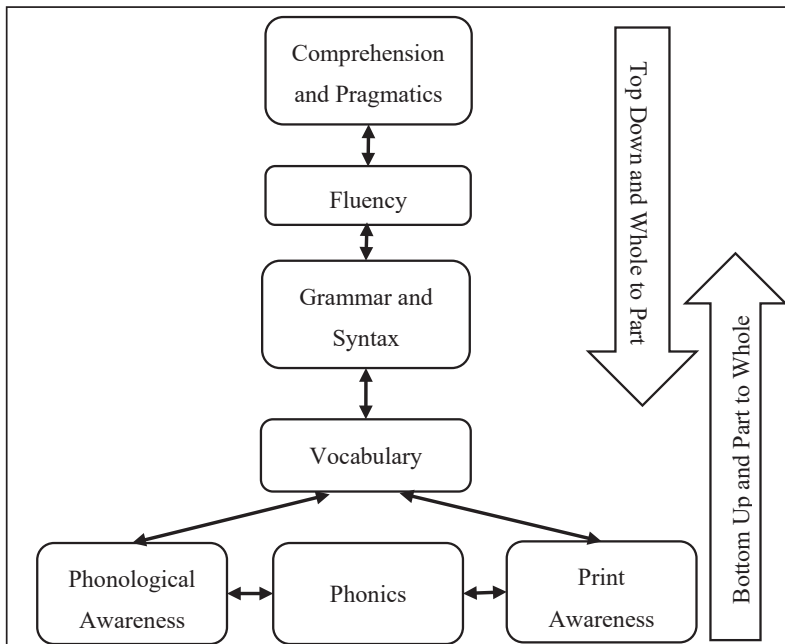
In addition, the Benesse Educational Research and Development Institute (2009) surveyed 3,643 English teachers in public junior high schools on English teaching and learning. Findings showed that the main challenges to students' English learning were their difficulty remembering words (e.g., pronunciation, spelling, and meaning) (68.8%), lack of study habits (68.0%), low motivation for learning (61.0%), inability to read (e.g., convert letters into sounds) (50.2%), struggles in understanding grammar (45.7%), failure to achieve desired results in tests (33.8%), and resistance to learning English (27.5%). Although the survey did not intend to highlight the difficulties encountered by students with dyslexia, it identified "difficulty remembering words" and "inability to read letters and sentences" as issues that must be carefully considered, including the possibility of dyslexia.

Despite these studies, there continues to be a lack of practical research on how to support students with dyslexia in English learning, especially in regular classrooms. Teachers are also clearly aware of their need to acquire knowledge and skills to efficiently support these students. Therefore, it is necessary to investigate what kind of training and instructional programs would be required and feasible for the future given the potentially higher attention on special-needs education knowledge (Kagata et al., 2015; Otani et al., 2015). Teachers must be ready to support FL learning, especially since Japan is moving toward ensuring equal rights for students with developmental disorders including dyslexia.

### Three Ways to Support Students with Dyslexia in EFL Classrooms

Research shows that an effective method to support students with dyslexia is to help them develop basic reading skills (e.g., Morrison, 2014; Murakami, 2018). Figure 2 shows the development mechanism of literacy skills. The three elements at the bottom of the pyramid—phonological awareness, phonics, and print awareness—are the basic reading skills that students must learn before proceeding to the acquisition of higher skills.

**Figure 2**  
*Comprehensive Literacy Development Paradigm*



*Note.* Adopted from Morrison, A. (2014). Literacy Development and Disabilities. <https://slideplayer.com/slide/7642968/>

Phonological awareness is the ability to focus on the sound of speech as distinct from meaning and detect or manipulate these sounds in words. Print awareness refers to the ability to quickly and correctly identify letterforms and includes the alphabet and the spelling of words. Phonics knowledge pertains to the ability to read by focusing on letter–sound relations.

