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REVIEW OF RECENT SCHOLARSHIP

Specific learning differences in learning, teaching, and assessing additional languages

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Abstract

The prominence and significance of research on specific learning differences (SpLDs) in language learning, teaching, assessment, and teacher education have substantially increased in the past ten years, which justifies the need to review the findings of studies conducted in recent years. The growth of the field also requires that the scope of the review is extended to research in the area of L2 assessment and teacher education. In our paper, we first offer a short discussion of different views of disability and inclusion and a succinct summary of the definitions of SpLDs. We then summarize recent research developments in five main areas: (1) the impact of SpLDs on L2 learning and achievement, (2) the identification of SpLDs in multilingual contexts, (3) teaching techniques and programmes in supporting language learners with SpLDs, (4) assessing the second language competence of test-takers with SpLDs, and (5) raising language teachers' awareness and knowledge of SpLDs.

In our conclusion, we highlight the implications of recent scholarship in this field for language teaching and testing, teacher education, and suggest further research directions.

Keywords: language teaching pedagogy; second language assessment; second language learning; specific learning differences; teacher education

1. Introduction

In our globalized world, proficiency in another language is an indispensable skill. Therefore, it is crucial to ensure the accessibility of second language (L2) education for all and that students who have special educational needs receive efficient support in learning additional languages. Additional languages can include another language taught in the classroom, which is traditionally referred to as a foreign language, a second language that is the language or medium of instruction in the context but is different from students' home language (usually referred to as second language learning contexts or multilingual contexts), or the study of a heritage language, 'a socio-politically minority and/or minoritized language acquired as the first or one of the first languages in a bilingual or multilingual context' (Montrul, 2023, p. 399). Individual differences that can exert a potential impact on processes and outcomes of L2 learning have been extensively investigated. Nonetheless, how students with special educational needs, particularly those who have specific learning differences (SpLDs), that is, difficulties in the domains of literacy (dyslexia and dysgraphia/dyspraxia) and numeracy (dyscalculia), acquire additional languages had been given little attention in the past. Specific learning differences can have a substantial effect not only on the development of first language (L1) literacy skills but

also on L2 learning processes and outcomes. As a consequence, it is of great importance that we gain detailed insights into how individuals with SpLDs acquire additional languages if we want to ensure equitable educational opportunities for this group of L2 learners. It is also essential that we understand how developmental trajectories of children who speak different home language(s) from the contextually, socially, and educationally dominant language are affected by SpLDs to identify their learning strengths and weaknesses in a timely manner and support the acquisition of literacy skills in the language of schooling. Furthermore, the field of second language education also needs to be provided with relevant empirical evidence about the effectiveness of educational programmes and teaching methods that can be applied to enhance the second language and literacy skills of individuals with SpLDs.

The increasing accessibility of educational opportunities worldwide has also led to a rise in the number of candidates taking international tests and among them there are many students who have diverse needs, including those with disabilities. Consequently, it is crucial that neither the design nor the implementation of these tests presents barriers for these students and that assessment procedures are both valid and fair. In the past few years, the field of L2 assessment has directed considerable research effort into investigations of test-fairness for test-takers with SpLDs. Although studies are still few in number, a growing number of publications have examined the utility of special arrangements in supporting candidates with disabilities, including those with SpLDs, to perform to the best of their abilities in language tests.

As a result of the augmented focus and accumulated research insights on SpLDs in the field of cognitive psychology, second language acquisition, language education, and assessment, the need to enhance language teachers' awareness and expertise in inclusive language teaching methodologies has also been recognized. Several initiatives, including larger scale European Union funded projects (e.g. Dyslexia for Teachers of English as a Foreign Language), massive open online courses (e.g. Dyslexia and Foreign Language Teaching) on FutureLearn, as well as smaller scale programmes in South and East Asia (e.g. Indrarathne, 2019), have been launched to promote the inclusion of language learners with SpLDs in a variety of instructional settings. Researchers, who were often part of the team that designed and delivered these teacher education programmes, have been keen to gauge the impact of these programmes on teachers' knowledge, self-confidence, and attitudes towards inclusion.

In sum, the prominence and significance of research on SpLDs in language learning, teaching, assessment, and teacher education have substantially increased in the past ten years, which justifies the need to review the findings of studies conducted since 2018, which is the date of the last publication included in Kormos' (2020) research timeline on SpLDs. The growth of the field also requires that the scope of the review is extended to research in the area of L2 assessment and teacher education. In our review, we mainly report studies in foreign and second language contexts as most research has been conducted with either students who acquire an additional language in classroom settings or children whose home language(s) differ from that of the language schooling. Following current conventions in second language research, we use the term L2 to include all the different types of additional learning contexts, but where relevant we specify specific characteristics of the setting in which an additional language was learned. To our knowledge, no existing studies have examined heritage language learners with SpLDs, and for this reason this group is not included in our review.

The review was conducted through a comprehensive search of databases such as EBSCOHost, Google Scholar, Web of Science, and Scopus. We have included studies that focus on SpLDs in general as well as dyslexia in particular, which is one of the most widely researched subtypes of SpLD in our field, and which has a significant impact on L2 learning processes and outcomes (Kormos, 2016). Research that does not categorize students as having an SpLD or dyslexia based on prior identification by a certified expert but classifies participants in categories of attained level in a relevant skill area, such as 'typical' and 'struggling/poor' readers/comprehenders/writers is considered. Original terminology applied in the reviewed studies will be reported, but we aim to avoid the use of language which promotes a deficit perspective of disabilities and instead emphasizes 'that people are different

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without reducing those differences to deficiencies and without attributing a lesser value to the individual' (Cioè-Peña, 2021, p. 22). In our review, we will first offer a short discussion of different views of disability and inclusion and a succinct summary of the definitions of SpLDs. We will then summarize recent research developments in five main areas: (1) the impact of SpLDs on L2 learning and achievement, (2) the identification of SpLDs in multilingual contexts, (3) teaching techniques and programmes in supporting language learners with SpLDs, (4) assessing the second language competence of test-takers with SpLDs, and (5) raising language teachers' awareness and knowledge of SpLDs.

2. Disabilities, inclusion, and specific learning differences

Despite extensive global and local endeavours that promote the use of transparent and non-offensive language, agreeing on universally accepted terminology relating to disabilities and inclusion can be challenging. Even the term 'disability' itself lacks a clear-cut definition. According to the UK Equality Act (2010), disability is 'a physical or mental impairment which has a substantial and long-term adverse effect on one's ability to carry out normal day-to-day activities', a definition that also encompasses SpLDs. The United Nations Convention on the Rights of Persons with Disabilities recognizes that disability is an evolving concept (United Nations, 2006), implying that definitions may change as societal perceptions evolve and more voices of disabled individuals are represented in the discourse. The recent social justice model of dis/ability highlights the importance of understanding how conceptualizations and discourses of dis/ability can 'sustain hegemonic divisions of power and ideals of normalcy' (Cioè-Peña, 2021, p. 21).

The terms used to label SpLDs differ hugely across contexts. In the USA, the fifth edition of the Diagnostic and Statistic Manual of Mental Disorders of the American Psychiatric Association (DSM-5, American Psychiatric Association, 2013) uses the term *specific learning disorder*. The terms *learning disability* and *learning difficulty* are frequently applied in psychological research and legislation in Canada, Australia, and the United Kingdom. These terminologies are used within *deficit models* of disabilities that view disabilities as deficiencies and consider them as a series of obstacles in one's lives. The deficit models, which also embody medical conceptualizations of disabilities as 'disorders', resulted in educational approaches with the main aim of meeting individuals' specific needs (Thomas & Loxley, 2007). In educational provision based on this model, no consideration is given to how the educational context and prevalent teaching and assessment methods create barriers to effective learning.

To counter these perspectives, MacKay (2006) suggested the use of the expression 'specific learning difference' for students who experience barriers to learning due to dyslexia, autism, and ADHD. However, in most countries and educational and diagnostic contexts, SpLDs only comprise dyslexia, dyspraxia, dyscalculia, and dysgraphia (see Sewell, 2022). The term SpLDs also reflects the view that is endorsed by the United Nations Convention on the Rights of Persons with Disabilities that disability is a socially constructed barrier, which 'may hinder full and effective participation in society on an equal basis with others' (United Nations, 2006, p. 4). Thus, SpLDs are seen as differences in individuals' abilities which might pose challenges in particular aspects of learning if their environment does not accommodate their needs (Sewell, 2020). According to the *interactional view of disabilities* (Norwich, 2009) that forms the basis of inclusive educational practices, disabilities hinder full participation in society and education because individuals' specific characteristics interact with barriers in the environment. Therefore, the main aim of inclusive education is to understand what barriers students face that prevent them from learning effectively and to remove these obstacles to participation and success. The more recent *social justice perspective* views SpLDs (originally based on the work of Singer [1998]) as part of the naturally occurring diversity of human cognitive development and functioning. The conceptualization of and the advocacy movement for neurodiversity places emphasis on

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recognizing the diversity of the lived experiences and identity of neurodiverse individuals (Kapp et al., 2013).

