



Published by the Dyslexia Association of Singapore (DAS)

© 2024 DAS

ISSN 2717 5200 (digital)

Contact:

The Managing Editor
Dyslexia Association of Singapore
1 Jurong West Central 2
#05-01, Jurong Point
Singapore 648886

Email: research@das.org.sq

Reprint permission may be obtained by writing to the Managing Editor at the above address.

The responsibility for facts and opinions represented in the articles rests exclusively with the individual authors. Their interpretations do not necessarily reflect the views or the policy of the Asia Pacific Journal of Developmental Differences (APJDD) editorial committee, the DAS research committee, sponsors of the APJDD, or the Dyslexia Association of Singapore.

# Asia Pacific Journal of Developmental Differences

#### Editor-in-Chief

Professor Angela Fawcett Research Consultant Dyslexia Association of Singapore Emeritus Professor Swansea University, UK

#### **Executive Editors**

Professor John Everatt University of Canterbury New Zealand

Dr Geetha Shantha Ram Dyslexia Association of Singapore Singapore

#### **Managing Editor**

Deborah Hewes Dyslexia Association of Singapore

#### Contact:

1 Jurong West Central 2 #05-01, Jurong Point Singapore 648886

research@das.org.sg

#### Associate Editors

Helen Boden, Director at Dyslexia & Neurodiversity In-Sight, UK

Professor Hugh Catts, Florida State University, USA

Professor James Chapman, Massey University, New Zealand

Professor Steve Chinn, Educational Consultant, UK

Prof. Kevin K H Chung, The Hong Kong Institute of Education, Hong Kong

Kate Curawalla, President, Maharashtra Dyslexia Association, Mumbai, India

Dr Kristiantini Dewi, Dyslexia Association of Indonesia, Indonesia

Dr Shirley Egley, University of South Wales, UK

Dr Gad Elbeheri, Dean, Australian University of Kuwait

Dr Sudha Mary George, National Institute of Education, Singapore

Professor Esther Geva, University of Toronto, Canada

Dr Charles Haynes, MGH Institute of Health Professionals, Boston, USA

Professor Sunil Karande, King Edward VII Memorial Hospital, Mumbai, India

Junko Kato MD, Japan Dyslexia Research Association

Professor Sharanjeet-Kaur, Universiti Kebangsaan Malaysia

Dr Lim Boon Hock, Special Education Consultant, Malaysia

Professor Su-Jan Lin, National Kaohsiung Normal University, Taiwan

Dr Beth O'Brien, National Institute of Education, Singapore

Dr Dino Ocampo, Philippine Dyslexia Foundation, Philippines

Chivonne Preston, CEO British Dyslexia Association, UK

Dr Ong Puay Hoon, Dyslexia Association of Sarawak, Malaysia

Assoc. Professor Kenneth Poon, National Institute of Education, Singapore

Dr Gavin Reid, Educational Consultant, UK and Canada

Assoc. Professor Susan Rickard Liow, National University of Singapore

Dr Thomas Sim, Southern Cross University, Australia

Dr Purboyo Solek, Dyslexia Association of Indonesia, Indonesia

Professor Akira Uno, Tsukuba University, Japan

Professor Taeko N. Wydell, Brunel University, UK

Professor Dongbo Zhang, University of Exeter, UK

#### Asia Pacific Journal of Developmental Differences Volume 11 | Number 1 | July 2024

## Contents

1	Editors Comments		
	Angela Fawcett		
5	Empowering Struggling Learners in Singapore		
	Kah-Hung Yuen and Joanne Yoong		
19	Virtual Educational Therapy—Experiences and Perceptions of Educational Therapists at the Dyslexia Association of Singapore		
	Nurul Hudaa Binte Mohamed Daud		
67	Blended Synchronous Learning Environment- Perceptions and Experiences of Educational Therapists at Dyslexia Association of Singapore		
	Praba Siva		
99	The impact of social-emotional competencies on drama students with dyslexia during the pandemic		
	Muzdalifah Hamzah and Amrit Kaur Gill		
123	Identifying Training Needs in Using Educational Technology: a New Integrated Model		
	Soofrina Mubarak		
181	Designing for Dyslexic Individuals in the digital environment		
	Wu Junyi		
195	Evaluating a Reading Comprehension Curriculum and Factors Predicting Reading Comprehension Performance		
	Fong Pei Yi and Lay See Yeo		
225	Exploring the Challenges of Dyslexia in Education and the Workplace: A Multi-Case Study of Academic and Professional Journeys		
	Fatemeh Zolfagharian, Mahnaz Akhavan Tafti and Elaheh Jarrahi		
245	Dean Bragonier and Noticeability: The man, the model and the need		
	Angela Fawcett and Dean Bragonier		
265	UNITE 2024 Conference Abstracts		

Asia Pacific Journal of Developmental Differences Vol. 11, No. 1, July 2024, pp. 1—3



### Editorial Comment

#### Angela Fawcett, Editor in Chief

It is a very great pleasure to introduce the latest edition of the Asia Pacific Journal of Developmental of Developmental Differences. This issue has been published to coincide with the UNITE 2024 conference in June, an important event in representing the first face-to-face conference for the Dyslexia Association of Singapore since the COVID pandemic. As such, we have a greater number of contributions to share with you than we would normally present.

A key article from an independent think tank, Research for Impact, has highlighted the need for a broadening of the remit of DAS, to include struggling learners, in line with educational policy. This first article by Yuen and Yoong is entitled 'Empowering Struggling Learners: A Research Roadmap for the Dyslexia Association of Singapore'. Their review suggests that struggling learners, (that is, those who are unable to keep up with their peers, but show a learning profile similar to those with dyslexia but do not have a formal diagnosis of a learning difference such as dyslexia), are disadvantaged throughout their lives and action must be taken to ameliorate this situation. The Dyslexia Association of Singapore is now opening their doors to anyone who learns differently, following a series of profiling tests or full psychological assessment to identify their learning profile. This Research for Impact paper goes on to discuss articles past, present and future, many published in this journal which have evaluated the success of DAS interventions. Many of these are now presented in this issue of the journal.

A number of articles in this issue address the impact of working online during the COVID pandemic, on both therapists and children participating, and how these findings can enhance future research projects. The topic is led by a general article from Nurul Hudaa entitled 'Virtual Educational Therapy: experiences and perceptions of Educational Therapists at the Dyslexia Association of Singapore'. This article examines the reactions of 10 Educational therapists to moving online, adopting a phenomenological approach to reveal the benefits and challenges, and success factors and conditions, to enable therapists to design better online therapy in future. This is followed by an article from Siva entitled 'Blended Synchronous Learning Environment- Perceptions and Experiences of Educational Therapists at Dyslexia Association of Singapore' on running a dual mode intervention, known as BSLE learning, where some participants are online and others face to face. They extract themes which conclude that there are both benefits and challenges to this approach, and suggest strategies for improving BSLE and reducing the impact on therapists, working with an interview study of three educational therapists.