As Murakami (2015) argued, English education in Japan does not provide sufficient instruction in “phonological awareness” and “decoding” as practiced in English-speaking countries. As a result, the acquisition of basic English reading and writing skills may not be seamless, especially for learners with reading and writing difficulties. Therefore, this paper suggests three ways to support students with dyslexia in EFL classrooms following the three basic skills derived from research and practice in English-speaking countries: phonological awareness training, phonics instruction, and multisensory language teaching. Some of the trainings can be conducted not only individually but also in mainstream classrooms as a way to provide a universal design of English language learning in the limited amount of time allowed by the national curriculum.

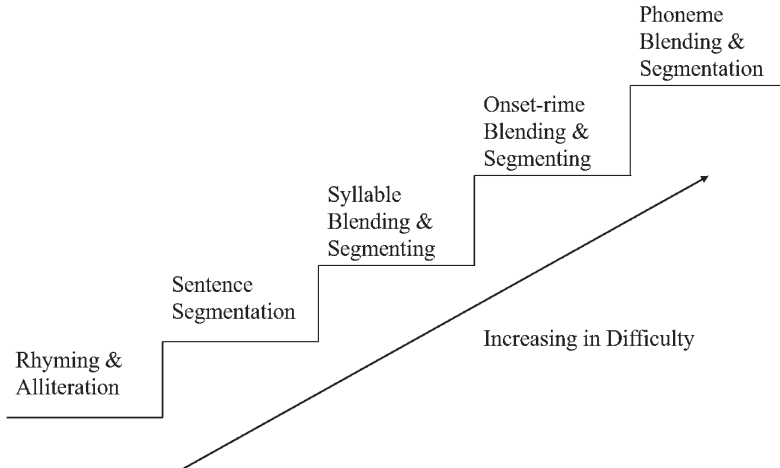
### **Phonological Awareness Training**

Phonological awareness refers to the ability to concentrate on the sound of speech separately from meaning and detect or manipulate sounds in words. It consists of four subskills: word, syllable, onset/rime awareness, and phonemic awareness (see Figure 3). As mentioned above, phonological awareness is a crucial skill for students’ literacy development and a predictor of later reading and spelling success (Kormos, 2017). In English-speaking countries, phonological awareness has been shown to enable reading and writing and has been linked to vocabulary acquisition (Bowey, 2001; Metsala, 1999). It is also vital for students learning English as a second language (e.g., Yeung et al., 2013). Therefore,

Japanese EFL learners must undergo phonological awareness training before proceeding to letter–sound relations.

**Figure 3**

*Phonological Awareness Continuum*



*Note.* Adapted from Chard, D. J., & Dickson, S. V. (1999). Phonological awareness instructional and assessment guidelines. *Intervention in School and Clinic, 34*, 262.

For Japanese EFL students, whose L1 does not require onset/rime awareness and phonemic awareness and has a unique level of sound called mora—the unit of time equivalent to an ordinary or normal short sound or syllable—learning onset/rime awareness and phonemic awareness does not occur naturally. Studies have shown that mora affects Japanese EFL students when they acquire English sounds and spellings (e.g., Tsuda & Takahashi, 2013). Therefore, for Japanese learners of English, phonological awareness should be taught in consideration of mora interference.



## **Phonics Instruction**

Currently, Japanese elementary, junior high, and high schools often expect students to memorize new English vocabulary. Some students do not find memorization easy, however, which causes them to be left behind. One effective teaching method for these learners is phonics, of which there are two main kinds: analytic phonics and synthetic phonics. Analytic phonics has been prevalent in the United States since the 1980s. Here, students learn spelling rules by analyzing and breaking down words they already know. Unlike synthetic phonics, another type of phonics method, analytic phonics does not teach sound blending. Analytic phonics is also called implicit phonics because the relation between sounds and letters is not directly taught but rather implicitly understood.

English-speaking countries introduce analytic phonics to children aged 4–5, which means that, in these countries, children receive a wealth of audio input before they encounter written instruction. Children in English-speaking countries are said to consume approximately 17,000 hours of audio input over five years. In Japan, however, EFL learners are exposed to a total of 210 credit hours of English in “foreign-language activities” and “foreign-language studies” at elementary school. Thus, care should be taken in teaching analytic phonics to establish sound–letter correspondence from words that these students already know.