The cognitive conceptualization of SpLDs in our review is based on the fifth edition of the Diagnostic and Statistic Manual of Mental Disorders (DSM-5) of the American Psychiatric Association (2013). Although DSM-5's (American Psychiatric Association, 2013 definition and characterization of SpLDs and its application to education is not without problems (see e.g. Peters & Ansari, 2019), it offers an empirically grounded conceptualization of SpLDs. One useful aspect of the description of SpLDs in DSM-5 is that it brings together various subtypes of SpLDs, such as dyslexia and dyscalculia, under a joint umbrella term of SpLDs, and thereby highlights the substantial overlap between these subtypes of SpLDs. Nonetheless, DSM-5 also acknowledges that various subcategories of SpLDs exist, of which 'specific learning disorder in reading' and 'specific learning disorder in written expression' are of high importance in multilingual contexts. The DSM-5 differentiates word-level decoding problems (dyslexia) from higher-level text comprehension problems (specific reading comprehension impairment). However, word- and text-level comprehension problems can also co-occur. In the writing domain, SpLDs can cause challenges with spelling, punctuation, and grammatical accuracy, as well as clarity of expression and coherent organization of ideas. The DSM-5 applies the *processing strengths and weaknesses* framework (Hale et al., 2010) that recognizes that each individual with an SpLD displays different strengths and weaknesses and recommends that general educational approaches and additional support be tailored to students' individual profiles. The DSM-5 lists weaknesses in the areas of working memory, executive functioning (planning, organizing, strategizing, and paying attention), processing speed, and phonological processing as key characteristics of SpLDs.

Although the cognitively oriented conceptualization of SpLDs in our review is based on a primarily medical/psychological model, where relevant we still prefer to use the term 'specific learning differences'. This terminology is in line with the interactional and social justice views of disabilities (Norwich, 2009; Sewell, 2022) that can guide L2 research in this field in exploring the strengths and weaknesses of L2 learners and multilingual language users with SpLDs and the complex and dynamic interactions between individuals and their multilingual educational contexts.

3. The impact of specific learning differences on second language learning and achievement

The previous research timeline (Kormos, 2020) covered two distinct areas of the (1) cognitive and (2) affective impact of SpLDs on L2 learning processes and outcomes. In contrast to the substantial increase in the studies examining the cognitive correlates of SpLDs and their overall impact on L2 learning and achievement, to our knowledge, only two recent studies have focussed on the affective aspects of L2 learning. Venagli and Kupisch (2024) examined differences in self-perceived competence and L2 learning motivation between dyslexic L2 users of English in Italy and Germany (aged between 18 and 24), as well as the relationship between these two variables. They found that dyslexic participants from Germany reported higher L2 competence in all four skills and they also exhibited higher levels of L2 motivation, which the authors explained with typological similarities between German and English and different language teaching approaches in the two countries. L2 learning motivation, which was conceptualized as the composite of ideal- and ought-to L2 self (Dörnyei, 2009), was a strong predictor of perceived L2 competence for both groups, highlighting the important role future-related visions and external motives can play in L2 achievement among dyslexic L2 learners (see similar previous findings in Csizér et al's (2010) study). Venagli and Kupisch' (2024) study was also novel in asking participants to rate dyslexia awareness among their peers and teachers. The results showed that a lower rate of awareness of dyslexia in the educational context was associated with lower motivation and self-esteem of dyslexic L2 learners. This finding establishes an important link to the need for raising teachers' awareness of SpLDs and inclusive language teaching practices (see our review below).

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Another study that did not focus on L2 learning outcomes and processes was conducted by Gavriilidou et al. (2021) and examined differences in self-reported learning strategy use between Greek dyslexic and non-dyslexic L2 learners of English (aged 9–15 years). They found that dyslexic learners applied fewer cognitive and social strategies and used more metacognitive strategies for supporting their language learning processes than their non-dyslexic peers suggesting that dyslexic learners might benefit from more awareness raising and training in the use of effective language learning strategies.

Before discussing the impact of SpLDs on each separate L2 language skill and knowledge area, it is important to consider the results of a recent study by Burbank (2024) that has investigated the language learning experiences and achievement of L1 English speaking dyslexic students in high-stakes secondary school exams in the UK. Burbank's results showed that dyslexic students (aged around 18) achieved similar scores in these exams in Latin and Spanish, but they performed below their non-dyslexic peers in French. Burbank's interviews with dyslexic learners of these modern foreign languages also revealed that the higher transparency of the orthography of Spanish and Latin as well as smaller class sizes for these languages than for French might explain these differences in attainment. Students also mentioned positive language learning experiences, effective teaching methods, and available support as key factors that play a role in their attainment.

3.1. The impact of SpLDs on L2 reading

Studies in the period of the review have examined the impact of SpLDs on language learning outcomes and achievement from a number of perspectives and in a variety of settings. As L2 learners with SpLDs tend to experience difficulties not only in L1 but also in L2 reading, one thread of studies has focussed on the impact of SpLDs on L2 reading outcomes in contexts where L2 English is learned predominantly in classroom-based contexts, and there has also been a growth of studies in immersion, content-integrated, and multilingual contexts.

3.2. Word-level L2 reading

Most research on reading in alphabetic languages has been concerned with the extent to which dyslexic L2 learners from various L1 backgrounds such as Italian (Fazio et al., 2021), French (Commissaire & Demont, 2022), Spanish (Suárez-Coalla et al., 2020), and Polish (Łockiewicz & Jaskulska, 2019; Łockiewicz et al., 2020) differ from their peers in terms of their word-level reading skills in L2 English as a foreign language. Fazio et al.'s (2021) study showed that Italian children from 4th to 8th Grade (10–14 years old) with reading difficulties in their L1 performed below their peers with no reading difficulties in tests of L2 word and non-word reading. Similar findings were obtained in L2 English word- and non-word reading by Suárez-Coalla et al. (2020) for Spanish dyslexic children (8–12 years) and Gkountakou and Talli (2024) for Greek dyslexic children (9–12 years). The significant impact of dyslexia on L2 English word-level reading skills was also demonstrated in Pan et al.'s (2024) study of dyslexic children from three different Chinese L1 backgrounds (Beijing, Hong Kong, and Taipei). A relatively high latency of co-occurring L1 Chinese and L2 English word-level decoding difficulties (approx. 50%) was observed in a Chinese CLIL programme with students aged 13 to 14 by Li et al (2021). Shakory et al.'s (2023) longitudinal study in a French-Canadian immersion context established a relatively large overlap of L1 English and L2 French word-level reading difficulties (between 56% and 86%) using the joint predictors of word-reading fluency and accuracy. Their findings also revealed that children who had difficulties in reading in both languages in Grade 1 (age 6) continued to exhibit these challenges in Grade 3 (age 9), but almost all of those who were 'struggling' readers in only one of the languages became typical readers by Grade 3.

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The only study during the review period that showed no statistically significant difference in L2 English real-word and non-word reading between children with L1 reading difficulties and their peers with no such difficulties was conducted by Łockiewicz et al. (2020) with Polish children aged 14. The authors argued that the L2 proficiency of students might not have been sufficiently high for differences between the two groups of learners to emerge. The sample size of this study was also relatively low resulting in reduced statistical power.

Fazio et al.'s (2021) data suggested that working memory and phonological skills in L1 accounted for the lower L2 word-reading performance of the group of children (10–14 years) who had reading difficulties in their L1 Italian. These findings were also supported by Łockiewicz and Jaskulska's (2019) study with Polish learners of L2 English (aged 16) who had dyslexia. In their research, L2 real-word reading accuracy in the dyslexic group of students was predicted by verbal short-term memory capacity, phoneme blending, and rapid automatized naming skills.

Commissaire and Demont's (2022) study examined L2 word reading of L1 speaking French children (11–15 year old) in L2 English as a foreign language, and they were also interested in finding out to what extent the differences between L1 and L2 orthography and sound-letter correspondences influence word-reading accuracy in silent reading and reading out loud. Dyslexic participants performed best in reading words that shared L1 and L2 orthographic patterns and were congruent in sound-spelling correspondence in both English and French. In contrast, they were least accurate in reading words that shared L1 and L2 orthographic features but were incongruent in terms of letter-sound correspondences in the two languages. Commissaire and Demont's (2022) research demonstrated that establishing new representations of sound-letter relationships when there is cross-linguistic similarity is a resource-demanding process in which dyslexic students might need additional support. Suárez-Coalla et al.'s (2020) study also highlights that word-reading difficulties might depend on the characteristics of words with longer non-words being harder to process for dyslexic L2 readers than shorter real-words.