In their article Hamzah and Gill address the strengths and difficulties associated with trying to move a drama curriculum online, and the reactions of the students in their article entitled 'The impact of social-emotional competencies on dram students with dyslexia during the pandemic'. This article identifies a number of factors in an interview study, such as comfort in the home environment that can facilitate or impede progress for individual students, and what some participants identified as the benefit of not needing to travel to get to their lessons.

A general overview of the issues, the need for ongoing training and a new model for success is presented in the article from Mubarak entitled 'On Identifying training needs in using Educational Technology: a new Integrated Model'. In this article, the author evaluates any disparities between the expected expertise of educational therapists in relation to incorporating technology into their teaching programme. Using a series of surveys, observations, focus groups and interviews, a series of 7 issues were identified that influenced the outcomes, largely pertaining to skills but also to knowledge and attitudes towards technology. A new integrated model for training for the future will encompass student responses in addition to those of therapists, with implications for training more widely.

The next article by Wu, entitled 'Designing for dyslexic individuals in the digital environment' considers the usefulness of a series of simple tools to help with literacy in older participants, evaluating them with university students and secondary school pupils, finding strong individual preferences to impact on their usage.

This is followed by an article from Fong and Lay, entitled 'Evaluating a Reading Comprehension Curriculum and Factors Predicting Reading Comprehension Performance'. This article evaluates the impact of a new curriculum for comprehension at the Dyslexia Association of Singapore, in a longitudinal study conducted over three time periods. Interestingly, this article compares high and low verbal ability in the group to find predictors of success in reading comprehension, and finds that, although the new curriculum is favoured by the higher achieving children, the less able children preferred the previous version.

The next article, from Zolfagharian, Tafti and Jarrahi entitled 'Exploring the Challenges of Dyslexia in Education and the Workplace: A Multi-Case Study of Academic and Professional Journeys' examines the experiences of dyslexic adults including some who dropped out of school. A series of interviews here indicates great fluency in this group, understanding of both strengths and weaknesses in these participants, and an emphasis on how their strengths have helped them through, even in the presence of school failure.

The final article is unique, from Fawcett and Bragonier, entitled 'Dean Bragonier and NoticeAbility: the man, the model and the need' which includes the transcription of an interview with Bragonier himself, the dyslexic CEO of NoticeAbility, following the recent

successful Magellan tour. This article concludes with a review of the need for strengths-based support, with the costs and benefits of not providing support such as NoticeAbility to allow children with dyslexia, in the early years of secondary school, to demonstrate their competence in a collaborative, mentor-led workshop on topics chosen to highlight dyslexic abilities.

The final section of the APJDD includes the abstracts from the presentations from UNITE 2024 Conference in Singapore demonstrating a rich selection of presentations delivered at the conference all of which will be available on the DAS YouTube channel.

We are confident that this selection of articles will inform and inspire others to research some of the important areas that have been highlighted here.



EXPANDED
ACCESS FOR
STRUGGLING
LEARNERS

No diagnosis required



#### **NO CHILD LEFT BEHIND**

DAS Services for those who learn differently

# I LEARN DIFFERENTLY

We have now opened our doors to students who learn differently whether they have a formal diagnosis of a learning difference or not. To access our programmes all students will undergo **profiling tests**, a simple step to ensure they are placed in a class that suits their learning needs best. We're dedicated to providing tailored support to every child, empowering them to reach their full potential.



DAS offers a range of evidence-based services to help those who learn differently\*

\*NO FORMAL DIAGNOSIS REQUIRED



FIND OUT MORE: bit.ly/iLEARN-DAS

info@das.org.sg

the playing field for those who are struggling to learn and equip them with the tools & strategies to achieve success!











Asia Pacific Journal of Developmental Differences Vol. 11, No. 1, July 2024 pp. 5—18

DOI: 10.3850/S2345734124000054



# **Empowering Struggling Learners in Singapore**

## Kah-Hung Yuen<sup>1\*</sup> and Joanne Yoong<sup>1</sup>

1. Research For Impact, Singapore

#### Abstract

In Singapore, individuals who experience learning difficulties without a formal diagnosis of a learning disability are increasingly recognised as individuals who learn differently and are also known as struggling learners. Despite forming a significant fraction of Singapore's student population, they may be excluded from receiving targeted support or government subsidies, even though there is a growing body of research highlighting the feasibility and effectiveness of locally adapted evidence-based interventions that meet their needs. To foster a more equitable educational landscape, policymakers must prioritise expanding access, appropriateness, and affordability of programming for children who learn differently.

Keywords: Struggling learners, structured intervention, individuals who learn differently, neurodiverse

Kah-Hung Yuen, Research For Impact, oliver@rforimpact.com

<sup>\*</sup> Correspondence to:

#### Who is a struggling learner?

For the purposes of this essay, struggling learners are individuals who experience difficulties in reading, writing, numeracy, or other areas of learning, but without formal diagnosis of a learning difficulty such as dyslexia. At any one time, struggling learners constitute up to 25% to 30% of the student population in Singapore, forming a group up to two times larger than the population of students diagnosed with special educational needs (SEN) (Dyslexia Association of Singapore, 2023a).

This group varies widely for reasons related to the fundamental nature of learning - a dynamic process that draws on a wide range of abilities and contextual factors that work together - as individuals may face very different underlying issues. For instance, some individuals may have specific areas of difficulty, such as processing speed, while at the same time excelling in other areas, such as phonological awareness. This makes it effortful for them to keep up with the typical demands of a fast-moving schoolroom with large class sizes, although they may be more able than their peers in other ways. Issues faced by any one individual may also manifest differently over time and in different environments, resulting in episodic struggles that may not appear in an everyday setting but that nonetheless undermine a learning journey.

While Singapore has made significant strides in supporting learners with dyslexia and special educational needs, it is important to remember that this group of struggling learners deserves attention (Shantha Ram, 2022). With the introduction of compulsory education in 2003, all Singapore Citizens must attend a national primary school unless an exemption is granted. This includes children with mild SEN, such as attention deficit hyperactivity disorder and dyslexia, who attend mainstream schools which are well-resourced to provide additional support for a range of learning needs (Ministry of Education, 2021).

#### Why are their unique needs difficult to meet?

Matching the needs of struggling learners to effective support is a challenge at many levels. A child who learns differently ideally requires identification, a holistic assessment followed by targeted interventions to address learning gaps, as well as strategies to manage the root causes of their learning difficulties. For families and individual educators, awareness, as well as knowledge, time, and financial resources may be binding constraints.