A more recent phonics method, synthetic phonics, introduces letters in stories and contexts that are familiar to young children and uses multisensory cues to help them learn letters (e.g., Jolly Phonics). The United Kingdom and other countries are starting to use synthetic phonics to teach children who do not know English letters and sounds (Yamashita, 2015). Synthetic phonics has also been found effective for children whose first language is not English

(Stuart, 1999). Although in-service and preservice teachers take some time in acquiring the training skills within a short period, having the knowledge and skills associated with the phonics method allows teachers to support a wider range of students in classrooms.

### **Multisensory Language Teaching**

Multisensory language teaching is a teaching approach that uses visual, auditory, and kinesthetic senses simultaneously and is said to be more effective than single-sensory learning because it stimulates all areas of the brain (Shams & Seitz, 2008). Multisensory approaches have been found more effective for learners who experience problems obtaining information from specific senses (including students with dyslexia). This type of instruction can be used to improve students' phonological awareness, phonics skills, and print awareness.

One benefit to adopting the multisensory approach is that instruction is more memorable. Multisensory teaching involves traditional visual and auditory learning and physical instruction that incorporates motor senses, such as dance, and special materials that utilize the sense of touch. This type of learning is enjoyable, and students may store such an experience as episodic memory. Another advantage is that it can compensate for the weak phonological processing ability of children with dyslexia (Kormos & Smith, 2012).

Studies in EFL settings have shown the effectiveness of the multisensory approach in FL learning (e. g., Mori, 2014; Murakami, 2018). For example, Murakami (2018) reported educational practice on reading and writing the letters of the alphabet, English phonological awareness, and reading and writing words of the basic structure for fourth-grade students with reading and writing difficulties. She used kinesthetic sand, braid, whiteboard for tabletop, cardboard for skywriting practice, iPad apps to trace letters, and original teaching materials

(e.g., picture cards, games, magnets, etc.) in a yearlong training for a fourth-grade EFL student. The student showed a significant improvement in reading and writing alphabetic letters and in phonological awareness of English as well as in reading and writing tests of words with basic structures.

Although many of the reported multisensory language teaching practices have mainly focused on individual tutoring and small-group methods, they can also be adopted in mainstream classrooms. Since many students are not provided special treatment although teachers recognize they struggle in mainstream classes, as observed in a MEXT (2022) survey, such practice can benefit not only learners identified within the school as requiring special support but also those who need help but fall outside that category as well as those who do not necessarily require special support.

## **Conclusion**

This paper aimed to discuss issues surrounding students with dyslexia in EFL classrooms. To this end, this study provided an overview of dyslexia and explained its mechanism and manifestation in different languages. It also clarified how teachers can support students with dyslexia in EFL classrooms. Surveys of elementary, junior high, and high school teachers' perceptions of English learning stumbling blocks (e.g., Kagata et al., 2015; Yukimaru, 2020, 2022) have found that teachers have limited awareness of English reading and writing difficulties or English dyslexia. Many teachers also believe that they need to be trained in knowledge and teaching methods associated with English literacy difficulties and urgently so.

Another critical perspective entails delivering training in knowledge and teaching methods with respect to reading and writing difficulties in preservice

English teacher education programs at the university. By enhancing the knowledge and teaching skills in English literacy in these programs, trainee teachers will be empowered to work with a more diverse range of students when they officially become teachers. To this end, this paper suggested three ways to help students with dyslexia in EFL classrooms based on a universal design perspective. Future studies must develop practical training programs for both teachers and preservice teachers.

### **Acknowledgments**

This paper was supported by JSPS KAKENHI grant number 21K00737. I would like to thank Professor Hiroyuki Kusunoki for his insightful comments and suggestions.