3.3. Text level L2 reading

Another area investigated in a number of recent studies is the impact of L1 reading skills and dyslexia on L2 text-level reading comprehension. In a study of Slovenian children (aged 10–11) learning L2 English in classroom settings, Košak-Babuder et al. (2019) found that students with an official identification of dyslexia performed significantly below the level of their peers in a test of L2 reading comprehension. Levlin et al.'s (2024) study, which was also conducted in a foreign language context, revealed that Swedish students aged 15 who had reading comprehension difficulties in their L1 Swedish were 23 times more likely to score lower on a test of L2 English comprehension (combined reading and listening text comprehension scores) than their typically developing peers. Participants who had mixed word-level and text-comprehension difficulties were six times more likely to achieve below the level of their peers with no L1 reading-related difficulties. However, in this age group, L1 Swedish word-level reading difficulties were not associated with L2 text comprehension. L1 reading fluency in German was not significantly related to L2 English sentence comprehension in Maurer et al.'s (2021) study conducted with Swiss children (aged 9) from mono- and bilingual language backgrounds either. Kormos et al.'s (2019) analysis also showed that 5% of dyslexic children belonged to the above average L2 reader group and 15% of participants in the below average L2 reader group were not dyslexic. These findings suggest that as children's word-level decoding skills in their L1 develop and become automatized as a result of literacy instruction, they do not reliably predict text comprehension difficulties in an L2 acquired in classroom contexts.

In an immersion context, D'Angelo et al.'s (2020) study focussed on Anglophone children in French immersion in Canada and found that the shared variance in reading comprehension difficulties in the participants' L1 English and L2 French was 41.7% at age 9 (Grade 3). They explained the relatively low overlap in text reading difficulties in the two languages with reference to Elwér et al.'s (2013) research

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that demonstrated that children's reading comprehension difficulties generally become apparent in about Grade 4 when oral language comprehension abilities and word-level decoding skills contribute similarly to written text comprehension (e.g. Simple View of Reading, Gough & Tunmer, (1986) and its use in L2 research reviewed by Sparks, 2021). In D'Angelo et al.'s (2020) study, poor comprehenders in L1 English and L2 French were also found to differ from their peers with average and above average reading comprehension scores in vocabulary knowledge in both of their languages as early as in Grade 1. A further important aspect of this research was that it involved multilingual participants representing the diverse linguistic landscape of the Canadian context.

Since the publication of Kormos' (2020) research timeline, there has been a clear expansion of research involving instructed Chinese L2 learners of English as a foreign language (e.g. Gao et al., 2019), students participating in a CLIL program in China (Li et al., 2021), and bilingual Chinese-English children in Hong Kong (e.g. Chung & Lam, 2020; Deng & Tong, 2021; Huo et al., 2022; Tong et al., 2022). One line of studies has investigated the extent of overlap of text reading difficulties in participants' L1 that uses a logographic writing system and L2 English that has an alphabetic system and the predictors of reading difficulties in the two languages. In a foreign language learning context, Gao et al.'s (2019) study with children aged nine to ten from urban and rural locations in China, the co-occurrence of L1 Chinese and L2 word-reading difficulties was only 36%. The lower overlap might be partly due to the shorter duration of English language instruction the students received and the younger age of participants, but might also be the result of the fact that they used a spelling test in L2 English as a proxy measure of L2 reading ability, which does not seem to be a valid tool for assessing L2 reading skills. Gao et al.'s (2019) research also called attention to the urban-rural divide in educational resources and opportunities that resulted in a higher prevalence of L2-related difficulties in rural contexts than in urban settings in their study.

In the bilingual context of Hong Kong where English is learned from the age of 3.5 in kindergarten, Tong et al. (2018) found that around half of the children (aged around ten) who were classified as poor text comprehenders in L1 Chinese in Hong Kong also belonged to the poor comprehender group in L2 English. In a content-integrated language learning (CLIL) context in China, Li et al. (2021) showed that students (aged 13–14) who had reading comprehension difficulties in L1 Chinese scored significantly lower in an L2 English reading comprehension test than those participants who had L1 word-decoding difficulties or were typically developing L1 Chinese readers.

Another line of research conducted with Chinese learners aimed to identify the predictors of L2 English reading performance. Deng and Tong's (2021) research investigated the differential role of segmental and suprasegmental phonological awareness in L1 Chinese and L2 English text comprehension and concluded that Cantonese lexical tone awareness played an important role in both L1 and L2 text reading difficulties. Tong et al.'s (2018) study found that in addition to word-decoding skills, rapid automatized naming, and phonological awareness in L1, which are well-established factors that account for L2 English reading difficulties for learners from alphabetic language backgrounds, morphological awareness in L1 Chinese contributed significantly to L2 text comprehension. Chung and Lam's (2020) study with young adolescent students aged 12 to 13 provided evidence for the prominent role of the same factors except for phonological awareness in L1 Chinese, which might be because with the development of literacy skills, the influence of phonological awareness tends to decrease (Landerl et al., 2013). However, Tong et al.'s (2022) research failed to identify morphological awareness as an underlying ability that would account for differences in L2 reading performance of groups of children (aged 10–11) with varying levels of difficulties in L1 and L2 reading comprehension. Instead, their data indicated that these groups differed in syntactic awareness and argued that lower levels of syntactic awareness in L1 Chinese might result in difficulties in L2 English syntactic awareness, which then might exert a negative impact on L2 text comprehension. This recent line of research highlights the need to consider a wider array of linguistic abilities in identifying L2 reading difficulties among Chinese L1 speakers and to take into account the shift in the role that these underlying L1 abilities might play with cognitive maturation, L1 literacy instruction, and L2 instruction and exposure.

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Finally, Kuester-Gruber et al.'s (2023) work is unique in its focus on how German children with dyslexia learn to read Chinese characters and its innovative use of eye-tracking methodology. In this study, 18 dyslexic children and 22 non-dyslexic children aged around ten were taught Chinese in eight consecutive 3-hour sessions. After the teaching sessions, the accuracy of character naming and the duration and number of eye fixations on the Chinese characters were measured. Dyslexic participants did not differ from their peers in terms of their eye movements, which suggests that their visual-spatial processing of Chinese characters is not different from that of their non-dyslexic peers. However, they scored lower than their peers both in naming the characters in German and Chinese, but the difference was more pronounced when the characters were named in Chinese. These findings suggest that dyslexic learners from alphabetic language backgrounds might have challenges with learning to read in Chinese due to the limitations of verbal working memory and lower levels of phonological awareness.

Overall, the research reviewed during the period seems to align with the results of von Hagen et al.'s (2021) meta-analysis that demonstrated a significant effect of L1 reading difficulties on L2 word- and text reading regardless of similarities and differences between the target language and the L1 of the participants, onset of L2 instruction, and the age of the students. Although research conducted in immersion and CLIL settings is limited during this period compared to instructed foreign language learning contexts, previous studies provide ample evidence for the overlap of L1 and L2 word- and text level decoding difficulties of bilingual children in a variety of immersion contexts across languages with different orthographic systems (for a review see Gottardo et al., 2021). Nonetheless, the focus of the majority of studies still remains on English as an L2. There would be a need to investigate a wider range of target languages, and not just European ones, such as various languages used in education in Asia and Africa that might not be spoken by children at home in these contexts.