At the same time, conventional educational systems may find it a stretch to fulfil the mandate of addressing the needs of all learners. Providing support at scale for those whose challenges do not rise to the level of a diagnosis is particularly difficult when overall resources are scarce and interventions for the diagnosed population are prioritised. Even without resource constraints, determining and delivering the appropriate

coverage and quality of intervention for this diverse population is a complex affair. Screening into services can be subjective or unsystematic, especially for learners whose struggles are less visible or more intermittent, while the ability to deliver specialised or individualised attention in a school-based setting may be limited by the setting and curricular time. For adults, these challenges may extend to continuous education outside school.

These multiple challenges across the wider spectrum of learning difficulties leave struggling learners at risk of "falling through the cracks" in a formal education system (Dyslexia Association of Singapore, 2023a). Learning difficulties, especially if left unaddressed, can lead to a chain of events including school absences, poor academic performance, as well as behavioural and psychological problems (Koifman, 2023). In particular, twice-exceptional students – a subset of struggling learners who possess both exceptional ability and learning difficulties that mask each other – are typically difficult to identify, although they also need appropriate support to help unlock their full potential (Brody & Mills, 1997). Instead of actualising their individual potential, school may contribute towards a cycle of academic underachievement and diminished self-esteem that eventually materialises as a yawning gap between capable students and struggling learners through the years (Stanovich, 1986, cited in Merga, 2020).

Beyond the consequences for individuals and their families, the societal cost of learning difficulties is high. In 2010, the Organisation for Economic Co-operation and Development (OECD) conducted a landmark Programme for International Student Assessment (PISA) study on the cost of poor educational performance, revealing that learning outcomes (rather than years of schooling) have large impacts on the future well-being of countries. The study estimated that learning gaps, relative to a universal minimum level of proficiency, were responsible for total gross domestic product (GDP) losses of up to USD 200 trillion worldwide (OECD, 2010). Other studies have also estimated the wider lifetime impact of learning disabilities. For instance, dyslexia was estimated to cost California approximately USD 12 billion in 2020 and USD 1 trillion over the next 60 years of the working lifetime of dyslexic learners, with these costs attributed to increased educational support needs, unemployment, and criminal justice involvement (Boston Consulting Group, 2020). Finally, to the extent that access to timely, effective and sustained intervention is associated with socioeconomic status, failing to address these issues reinforces inequity and reduces social mobility.

#### What is currently being done in Singapore?

Although children below six years of age are too young for a school-age psychological assessment, preschool interventions can help children at risk of becoming struggling learners. The Early Childhood Development Agency (ECDA) provides support to children who are identified to be at risk of development delay, including those with early learning difficulties. Those with moderate to higher needs may receive subsidised centre-based

early intervention and an individual education plan under the Early Intervention Programme for Infants and Children (EIPIC) (Early Childhood Development Agency, 2024b). Early intervention and screening into EIPIC at this stage are based on formal assessments by a medical professional. For children requiring less intensive intervention, ECDA is expanding Development Support-Learning Support (DS-LS), which is a set of short term individual/group interventions delivered by learning support specialists and educational therapists in collaboration with preschools in K1/K2, to help bridge the transition to primary school (Early Childhood Development Agency, 2024a). The majority of struggling learners then go on to attend mainstream schools, where they have access to school-based dyslexia remediation, learning support for English, Mathematics and Mother Tongue during the early primary school years, as well as SEN allied educators (Ministry of Education, 2023a, 2023b).

Alongside the formal education system, evidence-based intervention services are offered by social service organisations as well as private providers. The Dyslexia Association of Singapore (DAS) has long recognised the critical need to address these challenges through targeted interventions, research, and advocacy, aiming to create a more inclusive educational environment, not only for students with dyslexia whom it had set out to serve, but also for struggling learners (Dyslexia Association of Singapore, 2023b). DAS provides a comprehensive range of learning support interventions, including Specific Learning Differences (SpLD) assessments and literacy support as well as specialised educational programmes such as Mathematics or Chinese – these are offered to struggling learners of all ages from preschool to adult, even without a formal diagnosis.

For example, subject to a profiling test, DAS, which has been serving individuals with dyslexia for more than three decades, may recommend struggling learners to their Main Literacy Programme, which is a relatively mature programme serving hundreds of dyslexic students annually, or to other more specific interventions that cater to their needs in areas such as Mathematics and Chinese. However, only students with a formal diagnosis of dyslexia on the Main Literacy Programme are eligible for subsidies from the Ministry of Education (MOE). Nonetheless, through the generous support of funders, DAS provides bursaries to support learners with dyslexia from lower-resourced families in their non-MOE-funded programmes and services. As of 2023, more than 50% of DAS students receive financial support to access interventions.

Other social service organisations (such as Care Corner, TOUCH and SHINE) also provide specialised learning support as part of holistic care for socioeconomically disadvantaged children and families, although the nature and extent of such programming varies. Families may also choose to pursue specialised educational therapy or counselling in the private sector, albeit at their own cost.

Finally, beyond formal intervention approaches, a wide range of individual and group tuition/homework support services are offered to the general population by community-

based self-help groups, such as the Chinese Development Assistance Council (CDAC) and MENDAKI, as well as social service organisations and private providers.

#### Why might this not be enough?

While the current landscape includes many helping hands at many stages, for an individual family, the journey can be complex and fraught, with issues related to access, coverage, and quality, especially for those without a diagnosis of SpLD. At early ages, access to early intervention and the requirements of medical referral may be a primary concern. Families who are not in the preschool system or within the ambit of social service agencies may be completely excluded. Even for a family of means, both the direct and indirect costs of a journey towards diagnosis have been recognised as a significant barrier, but ironically, a journey without a diagnosis can be even more challenging as subsidies are scarce. Other families may be financially able but unaware or unready to explore services.

During the formal school years, those who require formal intervention beyond school-based support can in principle access it. However, as noted, only students with a formal diagnosis of dyslexia are subsidised. Moreover, continued eligibility for subsidies requires continuous monitoring of both attendance and performance over time. Alternatively, families identified independently by social service agencies may also receive support services, but the capacity of such agencies to support their beneficiaries may be constrained by resources and mandate.

There is a trend of more students from low-income households progressing further in education - in 2018, nine in ten students from the bottom socio-economic quintile had progressed to post-secondary education, compared to five in ten students 15 years earlier (Ministry of Social and Family Development, 2018). Nevertheless, children from humbler homes and communities continue to have lower academic performance than their classmates from higher socio-economic backgrounds (Juhari & Tan, 2022), and the gap between Singapore students in the top versus the bottom quarters with respect to socio-economic status is larger than the average difference seen in OECD countries (Teng & Davie, 2023). This disparity underscores the importance of providing targeted financial support for struggling learners, as well as broadening this for older learners who encounter lifelong learning difficulties and who would thus benefit from interventions to support their learning.