## References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). <https://doi.org/10.1176/appi.books.9780890425596>
- Benesse Educational Research and Development Institute (2009). *First basic survey on English teaching in junior high schools (Survey of teachers and students), 2008–2009*. <https://berd.benesse.jp/global/research/detail1.php?id=3303>
- Bowey, J.A. (2001). Nonword repetition and young children's receptive vocabulary: A longitudinal study. *Applied Psycholinguistics*, 22(3), 441–469. <https://doi.org/10.1017/S0142716401003083>
- Metsala, J.L. (1999). Young children's phonological awareness and nonword repetition as a function of vocabulary development. *Journal of Educational Psychology*, 91(1), 3–19. <https://doi.org/10.1037/0022-0663.91.1.3>
- Bradley, L., & Bryant, P. E. (1978). Difficulties in auditory organisation as a possible cause of reading backwardness. *Nature*, 271(5647), 746–747. <https://doi.org/10.1038/271746a0>
- Carioti, D., Masia, M. F., Travellini, S., & Berlinger, M. (2021). Orthographic depth and developmental dyslexia: A meta-analytic study. *Annals of Dyslexia*, 71(3), 399–438. <https://doi.org/10.1007/s11881-021-00226-0>
- Carroll J, M., Maughan, B., Goodman, R., & Meltzer, H. (2005). Literacy difficulties and psychiatric disorders: Evidence for comorbidity. *Journal of Child Psychology and Psychiatry, and Allied Disciplines* 46(5), 524–532. <https://doi.org/10.1111/j.1469-7610.2004.00366.x>
- Doust, C., Fontanillas, P., Eising, E., Gordon, S. D., Wang, Z., Alagöz, G., Molz, B., 23andMe Research Team, Quantitative Trait Working Group

- of the GenLang Consortium, St Pourcain, B., Francks, C., Marioni, R. E., Zhao, J., Paracchini, S., Talcott, J. B., Monaco, A. P., Stein, J. F., Gruen, J. R., Olson, R. K., Willcutt, E. G., DeFries, J. C., Pennington, B. F., Smith, S. D., Wright, M. J., Martin, N. G., Auton, A., Bates, T. C., Fisher, S. E., & Luciano, M. (2022). Discovery of 42 genome-wide significant loci associated with dyslexia. *Nature Genetics*, *54*(11), 1621–1629. <https://doi.org/10.1038/s41588-022-01192-y>
- Fisher, S. E., & Defries, J. C. (2002). Developmental dyslexia: Genetic dissection of a complex cognitive trait. *Nature Reviews. Neuroscience*, *3*(10), 767–780.
- Ijima, M. (2020). Eigo no gakushu process to sono tsumazuki [The English learning process and its stumbling blocks]. In M. Otani. (Ed.), *Tokubetsu shien kyoiku no shiten de donokomo manabi yasui shougakko eigo no jugyo zukuri* [Creating elementary school English classes that are easy for all children to learn from the perspective of special needs education]. (pp. 27–40). Meiji Tosho.
- International Dyslexia Association (2021). *Frequently asked questions about dyslexia*. <http://www.interdys.org/FAQ.htm>
- Ishii, K. (2005). Strategies for reading and writing learning difficulties (dyslexia). *Science & Technology Trends Quarterly Review*, *15*, 13–31.
- Ijuin, M. & Wydell, T.N. (2018). A reading model from the perspective of Japanese orthography: Connectionist approach to the hypothesis of granularity and transparency. *Journal of Learning Disabilities*. *51*(5), 490–498. <https://doi.org/10.1177/0022219417718200>
- Japan Dyslexia Research Association (2014). *Understanding dyslexia*. [Dyslexia wo rikai suru tameni].
- Kormos, J. (2017). *The second language learning processes of students with*