3.4. The impact of SpLDs on L2 writing

3.4.1. Spelling

Another area where there has been growth is the examination of the impact of SpLDs on L2 writing at the lower level of spelling and higher level text composing skills. In Fazio et al.'s (2021) study, which was already reviewed above, Italian children with reading difficulties spelled half as many words correctly in a dictation task as their peers with no reading difficulties and the most important predictors of L2 word spelling accuracy were phonological awareness in L1 Italian and working memory capacity. Significant differences in L2 English word spelling accuracy between dyslexic and non-dyslexic adolescents in Hong Kong, albeit with a smaller performance gap of around 30%, were also observed in Chung and Lam's (2020) research. Their findings also showed that rapid letter naming, and L2 English morphological and phonological awareness contributed significantly to L2 spelling accuracy in a dictation task. In another study in the same context with younger children (8–9 years old), Huo et al. (2022) found that participants with phonological and/or orthographic processing difficulties performed below their peers with no difficulties in an L2 word dictation task. A longitudinal study with kindergarten children (aged 3–4) in Hong Kong by Yeung and Qiao (2019) showed that children at risk of spelling difficulties lagged behind their peers in the development of the spelling of phonemes of short words and that spelling performance was predicted by L2 phonemic awareness and L2 vocabulary knowledge. In a qualitative interview study conducted in an Irish immersion context (Aindriú, 2021), class teachers and parents also gave account of dyslexic children's spelling difficulties and potential confusions between spelling in L1 English and L2 Irish. The only study that has detected no differences between dyslexic and non-dyslexic L2 learners is that of Łockiewicz et al. (2019), which compared the frequency of spelling errors in a free writing task of Polish teenagers. They hypothesized that students might have used words that they could spell correctly and might have consciously avoided those lexical items whose orthographic form they were uncertain about. The potential moderating role of the socio-economic context in the development of lower level L2

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writing skills such as spelling is demonstrated by Gao et al.'s (2019) results (mentioned above with regard to L2 reading and the urban-rural divide) as well as Fazio et al.'s (2021) findings showing that the level of mother's education had a significant link to L2 spelling skills.

3.4.2. Text-level writing

Herbert et al. (2020) carried out a longitudinal study in Canada with L1 English and L2 English speaking multilingual children between Grades 4 and 6 (aged 10–12). They divided their participants into typical readers, readers with word decoding difficulties, and readers with text comprehension difficulties, and examined the development in L2 writing skills using tests of punctation, mechanics, and a story-writing task. They found that regardless of language background, students who had either type of reading difficulties performed below those with typical reading skills in terms of overall story writing scores, the use of contextual conventions, contextual language use, and organization. They also produced fewer well-constructed sentences and complex and compound sentences, and wrote shorter stories than their peers. In terms of spelling, writers with word-level reading difficulties spelled fewer longer words correctly than those with text-level comprehension difficulties, who in turn also performed below their typically developing peers in this regard. Herbert et al.'s (2020) study has also shown that the writing development of children from mono- and multilingual backgrounds follows a similar path, but the developmental trajectory of children with reading difficulties in the majority language lags behind those of typical readers.

Li et al.'s (2023) study was carried out in China in an English-immersion context and investigated summaries written by Grade 8 students (aged 13–14). Similar to Herbert et. al's (2020) study, participants were classified as 'typical' readers, poor-decoders, and poor comprehenders in L1 Chinese and then also in L2 English. The summaries of L2 learners who had below average decoding and text comprehension skills in L1 Chinese included fewer themes than the work of those who belonged to the 'typical' reader category. Participants with below average text comprehension scores incorporated fewer main ideas and important details in their summaries than typical readers. These results show that reading-related difficulties in L1 can have a significant impact on performance in writing tasks that involve the integration of reading and writing skills.

Selhström et al. (2022, 2023) conducted a larger scale study in a foreign language context in Sweden and examined differences in L2 writing quality of upper secondary school students (17–18 years old) with and without reading difficulties in their L1 Swedish. In the first part of their project (Sehlström et al., 2022), students with L1 word-level decoding difficulties, L1 text-level comprehension difficulties, and no difficulties wrote an argumentative essay which was assessed for content, cohesion, coherence, vocabulary, language use, spelling, and punctuation. The poor comprehender group received significantly lower scores in terms of cohesion, language use, and spelling than the typically developing group, but there were no statistically significant differences between the group with word-level decoding difficulties and the participants who had no reading difficulties. In the second part of their project, Selhström et al. (2023) examined the argumentative text quality and writing self-efficacy of Swedish secondary school students, and they divided the participants into groups with word- and or/text-level reading difficulties in L1 Swedish and no reading difficulties. They found that participants with L1 reading difficulties displayed lower levels of confidence in their L2 writing abilities, and they achieved lower writing scores than their peers. These results are similar to those obtained in Levlin et al.'s (2024) study, which was already reviewed in the previous section in terms of findings for L2 reading comprehension. Levlin et al.'s data suggested that children who had been identified to display L1 reading difficulties in primary school were 74% more likely to have lower scores in a national test of L2 writing skills than those with no L1 Swedish reading difficulties.

Álvarez-Cañizo et al. (2023) investigated the quality of compositions on a familiar topic (family or hobbies) written by Spanish children with dyslexia (aged around 12) in an instructed classroom learning context. Unlike in the previously reviewed studies, dyslexic L2 learners were not compared to their non-dyslexic peers; instead, the researchers focussed on the relationships between L1 Spanish

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and L2 English writing fluency and linguistic text quality. Their results showed that the number of spelling errors, number of revisions, and writing pauses as well as the speed of writing and lexical diversity in the essays were significantly correlated (*r* values ranged from 0.5 to 0.7), and students performed better in L1 Spanish writing than in L2 English. The findings also revealed that children who demonstrated lower L2 word reading accuracy and fluency made more spelling mistakes, wrote slower and fewer words and longer sentences, and produced lexically less diverse texts. Similar associations between performance in a word-spelling task and L2 writing fluency and text quality measures were observed suggesting that difficulties with L2 spelling might cause further challenges in lexical and syntactic formulation processes during composing. Another interesting result of the study was that higher accuracy in an L2 picture naming task resulted in longer, more cohesive and lexically more diverse texts highlighting the important role of L2 vocabulary knowledge in L2 writing.

Overall, the results of the recent studies reviewed seem to indicate that L1 reading difficulties have a significant impact not just on L1 but also on L2 writing performance due to the cognitively demanding nature of composing that can be taxing for attentional and working memory resources (Kormos, 2023). The writing difficulties of children and adolescents with SpLDs seem to be substantial in both instructed and immersion contexts. These challenges in L2 writing might be due to the potential weaknesses of L2 learners with SpLDs in focussing and maintaining their attention on the content and organizational aspects of content planning and text production. Difficulties in L2 writing might also be caused by the lower L2 vocabulary knowledge of students with SpLDs which might be exacerbated by lower level L2 reading skills that limit opportunities for incidental L2 vocabulary learning. Challenges at the level of L2 spelling might be the result of lower levels of phonological awareness, slower word retrieval, and reduced working memory capacity and morphological awareness of L2 learners with SpLDs, which are also important contributing factors to L2 reading difficulties. The additional cognitive load at the level of spelling might drain attentional resources and prevent L2 writers with SpLDs from devoting sufficient attention to lexical choice, syntactic encoding, and the use of cohesive ties during composing. Currently, most research in this field has been conducted with children and adolescents, and our knowledge of the L2 writing difficulties of individuals with SpLDs in further and higher education contexts and in the workplace is limited. Further research would be needed with these learner groups because writing is a key means of assessment in higher education, and there are also several professions in which writing skills are highly important. In order to support the writing development of L2 learners/users with SpLDs using research-informed pedagogical tools and interventions, it would also be necessary to investigate writing processes using keystroke and/or think-aloud methodology and to conduct interviews to explore these learners' writing practices.

3.5. The impact of SpLDs on L2 oral and combined written–oral text comprehension

Recent research has also investigated challenges of students with SpLDs in L2 listening comprehension. Košak-Babuder et al. (2019) and Kormos et al. (2019) analyzed the differences in the performance of Slovenian dyslexic and non-dyslexic children (aged 11–13) on an L2 English listening test. Košak-Babuder et al.'s (2019) results indicated that dyslexic children scored significantly lower than their non-dyslexic peers. Kormos et al. (2019) reanalyzed the same dataset and found that around 50% of dyslexic children belonged to the below average, 35% to the average, and 15% to the above average L2 listener group, which demonstrates that around half of the young dyslexic L2 learners might not have substantial difficulties with understanding spoken L2 texts. They also conducted a regression analysis examining the predictors of L2 listening scores which indicated that dyslexia status made a unique contribution to L2 listening beyond orthographic skills (measured by a dictation task) and word-level decoding (measured by a timed word reading task). They hypothesized that 'additional difficulties, such as lower working memory capacity, which were not captured by the low-level L1 assessment tools, contribute to L2 listening performance' (Kormos et al. 2019, p. 845). These assumptions have been confirmed by Eberharter et al.'s (2023) study that examined the role of

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L1 word-level decoding, phonological working memory, and naming speed in a test of L2 listening comprehension for young learners in Austria (aged 13–15). Their findings demonstrated that lower phonological working memory capacity and L1 German word-reading accuracy were significantly associated with lower L2 listening scores. Levlin et al.'s (2024) study mentioned earlier also found that Swedish learners of English with L1 reading comprehension difficulties performed significantly below their peers in a test that included oral and written text comprehension tasks. In contrast to findings regarding single modal oral text comprehension, Košak-Babuder et al.'s (2019) and Kormos et al.'s (2019) findings revealed that when exposed to bimodal (spoken and written) texts, dyslexic students' understanding of key information is similar to those who have no official identification of reading difficulties.