The ubiquity of tuition services is not a substitute for evidence-based interventions – for some struggling learners, tuition services and providers can be a valuable platform for redressing gaps focused on curricular requirements through individual or small group learning and dedicated revision. However, if such approaches are not adequately responsive to learning differences, they may end up simply being ineffective or – at worst – even counterproductively replicating challenges faced in the classroom.

Finally, certain features of the Singapore education system also place added demands on struggling learners. Bilingualism requires that they navigate two distinct linguistic systems, within which learning difficulties may manifest in different ways depending on the language. Individuals might struggle with letter-sound relationships in English while struggling with the memorisation of characters and meanings in Chinese. Differences in phonetic rules across English and Malay or grammar structures between English and Tamil can also cause challenges. Singapore's approach to Mathematics as a core subject presents its own issues, as answering word problems requires competency in both mathematical skills and language comprehension (Abdullah, 2023). The demands of the Primary School Leaving Examination (PSLE) also require that students develop higher-order examination skills before the end of primary school education. All this implies that even best-in-class interventions developed in other educational systems may not be fit for purpose without thoughtful, intentional adaptation to the needs of local students.

#### What do we already know about what works in Singapore?

Previous work focused on dyslexia in Singapore has validated the application of the Orton-Gillingham (OG) approach with local students as "a direct, explicit, multisensory, structured, sequential, diagnostic, and prescriptive way to teach literacy" (Lim & Oei, 2015; Orton-Gillingham Academy, n.d.). The OG approach differs from the general classroom teaching method in that it simultaneously engages with the visual, auditory, and kinaesthetic/tactile senses (Stevens et al., 2021). In addition, it uses trained educational therapists to deliver "explicit instructions to teach phonological awareness, letter-sound knowledge and other literacy skills" (Weng, 2018, p. 220).

Currently, there is no separately established framework for working with struggling learners. Local interventions have largely taken the practical approach of extending the OG approach to this group, in line with research outside Singapore (Stevens et al., 2021).

To better understand the real-world evidence for interventions for struggling learners in Singapore, we reviewed studies from the DAS and others published in the last five years (from July 2018 to June 2023).

Starting with preschoolers, two studies – Weng (2018) and Sathiasilan et al. (2022) – reported on different approaches to support early literacy.

The Family Literacy Programme (FLP), a two-session parenting workshop lasting two hours each, showed no effect on children's early literacy achievement outcomes. However, it was well-received by the parents who were also the target of intervention and who reported gaining knowledge, skills, and confidence that would help them interact effectively and improve their child's literacy development.

On the other hand, completion of the Preschool Early Literacy Programme (PELP), a ten-week therapist-led small group intervention, had statistically significant effects on early literacy, suggesting that more explicit remediation may be helpful for preschoolers identified to be at risk of literacy difficulties.

In the primary school setting, two further studies by the DAS have highlighted successful interventions for struggling learners.

- Abdul Razak et al. (2018) report on the English Examination Skills Programme (EESP), an intervention targeting struggling non-dyslexic learners. The aim is to improve their examination techniques and overall proficiency, with an eye to the requirements of the PSLE. Over 20 weeks (an hour per week), the programme focused on enhancing students' test-taking strategies, reading comprehension, writing skills, and time management. The results showed that the structured, skill-focused intervention was associated with statistically significant improvements in examination performance among struggling learners. These benefits are comparable with another study of the same programme but targeted at dyslexic students (Leong et al., 2017).
- Rui et al. (2020) evaluated a Chinese language education programme designed for dyslexic and struggling learners in primary school, which focused on addressing the specific challenges in a character-based writing system. This programme was delivered over 18 weeks in a structured small-group format. It integrated multisensory learning approaches, phonological awareness training, and character recognition strategies to enhance reading and writing skills. This evaluation compared both dyslexic and struggling learners to a comparison group and found that not only was this intervention successful for both groups, but also that struggling learners benefitted more than the dyslexic group. The results highlight the potential for significant improvement in literacy outcomes by both dyslexic and struggling learners in a bilingual setting.

Both studies also noted that individual factors such as behavioural issues and language exposure at home would moderate outcomes.

From a methods perspective, all the studies adopted pre-post study designs with a peer-based comparison group. They all drew upon mixed quantitative and qualitative methods to triangulate data and gain insights beyond literacy scores. Although relatively small samples (ranging from n=4 to n=14 in some groups) limited statistical power and generalisability, taken together, these studies make a suggestive case for sustained direct interventions to support literacy based on the OG approach and developed specifically for the local context, with language or subject specialists involved in addressing the unique needs of the Singapore setting.

According to the literature, there are three tiers of educational support: typical classroom instruction is considered to be Tier 1 while supplemental interventions and intensive/extensive interventions are considered Tier 2 and Tier 3, respectively (Truckenmiller, 2024).

Table 1: Studies of interventions for struggling learners in Singapore

Age	Study and Intervention	Sample
Preschool	<b>Weng (2018)</b> Family Literacy Programme (FLP)	The participants were 9 Singaporean preschool children, aged 4 to 7 years old and at risk of literacy difficulties, who were enrolled in the DAS Preschool Programme and split into a control group (n=5) and an experimental group (n=4).
Preschool Preschool Early Literacy Programme (PELP)		The participants were 27 Kindergarten 1 and 2 students split into a control group (n=14) and an intervention group (n=13).
Primary School	Abdul Razak et al. (2018) English Exam Skills Programme (EESP)	The 10 participants were Primary 3 to Primary 6 students who had come to the DAS for academic support because of their struggles with school despite not having a diagnosis of dyslexia.
Primary School	<b>Rui et al. (2020)</b> Chinese literacy	Participants were aged between 6 and 11 studying in a mainstream primary school who had demonstrated difficulties learning Chinese. They were divided into three groups: struggling learners in an intervention group (n = 14); dyslexic children in an intervention group (n=20); dyslexic children in a control group (n=14).

In their meta-analysis of the effects of Tier 2-type reading interventions among students in Grades K-3 (i.e., aged 5 to 9) with or at risk for reading difficulties, Wanzek et al. (2016) found that such interventions led to the overall improvement in both standardised and non-standardised measures of foundational skills, as well as both standardised and non-standardised measures of language/comprehension skills. A later study with the same study population undergoing Tier 3-type interventions also found positive outcomes, suggesting the benefits of educational support for early struggling readers (Wanzek et al., 2018).

It should be noted, however, that these studies do not distinguish between struggling learners and students with a learning disability, which could be important to consider in seeking to understand the effectiveness of these interventions for different student populations.

#### What are we hoping to learn?

These promising albeit early findings point towards new directions for both researchers and practitioners as well as a potential roadmap for future research efforts.