- specific learning difficulties*. (Second Language Acquisition Research Series). Routledge.
- Kormos, J. & Smith, A. M. (2012). *Teaching languages to students with specific learning differences*. Multilingual Matters.
- Kagata, T., Murakami, K., Ito, M. Kawasaki, I., Morita, T., & Cheng, A. (2015). A survey concerning special educational needs in English class. *JES Journal*, 15, 142–154. [https://doi.org/10.20597/jesjournal.15.01\\_142](https://doi.org/10.20597/jesjournal.15.01_142)
- Kikuchi, T. (2022). *What 8.8% implies*. [8.8% ga imi suru mono] [https://note.com/tep\\_kikuchi/n/n9cf9f7d2e6db](https://note.com/tep_kikuchi/n/n9cf9f7d2e6db)
- Mori, M. (2014) Developing students who can actively participate in English classes with self-respect -Through an approach to increase students' phonological awareness [Jisonshin wo motte shutai teki ni eigo no jugyo ni sanko dekiru seito no ikusei: Onin ninshiki heno kiduki wo takameru torikumi wo toshite] *Eiken bulletin*, 26, 68–82. [Ihttps://www.eiken.or.jp/center\\_for\\_research/pdf/bulletin/vol26/vol\\_26\\_p68-p82.pdf](https://www.eiken.or.jp/center_for_research/pdf/bulletin/vol26/vol_26_p68-p82.pdf)
- Meara, P., Coltherart, M., & Masterson, J. (1985). Hidden reading problems in ESL learners. *TESL Canada Journal*, 3, 29–36. <https://doi.org/10.18806/tesl.v3i1.472>
- Moriwaki, H. (2007). What is the characteristics of dyslexia among Japanese EFL learners? *LEO* (Master thesis Tokyo Gakugei University), 38, 23–67.
- Ministry of Education, Culture, Sports, Science, and Technology. *Definitions of major developmental disabilities*. [https://www.mext.go.jp/a\\_menu/shotou/tokubetu/hattatu.htm](https://www.mext.go.jp/a_menu/shotou/tokubetu/hattatu.htm)
- Ministry of Education, Culture, Sports, Science, and Technology (2022). *Survey on students who have possibility of developmental disabilities and special educational needs in regular class*. [https://www.mext.go.jp/b\\_menu/](https://www.mext.go.jp/b_menu/)

houdou/2022/1421569\_00005.htm

- Morrison, A. (2014). Literacy Development and Disabilities. <https://slideplayer.com/slide/7642968/>
- Murakami, K. (2012). Reviewing dyslexia among students in Japanese English education. *Journal of Kobe Yamate College*, 55, 67–76.
- Murakami, K. (2015). The review of the teaching of reading and writing in the early stages of the acquisition of decoding and phonological awareness as basic skills. *Journal of Kobe Yamate College*, 58 57–73. <https://cir.nii.ac.jp/crid/105056953546285670>
- Murakami, K. (2018). Practical Report of Teaching the Alphabet, Phonological Awareness and Word reading to an Elementary Student with Reading and Writing Difficulties, *Journal of Kobe Yamate College*, 61, 39–53.
- Murakami, K. (2021). *Ko ni ojita eigoshido wo mezashite: Universal design no jugyo zukuri*. [Toward individualized English language instruction: Creating classes with universal design]. Kuroshio Shuppan.
- Otani, M., Ijima, M., Tsuido, M., & Ogawa, I. (2015). A thought to English education with supports from special needs education. *Memoirs of the faculty of education, Shimane University*, 48, 49–53.
- Pennington B. F. (2006). From single to multiple deficit models of developmental disorders. *Cognition*, 101(2), 385–413. <https://doi.org/10.1016/j.cognition.2006.04.008>
- Pugh, K. & Verhoeven, L. (2018). Introduction to this special issue: Dyslexia across languages and writing systems. *Scientific Studies of Reading*, 22(1), 1–6. <https://doi.org/10.1080/10888438.2017.1390668>
- Seymour, P. H. K. (2005). Early reading development in European orthographies. In M. J. Snowling & C. Hulme (Eds.), *The science of reading: A handbook*