3.6. The impact of SpLDs on oral communication and L2 vocabulary knowledge

There is limited research on the impact of SpLDs on oral communication partly due to the commonly held belief that L1 literacy-related difficulties have a limited effect on L2 speaking skills. The only study to date by Levlin et al. (2024) already reviewed above found that Swedish learners of L2 English with L1 reading comprehension difficulties were 12 times less likely to achieve high scores in a test of oral communication than their peers.

The results of larger scale quantitative studies on the impact of SpLDs on L2 vocabulary knowledge are somewhat contradictory. On the one hand, a meta-analysis of existing research by von Hagen et al. (2021) concluded that dyslexia does not have a statistically significant effect on receptive vocabulary size. Kormos and Smith (2023) have argued that this might have been because most of the previous studies included in the review applied vocabulary tests originally designed for L1 speaking children without modifications for the L2 learner participant group. In a large-scale study conducted in a Chinese CLIL context, Li et al. (2021) (reviewed above on L2 reading) showed that children who had word- and text-level reading comprehension difficulties in their L1 Chinese had smaller breadth and depth of vocabulary knowledge than their typically developing peers. Łockiewicz et al. (2019) did not detect any significant differences in L2 vocabulary knowledge between dyslexic and non-dyslexic Polish L2 learners (see above for results on L2 writing). On the one hand, these contrasting findings with regards to the influence of SpLDs on L2 vocabulary development might be related to the sensitivity and validity of the measures of L2 vocabulary knowledge used in these studies. On the other hand, the differences might also be due to the level of proficiency of the participants, which might interact with the effect of SpLDs. It is possible that in the early stages of L2 learning, differences in vocabulary size and depth might not be apparent between students with and without SpLDs (as in Łockiewicz et al.'s [2019] study), and they emerge only as L2 learners are expected to acquire higher levels of lexical knowledge (e.g. the immersion context of Li et al. [2021]).

Our understanding of the key underlying cognitive and language-processing related factors that predict the L2 learning outcomes and its development has been substantially expanded in the past few years in the areas of reading, listening, and writing. However, less attention has been given to spoken language skills and vocabulary development which are also key constituents of L2 competence. Further research in this field could shift focus to investigating the L2 difficulties of multilingual children in naturalistic, immersion, CLIL, and classroom-instructed settings, and the mediating role of socio-economic factors. This would help the timely identification of literacy-related difficulties among multilingual children from disadvantaged backgrounds and could also inspire future studies in the Global South.

4. The identification of specific learning differences in multilingual contexts

A key issue in bi- and multilingual contexts is how SpLDs can be identified in the case of L2 users whose L1 is different from the majority language and whose proficiency in the L2 might not be

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developed to the extent that their skills and cognitive characteristics can be assessed in the L2. This problem can be further complicated by the fact that if standardized tools in the participants' L1 are not available or if they are available, there are no qualified assessors in the context who can use them. In an overview of the field of assessing the L2 reading skills of multilingual children in a variety of contexts, Geva et al. (2019) argued that existing research evidence seems to suggest that for young L2 users in target language environments, L2 word decoding skills develop relatively quickly if the language of schooling is the L2. Therefore, for these children word-level decoding skills can be assessed reliably and tests can yield similar diagnostic information as for L1 speaking children. For older students with less exposure to the L2, word-reading tests administered in the L2 might not provide reliable results. However, Shakory et al.'s (2023) results with bilingual French-English immersion children in Canada that we described earlier, suggest that tests of word-level reading accuracy and fluency that are commonly used as diagnostic tools, might not be accurate predictors of persistent reading difficulties unless they are administered in both languages.

In a recent interesting and promising international collaborative project, Ho et al. (2024) designed an online diagnostic instrument for global English, called WordSword Test (https://wordsword.psy.cuhk.edu.hk) which assesses word-decoding speed and accuracy in and out of sentential context. Their validation study with nearly 900 participants of different ages and educational and language backgrounds has demonstrated appropriate psychometric qualities of the test and the aim of the research team is to offer referenced norms for different groups of L2 learners and users in the future. In another recent study, Kahn-Horwitz and Goldstein (2024) have designed a diagnostic assessment tool for measuring L2 English word decoding and spelling skills, vocabulary knowledge, and syntactic and morphological awareness and its predictors (orthographic knowledge and rapid automatized naming) for Hebrew speaking children in Israel (aged 11–16). Their research suggested that the assessment tool can yield valuable diagnostic information for teachers across Grades 5 to 10 and can help them identify students who might struggle with L2 English literacy skills.

In their review of previous research findings, Geva et al. (2019) concluded that phonological awareness and rapid automatized naming are independent of L2 proficiency and can be measured in either L1 or L2. When assessed in L2, these tests can also offer valuable predictive insights for L2 word reading difficulties. In the case of working memory, tests administered in L2 before L2 proficiency reaches a higher level were found to be less informative. The conclusions reached by Geva et al. (2019) have been confirmed by recent studies with monolingual and bilingual children in Italy that showed that being at risk of reading difficulties influenced performance on tests of phonological awareness (Taha et al., 2022; Vender & Melloni, 2021), rapid automatized naming, and non-word repetition (measure of phonological short-term memory) in Italian, but bilingual status did not (Taha et al., 2022).

Geva et al. (2019) recommend exercising caution when assessing L2 text comprehension difficulties of multilingual L2 users because L2 proficiency, school experience in the target language and prior to the arrival to the country, family literacy, and socio-economic background might all act as mediating factors in how well L2 users understand written texts. A highly influential European collaborative project has recently developed Language Impairment Testing in Multilingual Settings (LITMUS) tools for developmental language disorder (https://www.bi-sli.org/litmus-tools), which often co-occurs and overlaps with dyslexia (Snowling et al., 2020). These tools include language neutral tests of lexical and phonological processing, sentence repetition, and cross-linguistic lexical tasks in a variety of languages and parental questionnaires.

Some recent empirical investigations of the assessment of reading difficulties in multilingual contexts have also been carried out, one of which was conducted by Helland et al. (2023) with children from different language backgrounds in Norway (aged 8–9). Their research aimed to shed light on how using an instrument administered in the children's L2 Norwegian can distinguish difficulties arising from a potential underlying literacy-related difficulty from challenges that derive from not yet sufficiently developed L2 competence. When L1 Norwegian dyslexic and non-dyslexic children and

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L2 children were compared on tests of Norwegian reading, spelling, vocabulary, and sentence comprehension, L2 participants and L1 dyslexic children performed below the level of non-dyslexic L1 children. However, on domain general cognitive tests such as working memory, phonological memory, dichotic listening, and visuo-spatial memory, most L2 speaking children scored in the same range as L1 speaking children, and even higher than the L1 non-dyslexic group in dichotic listening and visuo-spatial memory. They further subdivided the L2 group based on the results of a risk-index questionnaire for dyslexia filled in by the caregivers and compared the subgroup's performance on domain specific tests (reading, spelling, vocabulary, and sentence comprehension) and domain general tests. The children with the lowest risk of dyslexia achieved at a level similar to their L1 speaking non-dyslexic peers, whereas those with the highest risk were similar to dyslexic L1 speaking children. The middle group could be placed within these two groups with a pattern either suggesting an emerging reading difficulty, or one that can be remediated with instruction and the development of L2 Norwegian skills. Similar to Geva et al.'s (2019) suggestions, Helland et al. recommend using domain general cognitive tests to identify literacy-related difficulties in multilingual children with sufficient exposure to the majority language.

Another project carried out by Krenca et al. (2020) in the French immersion setting in Canada applied diagnostic tools in the participants' L1 English and L2 French to predict early reading difficulties in L2 French, and compared the utility of assessment instruments in L1 English and L2 French. The novelty of their study was that they administered a playful and computerized dynamic assessment tool in which children aged 6 to 7 learned novel word pairs that only differed in one phoneme in L1 English and L2 French. Their results showed that lower performance on this dynamic test of lexical specificity in the children's L1 English was associated with a higher risk of L2 French reading difficulties, but scores on the assessment of L2 French lexical specificity were not predictive of L2 French reading status. The findings underscore the importance of applying L1 assessment tools, if they are available, for identifying emerging reading difficulties in an L2 at a young age when children's L2 proficiency is not yet sufficiently developed and when exposure might be largely limited to school contexts. They also provide evidence for the utility of a playful dynamic assessment instrument that tests a language processing ability that is a precursor to phonological awareness.