An immediate direction of travel would be to continue the investigation of comparative effectiveness and potential trade-offs across a wider scope of interventions and populations. Larger, longer-term studies could potentially follow students and families longitudinally to assess final educational attainment, continuing education, employment, and a wider range of outcomes related to well-being and life satisfaction.

Key priorities for such research would include other pedagogical approaches beyond OG, delivery modalities apart from the small-group in-person setting, subject areas that extend beyond English and Chinese literacy to Mathematics as well as the study of Malay and Tamil, and adaptation to a wider range of age groups and educational settings. In addition, the potential use of educational technology as a tool to enable personalised learning remains an exciting potential research gap to be further explored.

Reflecting on these, new studies are in the field to examine a more expanded set of interventions that support DAS' recent commitment to support struggling learners without a formal diagnosis (Table 2). The effectiveness of some of these programmes for dyslexic students has already been established, such as iStudySmart (Wee & Abdullah, 2023). Upcoming trials will specifically assess the feasibility and effectiveness of extending the intervention to struggling learners at the post-secondary level, for which published research not only locally but also worldwide is relatively scarce.

In addition to these ongoing efforts, interventions addressing supporting adult figures such as teachers and parents remain to be explored further. While parental education was not found to significantly alter student outcomes in the previous study from a statistical perspective, the qualitative evidence from the same source concluded that parents found it appropriate and helpful in bolstering their confidence, suggesting that this remains a feasible possibility for more intensive intervention.

There is also considerable scope for understanding and overcoming disparities in outcomes within the population of struggling learners, such as the role of individually specific learning difficulties and the impact of the family and home environment.

Table 2: Upcoming studies on interventions for struggling learners in Singapore

Age	Intervention	Description	Method and Experimental Design
Primary school	Prep 2 PSLE	Complements the DAS Main Literacy Programme and aims to equip upper primary students with essential skills and strategies such as active listening, note-taking, grammar concepts and visual text analysis for the PSLE English Language Paper as well as bridging to secondary school.	Mixed-methods quasi-experimental study
Primary to Secondary school	iReaCH™	Aims to support learners in Reading Comprehension and Writing through vocabulary instruction and educational technology based on the OG principles, and to increase their confidence and preparedness during examinations.	Mixed-methods pre-post observational study
Primary to Secondary Chinese school		Provides small-group literacy intervention for the Chinese language to support regular language learning as well as PSLE preparation.	Mixed-methods quasi-experimental study
Primary to Secondary school	Maths	Focuses on three streams of maths curricula structured around MOE curricular requirements.	Mixed-methods quasi-experimental study
Secondary to Post- Secondary / Tertiary education	iStudySmart™	Empowers students with time management and prioritisation skills, planning and organisation skills, tertiary writing skills and presentation skills, delivered online through both e-learning and consultation sessions.	Mixed-methods experimental study

Following intervention development and outcomes evaluation, economic analysis is also highly relevant to policymakers and researchers seeking to understand the value to the overall education system of expanding services for struggling learners, to unlock new investments, and make a strong case for expanding subsidies or grants. It is critical to assess the returns from implementing a more inclusive approach to learning support as well as the cost-effectiveness of alternative models from the individual and societal perspective.

Finally, serving struggling learners at scale requires not only that we identify interventions that work effectively and efficiently, but that organisational and systemic changes take place to ensure that these interventions are successfully adopted and integrated into mainstream practice for all. Beyond the initial proof-of-concept showing that an intervention can impact outcomes for students in a localised setting, decision-makers may also benefit from implementation research. Such research could identify how we should most appropriately be delivering a specific intervention and to whom, contextual factors that may curb or facilitate adoption in different organisational settings, and implementation strategies that can help ensure sustained take-up, such as leadership engagement, training, role revisions, toolkits, and other similar supports.

#### What can we do next?

Building a more inclusive educational landscape that recognises and accommodates the diverse needs of all learners will take time, trust, and evidence.

Today, in spite of ongoing innovation in programming and worthy efforts to widen the base of support, outcomes for struggling learners still rely significantly on individual families' knowledge and financial resources. The frustrations already faced by struggling learners and their families may be further exacerbated by barriers to accessing support, especially when missed opportunities for intervention can significantly impact a lifelong relationship with learning in the classroom and beyond.

The challenges at hand should not be underestimated, and indeed the complex and multifaceted issues faced by struggling learners call for a complex and multifaceted response. All stakeholders in the wider education ecosystem have a role to play in this regard, starting with efforts to raise awareness of the range of evidence-based interventions already offered by social service organisations aimed at supporting the diverse linguistic and academic needs of struggling learners and to shift societal attitudes towards learning difficulties at every stage.

A strong commitment is then required from policymakers, practitioners and researchers to work together. This starts with further developing, evaluating, and improving our existing pioneering movements for struggling learners. Beyond individual programmes, critical work then remains to integrate profiling, referrals, and financial support more

seamlessly across schools and social service organisations, and to monitor and evaluate these systems-level changes.

Throughout this process, credible and robust data will be needed to drive practice and policy towards a common understanding of the landscape and options available. A strong research roadmap is the first step towards building a shared purpose and direction on the long but worthwhile journey of making sure that high-quality interventions that truly answer families' needs are available and affordable to all in Singapore.

#### **Bibliography**

- Abdul Razak, T. E., See, E., Shi Huey, J. T., & Leong, E. (2018). Exploring the effectiveness of the English Examination Skills Programme on struggling non-dyslexic learners. *Asia Pacific Journal of Developmental Differences, 5*(2), 141–162.
- Abdullah, A. (2023). Metacognitive-based approach of problem solving for algebraic word problems for students with dyslexia. The experiences of Primary 6 students with dyslexia using the metacognitive-based approach of problem solving for algebraic word problems. *Asia Pacific Journal of Developmental Differences, 10* (1), 27–63.
- Boston Consulting Group. (2020). *The Economic Impact of Dyslexia on California*. https://media-publications.bcg.com/The-Economic-Impact-of-Dyslexia-on-California-Whitepaper-Final.pdf
- Brody, L. E., & Mills, C. J. (1997). Gifted Children with Learning Disabilities: A Review of the Issues. *Journal of Learning Disabilities*, 30(3), 282–296. https://doi.org/10.1177/002221949703000304
- Dyslexia Association of Singapore. (2023a). *Learning Differently.* https://das.org.sg/learning-differently/
- Dyslexia Association of Singapore. (2023b). *Vision & Mission*. https://das.org.sg/about-das/vision-mission/
- Early Childhood Development Agency. (2024a). *Development Support and Learning Support Programme (DS-LS).* https://www.ecda.gov.sg/parents/other-services/early-intervention-services/development-support-and-learning-support-programme-(ds-ls)
- Early Childhood Development Agency. (2024b). *Early Intervention Programme for Infants and Children (EIPIC).* https://www.ecda.gov.sg/parents/other-services/early-intervention-services/early-intervention-programme-for-infants-and-children-(eipic)
- Juhari, S., & Tan, J. (2022, September 29). Commentary: How can Singapore lessen the impact of SES on educational achievements? CNA. https:// www.channelnewsasia.com/commentary/parents-children-education-socioeconomic-status-2970186
- Koifman, J. (2023). School Struggling Without Learning Disabilities. *US-China Education Review B, 13*(4). https://doi.org/10.17265/2161-6248/2023.04.002
- Leong, E., Asjamiah, S., & Wang, A. (2017). Exploring the classroom practices of the