- 296–315. Blackwell Publishing. <https://doi.org/10.1002/9780470757642.ch16>
- Seymour, P. H. K., Aro, M., & Erskine, J. M. (2003). Foundation literacy acquisition in European orthographies. *British Journal of Psychology*, *94*(2), 143–174.
- Shams, L., & Seitz, A. R. (2008). Benefits of multisensory learning. *Trends in Cognitive Sciences*, *12*(11), 411–417. <https://doi.org/10.1016/j.tics.2008.07.006>
- Shaywitz, S. E., & Shaywitz, B. A. (2008). Paying attention to reading: The neurobiology of reading and dyslexia. *Development and Psychopathology*, *20*(4), 1329–1349. <https://doi.org/10.1017/S0954579408000631>
- Shaywitz, S. E., Shaywitz, B. A., Fletcher, J. M. & Escobar, M. D. (1990). Prevalence of reading disability in boys and girls: Results of the Connecticut Longitudinal Study. *JAMA*, *264*(8), 998–1002. <https://doi.org/10.1001/jama.1990.03450080084036>
- Stuart, M. (1999), Getting ready for reading: Early phoneme awareness and phonics teaching improves reading and spelling in inner-city second language learners. *British Journal of Educational Psychology*, *69*(4), 587–605. <https://doi.org/10.1348/000709999157914>
- Tsuda, C. & Takahashi, N. (2014). The different influences of phoneme-based and mora-based phonological awareness on learning English among Japanese children, *Japanese Journal of Developmental Psychology*, *25*, 95–106. <https://doi.org/10.11201/jjdp.25.95>
- Uno, A., Wydell, T.N., Haruhara, N., Kaneko, M., & Shinya, N. (2009). Relationship between reading/writing skills and cognitive abilities among Japanese primary-school children: Normal readers versus poor readers

- (dyslexics). *Reading and Writing*, 22(7), 755–789. <https://doi.org/10.1007/s11145-008-9128-8>
- World Health Organization. (2019). 2A85.5 Mantle cell lymphoma. In *International statistical classification of diseases and related health problems* (11th ed.). <https://icd.who.int/browse11/l-m/en#/http://id.who.int/icd/entity/1804127841>
- World Health Organization. (2019). 6A03. Developmental learning disorder. In *International statistical classification of diseases and related health problems* (11th ed.). <https://www.findacode.com/icd-11/code-2099676649.html>
- Wydell, T. N., & Butterworth, B. (1999). A case study of an English-Japanese bilingual with monolingual dyslexia. *Cognition*, 70(3), 273–305. [https://doi.org/10.1016/S0010-0277\(99\)00016-5](https://doi.org/10.1016/S0010-0277(99)00016-5)
- Yamashita, K. (2015). Synthetic phonics and special needs education using multi-sensory approach [Takankaku wo mochiita synthetic phonics to tokubetsu shien kyoiku] <https://kayokoyamashita.com/archives/7380>
- Yeung, S. S., Siegel, L. S., & Chan, C. K. (2013). Effects of a phonological awareness program on English reading and spelling among Hong Kong Chinese ESL children. *Reading and Writing*, 26(5), 681–704. <https://doi.org/10.1007/s11145-012-9383-6>
- Yukimaru, N. (2020). Why do my students have trouble learning English?:Voices of high school teachers in Japanese EFL classrooms. *Bulletin, Faculty of Foreign Studies, Kitakyushu University*, 151, 89–114.
- Yukimaru, N. (2022). A survey on teachers' perceptions of difficulties in reading and writing English in Elementary and Junior High Schools. *AUPELL Journal*, 1, 28–43.

- Ziegler, J. C., Muneaux, M., & Grainger, J. (2003). Neighborhood effects in auditory word recognition: Phonological competition and orthographic facilitation. *Journal of Memory and Language*, *48*(4), 779–793. [https://doi.org/S0749-596X\(03\)00006-8](https://doi.org/S0749-596X(03)00006-8)
- Ziegler, J. C., & Goswami, U. (2005). Reading acquisition, developmental dyslexia, and skilled reading across languages: A psycholinguistic grain size theory. *Psychological Bulletin*, *131*(1), 3–29. <https://doi.org/10.1037/0033-2909.131.1.3>