5. Teaching techniques and programmes in supporting language learners with specific learning differences

Another area of research in the field that has been expanded in the past five years is the investigation of the benefits of instructional programmes in supporting the L2 development of students with SpLDs. These studies include smaller-scale predominantly qualitative case studies that document potential effects of multisensory instruction on L2 spelling skills of dyslexic Norwegian learners of L2 English (Flaten Jarsve & Tsagari, 2022), the L2 reading skills of dyslexic Iranian students (Mohamadzadeh et al., 2020), and the reading and spelling skills of a Chinese learner of English (Kałdonek-Crnjaković, 2021) as well as quantitative intervention studies aiming to develop L2 linguistic skills (e.g. Abu-Rabia & Salfety, 2021; Li et al., 2023; Tribushinina et al., 2022). Reraki's (2022) research investigated the impact of an inclusive language teaching programme on Greek dyslexic and non-dyslexic students' motivation and achievement. The researcher trained three English language teachers on dyslexia-friendly approaches in the classroom who then implemented this approach in their teaching. Reraki's classroom observations as well as interviews with the students (aged 10–11) and their teachers indicated that dyslexic L2 learners' motivation improved during the seven-week programme, but the effects on performance were non-significant probably due to the short duration of the intervention and lack of individualized support.

In terms of instructional programmes supporting the development of L2 phonological awareness and L2 word-reading, Mohamadzadeh et al. (2020) conducted a study in Iran with five dyslexic students (aged 8–12) who received 12 sessions of multisensory instruction on the alphabetic principle,

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sound-letter correspondences, and phonological awareness. They found considerable improvement in L2 English and L1 Persian phonological awareness and in L2 English non-word reading. Li et al. (2023) provided lexical specificity training to a group of emerging bilingual children in Canada (aged 7) who were identified as being at risk of developing reading difficulties in L2 English. The experiment involved systematic practice in discriminating pairs of words that only differed in one phoneme (20 phonemic contrasts) for three weeks in two 20-minute sessions per week. The experiment was effective in terms of enhancing the at-risk group's performance on a test of phoneme discrimination but the training effects did not have an impact on L2 phonological awareness, word reading accuracy, or fluency. Similarly, the experimental group performed better than the at-risk control group of emerging bilingual children in the post-test, but not in any other L2 test, suggesting that the benefits of lexical specificity training do not transfer to other areas of L2 skills.

In Flaten Jarsva and Tsagari's (2022) study, five Norwegian dyslexic students (aged 11–12) participated in a multisensory teaching programme combined with digital practice for eight sessions that targeted L2 spelling skills. The intervention included activities that develop letter-naming and spelling skills as well as phonological awareness in L2 English. Most participants demonstrated improvement in the spelling test and reported increased motivation. The teacher who administered the programme also attested the effectiveness of instruction by giving an account of students' enhanced engagement. Kałdonek-Crnjaković's (2021) single participant case study involved a Chinese student studying in the UK, who took part in an intensive 12-session multisensory explicit teaching programme that aimed to enhance their word reading and spelling skills. The student demonstrated consistent improvement in L2 English word reading skills and general L2 self-efficacy but not in L2 spelling or in self-efficacy with regard to L2 spelling. Tribushinina et al. 's (2022) study was a quantitative experimental project in which 20 dyslexic Dutch students (aged 12–14) received spelling instruction for eight weeks in 20-minute sessions. The students compared and contrasted the Dutch and English spelling systems and were taught L2 English spelling regularities explicitly. The control group consisting of 20 dyslexic participants followed the regular English curriculum during this time. Although both groups improved over time, the experimental group made higher gains in L2 orthographic knowledge in the immediate post-test than the control group, and they maintained this gain in the delayed spelling post-test five weeks after the intervention. Both Flaten Jarsva and Tsagari's (2022) and Tribushinina et al.'s (2022) studies seem to provide evidence for the benefits of explicit, contrastive, and multisensory instruction of the L2 spelling system for dyslexic L2 learners in classroom contexts, while the single case study by Kałdonek-Crnjaković (2021) might indicate individual level-variability in how successfully L2 learners respond to intervention programmes.

Abu-Rabia and Salfaty's (2021) explicit aim was to examine whether the severity of L1 reading difficulties mediate the effectiveness of a four-month intervention programme targeting the development of L2 vocabulary knowledge, morphosyntactic awareness, reading accuracy, fluency, and text comprehension among L1 Arabic speaking learners of English in Israel. The researchers divided 180 dyslexic participants (12–13 years old) into three groups: those with severe, moderate, and mild forms of dyslexia. They examined whether the experimental group consisting of 90 dyslexic students improved in terms of L1 Arabic and L2 English word- and non-word reading, text comprehension, phonological, morphological, and syntactic awareness as a result of the intervention compared to the matched control group that did not take part in the intervention programme. Participants with mild and moderately severe dyslexia in the experimental group improved significantly in all of the L2 English tests over time and their gains were significantly larger than those of the control group. However, no significant change in the performance of students with severe dyslexia could be observed. The intervention on L2 skills also transferred to some of the L1 Arabic skills (word-level decoding, spelling, and text comprehension in the case of the group with mild dyslexia but not for those who had moderate or severe forms of dyslexia). Abu-Rabia and Salfaty's large sample longer term intervention study provides further evidence for the benefits of targeted intervention programmes that provide explicit instruction on different levels of the L2 linguistic system for dyslexic students. Their research also

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supports the theory of cognitive retroactive transfer (Abu-Rabia et al., 2013) that hypothesizes that instructional programmes developing L2 abilities also enhance L1 skills. However, their findings call attention to the heterogeneity of L2 learners with dyslexia and the need to search for further ways of effectively supporting students who have severe forms of SpLDs.

As shown in the above review, although there has been a growth in research investigating the impact of intervention programmes for language learners with SpLDs, most research has been small scale and has primarily targeted lower level L2 skills such as spelling and word-reading skills. Further studies would be necessary to replicate and extend Abu-Rabia and Salfety's (2021) larger scale investigation in a wider variety of language learning contexts. It would also be important to study the differential effects of inclusive language pedagogies for language learners with and without disabilities, not just in terms of language learning outcomes, but also for motivation, enjoyment, and engagement. There has also been an increased interest in multimodal language learning and teaching (cf. [Lim et al., 2022] systematic review) but studies so far have failed to consider their use and impact for language learners with SpLDs.

6. Assessing the second language competence of test-takers with specific learning differences

The objective of promoting fairness in assessment is to prevent tests from causing harm to test-takers, and to optimize the potential for all test-takers to perform to the best of their abilities. One way to achieve these aims and meet these standards is through ensuring that tests are accessible to all test-takers and follow the principles of universal design (Sireci et al., 2003). Universal design principles require careful consideration of the test construct and the selection of tasks that avoid bias or the emergence of construct irrelevant variance based on individual test-takers' characteristics. The principles of universal test design represent an important impetus towards ensuring the accessibility of tests (Christensen et al., 2023). Nevertheless, there will always be candidates who might require adjustments in the testing process (Lazarus et al., 2022).

Within the realm of second language assessment, three types of special adjustments have been investigated: read-aloud assistance, time extension, and the self-pacing of audio input in listening tests. Read-aloud assistance involves reading the text out loud to students with disabilities while they simultaneously read it themselves. Although read-aloud has an impact on test validity, it is more commonly used in classroom contexts, and less frequently applied in high-stakes assessments of text comprehension unless the construct of comprehension is assumed to be multimodal. In a study by Košak-Babuder et al. (2019), young Slovenian dyslexic and non-dyslexic learners of English were exposed to three different formats of input – written, oral, and bimodal written and oral texts – and the authors investigated whether dyslexic participants benefited from read-aloud assistance. The input texts also differed in difficulty based on readability indices. As mentioned earlier, dyslexic children performed at the level of their non-dyslexic peers in the bimodal text comprehension condition, but further analyses showed that improvement in comprehension in the read-aloud condition was more pronounced when the text was difficult. Košak-Babuder et al. (2019) argued that being able to simultaneously read and listen to a text eases the processing burden of decoding written words for dyslexic students and frees up attentional and working memory resources for higher level text comprehension.

Kormos and Ratajczak (2019) examined how Hungarian learners of English (aged 14) with different L1 literacy profiles perform in a digital test of L2 reading comprehension under extended and standard timing conditions. They assessed L1 literacy skills using a test of L1 reading comprehension, and a standardized test of Hungarian word- and non-word reading, phonological awareness, and rapid naming. A combined factor score based on students' performance on this test was created to analyze whether L2 learners with lower levels of L1 literacy skills benefit from extended time more than their peers with higher L1 literacy profiles. L1 literacy was significantly associated with L2 text comprehension. However, their study showed that the participants did not perform better

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in the extended timing condition and that time extension did not give an advantage for L2 learners with low-level L1 skills indicative of dyslexia. Possible reasons for the findings might be that the test included relatively short reading texts and was generously timed in the standard condition already. Kormos and Ratajczak also measured the time students took to complete the test and concluded that a margin of around 50% extra time from the mean test population test completion time could allow most test-takers to demonstrate their knowledge in similar tests of L2 reading. Motteram et al.'s (2023) recent study of a large-scale English language and numeracy test in Singapore, which used qualitative interviews with stakeholders, found that extended time might support test-takers in handling their anxiety that might be the result of or an accompanying characteristic of disabilities.