- English Exam Skills Programme for Singaporean primary school children. *Asia Pacific Journal of Developmental Differences, 4*(2), 167–194.
- Lim, L., & Oei, A. C. (2015). Reading and spelling gains following one year of Orton-Gillingham intervention in Singaporean students with dyslexia. *British Journal of Special Education*, 42(4), 374–389. https://doi.org/10.1111/1467-8578.12104
- Merga, M. K. (2020). "Fallen through the cracks": Teachers' perceptions of barriers faced by struggling literacy learners in secondary school. *English in Education, 54*(4), 371 –395. https://doi.org/10.1080/04250494.2019.1672502
- Ministry of Education. (2021). *Overview of compulsory education*. https://www.moe.gov.sg/primary/compulsory-education/overview
- Ministry of Education. (2023a, January 25). Special educational needs support at mainstream primary schools. https://www.moe.gov.sg/special-educational-needs/school-support/primary-schools
- Ministry of Education. (2023b, January 25). Special *educational needs support at mainstream secondary schools.* https://www.moe.gov.sg/special-educational-needs/school-support/secondary-schools
- Ministry of Social and Family Development. (2018). *Improving the Lives of Low-Income* and Vulnerable Families in Singapore. https://www.msf.gov.sg/docs/default-source/resources-document/improving-the-lives-of-low-income-and-vulnerable-families-in-singaporeaa9055cf8ac54de5b01b7f3999e451fe.pdf?sfvrsn=5f5518d4\_2
- OECD. (2010). *The High Cost of Low Educational Performance: the Long-run Economic Impact of Improving PISA Outcomes.* OECD Publishing.
- Orton-Gillingham Academy. (n.d.). What is the Orton-Gillingham Approach? Retrieved 4 March 2024, from https://www.ortonacademy.org/resources/what-is-the-orton-gillingham-approach/
- Rui, K. Y., Lan, S., Yen, S. L., Cailyn, K., & Dong, L. (2020). Evaluating the effectiveness of intervention in Chinese for dyslexics and struggling learners. *Asia Pacific Journal of Developmental Differences*, 7(2), 249–264.
- Sathiasilan, S., Weng, Y., Fawcett, A. J., Sathiasilan, S., Weng, Y., & Fawcett, A. J. (2022). Investigating the impact of the Preschool Intervention Programme on Struggling Learners. *Asia Pacific Journal of Developmental Differences, 9*(2), 172–193.
- Shantha Ram, G. (2022). Dyslexia in Singapore. In The *Routledge International Handbook* of *Dyslexia in Education* (pp. 261–273). Routledge. https://doi.org/10.4324/9781003162520-33
- Stanovich, K. E. (1986). Matthew Effects in Reading: Some Consequences of Individual Differences in the Acquisition of Literacy. *Reading Research Quarterly, 21*(4), 360–407. http://www.jstor.org/stable/747612
- Stevens, E. A., Austin, C., Moore, C., Scammacca, N., Boucher, A. N., & Vaughn, S. (2021). Current State of the Evidence: Examining the Effects of Orton-Gillingham Reading Interventions for Students with or at Risk for Word-Level Reading Disabilities. Exceptional Children, 87(4), 397–417. SAGE Publications Inc. https://doi.org/10.1177/0014402921993406
- Teng, A. & Davie, S. (2023, December 5). Students from lower-income homes in Singapore

outperform peers overseas. The Straits Times. https://www.straitstimes.com/singapore/students-from-lower-income-homes-in-singapore-outperform-peers-overseas

- Truckenmiller, A. (2024). New and Not-Well-Known Research about Reading Disabilities: Teachers Want to Know. *The Reading Teacher, 77*(5), 705–711. https://doi.org/10.1002/trtr.2280.
- Wanzek, J., Stevens, E. A., Williams, K. J., Scammacca, N., Vaughn, S., & Sargent, K. (2018). Current Evidence on the Effects of Intensive Early Reading Interventions. *Journal of Learning Disabilities*, 51(6), 612–624. https://doi.org/10.1177/0022219418775110
- Wanzek, J., Vaughn, S., Scammacca, N., Gatlin, B., Walker, M. A., & Capin, P. (2016).

  Meta-Analyses of the Effects of Tier 2 Type Reading Interventions in Grades K-3.

  Educational Psychology Review, 28(3), 551–576. https://doi.org/10.1007/s10648-015-9321-7
- Wee, R., & Abdullah, S. (2023). Executive functioning, study skills, and dyslexia Examining the effectiveness of an online programme for upper secondary and post-secondary students. *Asia Pacific Journal of Developmental Differences, 10*(1), 65–97.
- Weng, Y. (2018). Exploring the effectiveness of the Family Literacy Programme with Singaporean preschool children at risk of literacy difficulties. *Asia Pacific Journal of Developmental Differences*, 5(2), 205–225.

Asia Pacific Journal of Developmental Differences Vol. 11, No. 1, July 2024, pp. 19—65 DOI: 10.3850/S2345734124000192



# Virtual Educational Therapy—Experiences and Perceptions of Educational Therapists at the Dyslexia Association of Singapore

Nurul Hudaa Binte Mohamed Daud 1\*

1. Dyslexia Association of Singapore

#### Abstract

School closures were implemented in the first quarter of 2020 to halt the spread of the COVID-19 epidemic. Without adequate preparation time, students and teachers faced the problem of transitioning from face-to-face to online classes. Educational therapy sessions in the Dyslexia Association of Singapore were affected too. This study sought to explore educational therapists' experiences and perceptions of online teaching and learning with school-going age students with dyslexia in an online environment during the COVID-19 pandemic. To accomplish this, a phenomenological approach was employed using in-depth interview techniques with ten educational therapists from the DAS. A six-stage thematic analysis by Braun and Clark (2006) was employed to determine the themes for this study. The findings revealed four key themes: a) benefits of virtual educational therapy, b) challenges of virtual educational therapy, c) perceived success factors and conditions for an effective virtual educational therapy, and d) after-effects of educational therapy for educational therapists. Details in the findings could help educational therapists design better virtual lessons in the future. While online platforms may not be ideal for dyslexic learners, educational therapists believe that age and technological capability contribute significantly to the feasibility of virtual educational therapy. Recommendations for further research include a) a study to explore dyslexic learners' perspectives and experience of online learning, b) a survey of online learning with other programmes, not just the literacy programme and lastly, c) an investigation into the mental health and well-being of dyslexic learners and educational therapists while participating in online learning.

Keywords: COVID-19, dyslexia, educational therapy, online teaching, phenomenological case study, remote teaching.

Nurul Hudaa Binte Mohamed Daud, Senior Educational Therapist, Edtech Integration Specialist, English Language and Literacy (ELL) Division, Dyslexia Association of Singapore Email: nurul.md@das.org.sg

<sup>\*</sup> Correspondence to:

20 N. H. Bte Md Daud

#### INTRODUCTION

The global COVID-19 pandemic had a profound impact on education, causing the most significant disruption in history, according to the United Nations (UN, 2020). Starting in Wuhan, China, in December 2019, COVID-19 rapidly became a pandemic, reaching 220 countries, infecting nearly two billion people, and causing over four million deaths (World Health Organization [WHO] COVID-19 Dashboard, 2021). Governments worldwide implemented various measures to contain the virus, including school closures, affecting millions of students (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2021). Many countries turned to online learning to ensure educational continuity, supported by UNESCO (2020) to limit the virus's spread since students stayed home.

School closures disrupt learning, especially for students with special education needs (SEN) (Petretto et al., 2020). In Singapore, amid closures due to the "circuit breaker" order in April 2020, home-based learning (HBL) was implemented for all students, including those at Special Education (SPED) schools. However, clinician-led therapy services, including the Main Literacy Programme (MLP) at the Dyslexia Association of Singapore (DAS), continued online with safety measures (Ministry of Education Singapore, 2020). This ensured continuity for literacy-focused interventions.

While online learning for atypical learners has been studied, research on online special education for dyslexic school-age students remains limited. Most online education research centres on college students, neglecting K-12 students. This study aims to understand how educational therapists conduct online therapy for dyslexic students aged 7-18 during the COVID-19 pandemic.

#### **Terminology**

Educational therapy employs tailored methods to assist those with learning differences (Clark, 2020). The Dyslexia Association of Singapore (DAS) offers the Main Literacy Programme (MLP), based on the Orton-Gillingham (OG) principles, for dyslexic students aged 7-18. "Virtual educational therapy" refers to online MLP instruction during the COVID -19 lockdown, with educational therapists as the instructors.

#### Dyslexia and online learning

Dyslexia, often defined as a neurological condition, primarily affects literacy (Welsh Government, 2012). However, it also involves challenges beyond reading, impacting working memory and auditory processing (Fostick and Revah, 2018). These deficits can affect organisation, time management, coordination, sequencing (Marchand-Krynski et al., 2017), and attention (Smith-Spark et al., 2004).

Beyond literacy, dyslexic individuals exhibit cognitive deficits in short-term memory, working memory, and processing speed, influencing their learning quality and speed. This makes online learning more challenging for dyslexic students, as it often involves complex processes that require cognitive abilities they may lack. For instance, students with working memory difficulties may struggle when presented with numerous instructions without adequate processing time, potentially leading to information forgetting.

Supporting online learning for students with special educational needs (SEN) are two key arguments:

- Assistive Technology: Research suggests that online learning can level the
  playing field for students with SEN (Lancaster et al., 2009). Digital tools, such as
  communication devices and text-to-speech (TTS) software, can compensate for
  disabilities. For example, nonverbal students or those with speech impairments
  can utilise communication devices, while students with dyslexia can benefit from
  text-to-speech, speech-to-text, and spell-checking software.
- 2. Student-Centered Approach: Online education, often designed with a student-centred approach, has proven beneficial for students with SEN (Marteney and Bernadowski, 2016). This approach enhances access to learning activities and boosts motivation. It enables open access to course materials, making it easier for students to review content, such as repeatedly watching demonstration videos (Schuck and Lambert, 2020). Furthermore, online education allows teachers to tailor lesson content to suit the unique learning styles of nearly every student, providing them with access to a diverse range of online resources.

However, some learners who struggle in traditional classes, especially those with specific learning difficulties, may face even greater challenges in online environments. Alsobhi, Khan, and Rahanu (2015) noted that students with disabilities, including dyslexia, are often neglected in online tool development, resulting in unequal learning experiences. Woodfine et al. (2008) investigated the issues faced by dyslexic students in synchronous online learning, finding text-based activities like web conferencing and instant chat to be disadvantageous. Firth et al. (2019) also highlighted how functional changes, task-switching, and complex multimedia stimuli can harm attention, memory, and social cognition in online learning. For dyslexic learners already grappling with working memory issues, these challenges could be particularly detrimental. While Lancaster et al. (2009) emphasised the importance of digital tools for students with special educational needs, Alsobhi et al. (2015) pointed out the neglect of online tools for dyslexic students.

#### Research gaps

Existing studies do not conclusively establish the impact of online learning on students with dyslexia. In summary, one perspective advocates using assistive technology to level

22 N. H. Bte Md Daud

the playing field (Lancaster et al., 2009), while another perspective highlights the neglecting of students with disabilities, including dyslexia, in online lesson development (Alsobhi et al., 2015; Woodfine et al., 2008). Little research literature covers K-12 special education policies and practices for online learning (Burdette, Greer, and Woods, 2013). Understanding how online learning suits school-aged individuals with dyslexia is essential. Most dyslexia research focuses on higher education, which differs from K-12 settings (Pang et al., 2015). Exploring teachers' perspectives has also been limited (Worthy et al., 2016). Teachers' attitudes largely impact technology's success in teaching and learning (Hartman et al., 2019). Given that DAS's educational therapists work with dyslexic students daily, their insights can shed light on the effectiveness of online learning for school-age dyslexic students.

The preceding studies identify the following research gaps:

- 1. Additional research on dyslexic learners and online learning is necessary, as online learning during the pandemic is unique. The effects of the abrupt and forced change have not been adequately documented.
- 2. Additional research on younger dyslexic learners is necessary, as the benefits and challenges they face online may differ from university-going dyslexic learners.
- 3. Finally, instructors' voice is relatively underrepresented in the growing literature on online learning and learners with dyslexia, especially concerning how they conduct their lessons on a different platform than the norm.

#### **PURPOSE OF THE STUDY**

Considering the research gaps, this study explored educational therapists' experiences and perceptions of online teaching and learning with school-going-age students with dyslexia in an online environment during the COVID-19 pandemic. Therefore, the study's central question is:

What are the experiences and perceptions of educational therapists with regards to delivering virtual educational therapy sessions to students with dyslexia during the COVID-19 pandemic lockdown?

The research questions that will shape the current study are as follows:

- How do educational therapists deliver virtual educational therapy sessions to students with dyslexia?
- What are the benefits and challenges educational therapists face while conducting virtual educational therapy with students with dyslexia?