Eberharter et al. (2023) investigated whether giving young Austrian learners of English (aged 14) individual control over the recording of listening input provides a differential boost to the performance of students with varying levels of L1 skills indicative of dyslexia. They administered a test of listening under a single listening condition and in a self-paced condition when test-takers could stop, rewind, and forward the recording when listening for the second time. L1 literacy profiles were assessed similarly as in Kormos and Ratajczak's (2019) study using an instrument standardized for L1 German speakers. As mentioned earlier, participants with lower L1 literacy scores performed worse in the listening test than children with higher L1 literacy scores. Interestingly, no impact of self-pacing on listening scores was found, and test-takers with lower L1 skills scored lower in the self-paced condition compared to their peers. The authors argued that self-pacing might not have benefited the students because they could not see the questions that had to be answered during the self-paced phase of listening. This might have been a particular disadvantage for children with lower working memory capacity, who might have had difficulties maintaining the relevant information active to respond correctly to the listening items.

Current research findings on the benefits of testing accommodations for candidates with SpLDs are inconclusive. On the one hand, there is limited evidence for the positive impact of accommodations on test scores for students with SpLDs. On the other hand, there is a scarcity of studies that have examined how test-takers with SpLDs use these accommodations and perceive their benefits. More research with a wider variety of tests and test-takers with SpLDs would be needed to understand how testing accommodations and universal design features of L2 assessment support candidates with disabilities (see also Taylor & Banerjee, 2023).

7. Raising language teachers' awareness and knowledge of specific learning difficulties

Language teachers play a crucial role in the process of L2 learning of students with SpLDs. Their work involves observing and identifying learners with SpLDs, leading them to a formal diagnosis/screening process, employing inclusive pedagogical techniques in class, assisting both learners and their parents/caregivers to understand the strengths and weaknesses of learners, addressing the social stigma associated with SpLDs, employing appropriate assessment methods to measure the progress of learners with SpLDs, as well as working closely with school management to make the teaching-learning process suitable to learners with SpLDs. Research has investigated aspects such as teacher knowledge/awareness of SpLDs, teachers' attitudes towards learners with SpLDs, availability of teacher education programmes on SpLDs, and the effectiveness of such programmes. It is important to note that there was a limited number of studies that investigated these aspects in relation to language teachers before 2020. Thus, the summary provided within this section about the findings before 2020 refers to some studies that were focussed on teachers in general, primary education teachers, and/or special education teachers. The review of studies after 2020 focusses only on studies that investigated language teachers.

Several studies up to 2020 investigated teacher awareness of dyslexia/SpLDs. While most of these studies focussed on teachers in general or primary teachers rather than language teachers (e.g. Alawadh, 2016), a few studies investigated teacher awareness among language teachers (e.g.

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Indrarathne, 2019). These studies indicated that in many contexts, teachers either did not have sufficient awareness and knowledge of dyslexia/SpLDs or their awareness was not translated into the implementation of inclusive practices.

Several studies since 2020 have investigated language teacher awareness of dyslexia/SpLDs and inclusive language pedagogy in a variety of contexts. Atar and Amir (2023) surveyed 176 pre-service EFL teachers in Turkey and found that the participants either lacked knowledge or or their knowledge about dyslexia was inaccurate. Ataç and Taşçı (2020) investigated teachers' knowledge of inclusive education of 20 pre-service English language teachers also in Turkey and reported that the participants did not have sufficient expertise and skills to teach learners with learning difficulties. In another study with Turkish in-service language teachers, Özçelik and Elverici (2023) found that many English teachers in their survey of 180 participants were not prepared to teach learners with dyslexia. Nushi and Eshraghi (2023) distributed a questionnaire among 84 teachers of English in Iran to investigate their awareness of dyslexia and found that the majority lacked adequate knowledge about dyslexia. Wong and Russak (2020) administered a basic language construct survey, which included questions that assess phonological knowledge and skills of participants, among two groups of teachers who taught beginner literacy in English in Hong Kong. One group was non-native English speakers ($N = 96$) and the other native speakers ($N = 24$). Although the native speaker group performed significantly better, both groups scored below 50% except in the phonological awareness task. The findings indicate that the participants did not have sufficient understanding of what factors contributed to learning difficulties. Žero and Pižorn (2022) also found that undergraduate and graduate students who would become English teachers in Bosnia and Herzegovina had misconceptions about dyslexia/SpLDs. The above studies in a wide range of contexts confirm earlier findings before 2020 that teachers in general lack adequate awareness of SpLDs.

However, some studies that investigated language teachers' knowledge and awareness of SpLDs in Croatia and Poland demonstrated different results. Fišer and Kałdonek-Crnjaković (2022) analyzed the teaching practices of 16 Croatian English language teachers. They found that the participants could accurately define dyslexia and they used dyslexia-friendly teaching practices. However, the authors also observed that the teachers who had experience in teaching learners with dyslexia were less confident in defining dyslexia than those who did not have such experience. Similar findings were reported by Oskwarek et al. (2024) who investigated 75 English language teachers with some experience of teaching learners with dyslexia in the Upper Silesia Province. Their participants were aware of dyslexia and attempted implementing effective teaching and assessment techniques when teaching learners with dyslexia. These two studies indicate that having experience in teaching learners with dyslexia could either increase or decrease teachers' confidence in teaching these learners and factors such as the availability of resources and teacher training might moderate the link between experience and confidence in teaching L2 learners with SpLDs.

A notable difference can also be observed between the findings in studies before 2020 and after 2020 in terms of teacher attitudes towards learners with SpLDs and inclusive pedagogy. Studies conducted before 2020 highlighted that teachers in general had negative attitudes towards learners with SpLDs (e.g. Hettiarachchi & Das, 2014; Indrarathne, 2019). However, several studies after 2020 note that teachers are willing to learn about SpLDs and inclusive practices (e.g. Ataç & Taşçı, 2020; Haggag & Bakr, 2020; Nushi & Eshraghi, 2023). Young (2024a) distributed a modified version of the Sentiments, Attitudes, and Concerns about Inclusive Education Revised Scale (SACIE-R) among 239 English language teachers in Japan and found that teachers had positive attitudes towards teaching students with SpLDs. However, the participants stressed the need for more teacher training on SpLDs. Kałdonek-Crnjaković and Fišer's (2021) investigation of ten in-service Croatian EFL teachers also found that these teachers had positive attitudes towards teaching learners with dyslexia.

Another line of research after 2020 has also looked at teachers' readiness to teach learners with SpLDs and their use of classroom and assessment techniques. Huys (2020) investigated a group of 47 EFL teachers in the Netherlands and found that these teachers employed differentiation in

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assessing learners with dyslexia; however, differentiation techniques were less evident in their classroom teaching. The author also noted that the participants lacked confidence in their own ability to teach learners with dyslexia. Lack of teacher training was identified as the cause of these outcomes. Madden (2021) used interviews and think-aloud protocols to investigate the teaching practices of four EFL/ESL teachers in Northern Ireland on their use of inclusive pedagogical practices. The participants reported using several inclusive language teaching techniques through trial and error. They also mentioned that there was a severe lack of teacher training on teaching learners with dyslexia and that they did not feel prepared and confident to teach such learners. In another study, Konrad (2023) investigated the teaching practices of six EFL teachers from Austria in teaching learners with dyslexia. The teachers used support strategies when teaching writing, language structures, and sounds, but they also lacked formal teacher training in this area. In contrast to the findings described above, Lu et al. (2022) reported that the EFL teachers investigated in China (N = 328) had not used specific inclusive teaching techniques in class. The participants also emphasized that they had not received any training on this aspect.

Teachers' lack of awareness, possible misconceptions about SpLDs, their negative attitudes towards learners with SpLDs, and ineffective or insufficient inclusive practices can largely be attributed to the lack of professional training opportunities available to them (Indrarathne, 2019). Research before 2020 suggests that appropriate teacher training on SpLDs and inclusive language teaching can instil positive attitudes among teachers towards learners with SpLDs (e.g. Indrarathne, 2019; Kormos & Nijakowska, 2017), increase their knowledge on SpLDs (Giannopoulou et al., 2019; Rae et al., 2011) and their self-efficacy beliefs on teaching learners with SpLDs (Kormos & Nijakowska, 2017). As previously noted, some of these studies investigated language teachers and some teachers in general.

Considering the positive changes that teacher training can bring about, many studies that investigated language teacher awareness of dyslexia/learning difficulties and inclusive pedagogical practices after 2020 recommend teacher training to increase teacher knowledge of dyslexia/learning difficulties (e.g. Ataç & Taşçı, 2020; Atar & Amir, 2023; Nushi & Eshraghi, 2023; Özçelik & Elverici, 2023; Wong & Russak, 2020). Uçak and Demirok (2023) used a pre-post-test design in Turkey to investigate whether a teacher training initiative could increase the academic skills and professional knowledge of learning difficulties of 28 English language teacher participants. They found that there was a statistically significant increase from the pre-test to the post-test in the participants' skills and knowledge indicating the beneficial effects of teacher training in raising teacher awareness of learning difficulties. Nijakowska (2022) reported statistically significant improvements in self-efficacy beliefs and attitudes among a group of 69 EFL teachers from Greece, Slovenia, and Poland in terms of implementing inclusive teaching practices in a study that employed a pre-post comparison of the training programme. Wray et al. (2022) conducted a systematic review based on 71 studies that investigated self-efficacy among teachers for inclusive education practices. The review included both language teachers and other teachers. They found that pre- and in-service teacher training plays an important role in increasing self-efficacy beliefs in implementing inclusive teaching practices.

Although positive effects of teacher training have been reported, there still seems to be a scarcity of teacher training initiatives on SpLDs in many contexts. Sowell and Sugisaki (2020) administered a questionnaire among current and former graduates of Indiana University of Pennsylvania who were EFL teachers (N = 23) to investigate whether these participants had received any training on identifying and accommodating learners with SpLDs, the type of training they received, and whether the training was useful. They reported that the majority did not receive or had very little training and was not confident in teaching learners with SpLDs. The authors thus recommend initiatives to raise teacher awareness on SpLDs. Young (2024b) used the Inclusive Practices in English Language Teaching Observation Scale (IPELT) and post-observation interviews to investigate English language teachers' training needs on inclusive practices among 13 teachers in Japan. They concluded that the participating teachers needed more training on identifying and teaching learners with SpLDs. Žero and Pižorn (2022) also highlight the need for more training in teaching learners

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with dyslexia/SpLDs for undergraduate and graduate students who would become English teachers in Bosnia and Herzegovina. Mohammad (2022) emphasizes the same in the Iraqi EFL context.

These findings indicate that in many contexts, language teachers still do not have sufficient awareness of SpLDs. This often results in teachers becoming less confident and ready to teach learners with SpLDs. However, it seems that teachers have developed more positive attitudes towards learners with SpLDs and their willingness to learn how to teach learners with SpLDs has increased in the recent years. This may be due to the influence of the internet and social media where inclusion is being more often discussed. Although teachers' willingness to learn how to teach learners with SpLDs has increased, and the effectiveness of offering teacher training on raising teacher awareness of SpLDs has been documented, teacher training opportunities are still scarce in many contexts. Thus, both teachers and learners with SpLDs are disadvantaged in these contexts.

8. Pedagogical implications and conclusions

Researchers in the fields of cognitive psychology and second language acquisition have conducted extensive explorations of the impact of SpLDs, in particular dyslexia, on the development of L2 reading and spelling skills. Our understanding of the nature of the difficulties of dyslexic L2 learners in comprehending written texts and spelling single words particularly in English as an additional language has grown substantially over recent years. However, hardly any studies have been conducted on the role of SpLDs in multimodal text comprehension which is becoming an increasingly widely applied means of sharing information and using additional languages for entertainment. Insights into the extent to which multimodality can support text comprehension are important as multimodal input can enhance engagement with reading texts, contribute to L2 vocabulary development, and enhance uptake of new information through reading in content-integrated English for Specific and Academic Purposes settings. Research in this area would also have implications for increasing the accessibility of L2 assessment tasks and offer insights into whether multimodality can serve as a tool for universal design without substantial impact on the construct to be assessed. To develop effective writing support programmes, more research would also be required to explore the L2 written and oral text production difficulties of L2 learners with SpLDs with specific investigations in different genres that are prevalent across various levels of schooling. Studies could also investigate whether multimodal means of L2 production create engaging and effective opportunities for L2 users with SpLDs to demonstrate and develop their knowledge of the L2.

While there has been an increase in studies in instructed classroom contexts with participants from Chinese and European language backgrounds, we know still very little about the challenges of students with SpLDs who speak several home languages in the Global South and Central Asia. There would be a need to examine L2 learning challenges in a wider variety of target languages including Spanish as a target L2 and languages that serve as a tool of instruction and mediation in multilingual contexts, particularly in non-Western, non-industrialized contexts that are resource poor in terms of educational assets. There are very few studies with multilingual participants beyond the Canadian context which hinders developing diagnostic assessment tools that can detect L2 learning difficulties at an early stage before the students fall substantially behind their peers. As already mentioned in this paper, more systematic and preferably international collaborative studies would be required to design, validate, and if needed, norm and standardize, diagnostic assessment tasks for multilingual children and adults that can either be administered in the L1 or home language of L2 learners/users or that include language independent tasks. It would also be necessary to extend the scope of diagnostic assessment so that they include informative student, parent, and teacher questionnaires, observation tools, and interview schedules in addition to linguistic and cognitive tests.

It is also important to highlight that the majority of the reviewed studies and existing literature focusses on dyslexia and literacy-related (reading and writing) difficulties, and we currently lack insights into the L2 language learning processes and challenges of learners with dysgraphia, autism,

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and ADHD. Participants in most research projects tend to be selected so that they would only have one type of disability, whereas in reality disabilities often intersect and overlap. To advance inclusive second language education and assessment, it would be essential to extend the scope of research from dyslexia to other types of neurodiversity and consider the intersectionality of disabilities with race, ethnicity, and gender (Cioè-Peña, 2021).

Several recent studies have investigated the benefits of multisensory instruction and explicit teaching of sound-letter correspondences in the past few years. However, many of these studies are small-scale, involve a low number of participants, and tend to be short-term. The focus of existing research in this area is also relatively limited and centres around lower level linguistic skills. Larger scale classroom-based and also some more controlled experimental studies would be needed to better understand the impact of specific interventions for L2 learners with SpLDs, and whether different types of teaching methods and interventions yield more impactful results for different types and severities of SpLDs. More collaboration with SLA researchers investigating aptitude-treatment interactions would also be beneficial because findings relating to whether students with different working memory and aptitude profiles benefit differentially from various teaching approaches are directly relevant for L2 learners with SpLDs. The examination of the effect of teaching approaches and intervention should also be extended beyond impact on L2 skills and should include the effects on engagement, motivation, self-perceptions, and emotions as they are key predictors of achievement in L2 learning. A similar recommendation can also be made in the area of the use of accommodations and accessibility features in assessment. While it is important to gather more information on how different types of accommodations such as extended time affect test scores, research efforts should also focus on if and how test-takers use accommodations and how they can reduce test-taking anxiety and increase test motivation. Both of these factors can create construct irrelevant variance and disadvantage test-takers with SpLDs.

The review also showed that language teachers in several contexts lack sufficient awareness of SpLDs and inclusive language pedagogy. As discussed previously, a limited number of studies have investigated language teacher awareness of dyslexia, particularly in regions such as Africa, East Asia, and South America. Although small in number, the available studies largely point out the lack of awareness of SpLDs among language teachers. This may also be the case in regions where studies have not been carried out yet. The consequences seem to be teachers' inability to identify and teach such learners using appropriate pedagogical interventions and their lack of understanding of assessment techniques that need to be applied in the teaching-learning process. Many studies thus stress the need for teacher training initiatives to raise teacher awareness of SpLDs because existing research findings on the impact of teacher training initiatives highlight that they can successfully increase teacher awareness and raise their self-efficacy in teaching learners with SpLDs. Thus, both pre- and in-service teacher education programmes should include a component on SpLDs and inclusive language teaching in their curricula. This should not be limited to discussing/explaining theoretical concepts. Teachers need more hands-on experience in aspects such as identification tools, inclusive classroom techniques, and assessment methods. Teacher education thus should focus on contents such as inclusive teaching materials/assessment design, teaching practicum with learners with SpLDs, and microteaching to increase pre- and in-service language teachers' confidence. Continuous evaluation of training programmes is also needed in order to understand ongoing teacher needs and the impact and effectiveness of the programmes.

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