This study aims to explore the experiences of educational therapists providing online intervention to students with dyslexia during the COVID-19 pandemic. Examining therapists' practices during emergency remote teaching seeks to identify effective approaches and challenges. The findings will inform future strategic planning for online education and virtual therapy for dyslexic students.

#### Online education and online learning during the pandemic

Online education, also known as distance education, is a well-established concept in the field of education. It is defined as "institution-based, formal education in which the learning group is separated, and interactive telecommunications networks are used to connect learners with resources and instructors" (Simonson, Smaldino, and Zvacek, 2012). In recent years, online education, primarily delivered through the internet, has gained significant popularity. Even before the COVID-19 pandemic, a large number of students were already engaged in online learning.

In Singapore, for instance, e-learning weeks are common across primary, secondary, and junior college schools (Powell & Patrick, 2006). Blended learning, combining online curricula with in-person teaching, has been practised in schools for some time (Barbour et al., 2011). In the early to mid-1990s, U.S. universities and colleges began experimenting with online courses (Kentnor, 2015).

Studies on online education in higher education in the United States have been conducted by the Babson Survey Research Group for several years. Their tenth annual survey study in 2013, based on responses from over 2,800 academic leaders, reported that over 6.7 million students were enrolled in at least one online course. Between 2012 and 2019, the number of students enrolled in online courses increased by two million, reaching 7.4 million. The global market for educational technology (edtech) has also seen substantial growth, with expenditures exceeding \$17.7 billion USD in 2017 (Edtech in Singapore - opportunities and growth, n.d.).

Online education is not only a response to the COVID-19 pandemic but has been studied for decades. It is considered a means to reduce the achievement gap, increase graduation rates, and enhance students' progress toward proficiency (Patrick and Dawley, 2009). Additionally, it is viewed as an approach to making education more accessible to individuals with geographical, disability, and status-related constraints (Carr-Chellman, 2005). Online education can benefit learners of various ages, socioeconomic backgrounds, abilities, and geographical locations, provided they have access to the necessary technology and an internet connection.

The U.S. Department of Education funded the National Research Center for Distance Education and Technological Advancement (DETA). In 2004, they initiated the "No Significant Difference" database, which compiles research on the effectiveness of online

24 N. H. Bte Md Daud

learning. Approximately 92% of the studies in this database demonstrate that online education is as effective or more effective than traditional education (Nguyen, 2015).

Pre-COVID, research on online learning centred on learners who could choose between online and face-to-face instruction. Given that, they are supplied with a well-planned online curriculum to select, as well as the necessary devices to facilitate their learning. Online education uses a deliberate instructional planning process that incorporates a systematic approach to administrative procedures and course development (Barbour et al., 2011). On the contrary, using online learning amid an emergency, like the COVID-19 pandemic, is not a choice. A well-designed online course is not comparable to online teaching in response to a crisis(Hodges et al., 2020). It is seen as a spontaneous substitute for the typical face-to-face, brick-and-mortar teaching approach (Zawadka et al., 2021). Hodges et al. (2020) have coined a specific term for this temporary form of instruction in times of crisis: Emergency Remote Teaching (ERT). This transition to Emergency Remote Teaching (ERT) presented distinct challenges for key stakeholders in education (Long, 2021), especially for educators of students with special educational needs (SEN). Additionally, the transition presents distinct challenges for students with SEN, too, as they often benefit from strong face-to-face interaction, modelling (from both instructors and peers), and the use of physical manipulatives (Frederick, Raabe, Rogers and Pizzica, 2020) provided in the brick and mortar classroom.

#### Online education and Special Educational Needs (SEN)

The definition of "special needs" varies globally because different countries' legislations (OECD, 2012) generally apply to children who cannot thrive in mainstream educational settings without additional support or modifications. Typically, these students, classified as having special educational needs (SEN), face more significant learning challenges compared to their peers and require specialised educational services (Delaney, 2016). The category of special education encompasses learners with a range of conditions, including mild dyslexia, mild intellectual disability, severe learning difficulties, and autism spectrum disorder (ASD). Additionally, it includes those with conditions like attention deficit hyperactivity disorder (ADHD), visual or hearing impairments, mobility issues, limited motor skills, and movement challenges. Therefore, students with special educational needs (SEN) may exhibit a variety of issues, including learning disabilities, physical or developmental disabilities, as well as behavioural, emotional, and communication disorders (Kryszewska, 2017). Each student with disabilities and disorders has unique requirements and varying levels of support necessary for their learning.

#### Benefits of online education for SEN students

Online education offers several advantages for students with special educational needs (SEN), including flexibility in scheduling, the ability to adjust the pace of lessons, and the option to take breaks as needed (Allday and Allday, 2011). It also provides automated

feedback and tailored results to assist students in addressing errors promptly (DiPietro et al., 2010), reducing peer pressure (Tsai, 2009). Online learning allows teachers to customise lesson content to match students' learning styles. For instance, visual learners benefit from presentations, graphs, charts, animations, and videos, while auditory learners can use recorded lessons and audio readers. Providing transcripts aids verbal learners, and additional resources in various technology formats help students grasp course subjects in their preferred way (Marteney and Bernadowski, 2016).

Research by Murders (2017) found that college students with learning disabilities appreciate the convenience and flexibility of online classes. It offers extra time for information analysis and comprehension. Students with SEN may require Assistive Technology (AT) during online learning, and the accessibility of devices, apps, and online platforms for individuals with disabilities has significantly improved. Assistive interventions like text-to-speech (TTS), speech-to-text (STT), word processing, multimedia (hypertext), and smartpens have been studied. Word processing, multimedia, and hypertext interventions have been shown to be the most effective, while smartpens and text-to-speech systems had mixed results, and speech-to-text conversion systems had a modestly beneficial effect (Perelmutter, McGregor, and Gordon, 2017).

Assistive technology interventions, as researched by Perelmutter et al. (2017), can be beneficial for adolescents and adults with learning disabilities. However, it is crucial to understand that AT solutions should be individualised, as not all individuals with learning difficulties will benefit equally from tools like text-to-speech (TTS). The effectiveness of AT depends on the student's specific needs and reading abilities, making a case-by-case evaluation necessary. When appropriately applied, AT can help students with SEN complete assignments more efficiently, increasing their motivation (Bahr, Nelson, and Meter, 1996).

While online learning offers many advantages for students with special educational needs, it also presents challenges. Despite the positive research findings on online and special education, it is essential to consider the issues discussed in the literature.

#### Challenges of online education for SEN students

Students with special educational needs are more likely to experience behavioural difficulties in the classroom compared to their typically developing peers (Oldfield, Humphrey, and Hebron, 2017). During the COVID-19 lockdown, a study conducted in Germany found that both parents and children were stressed (Christner et al., 2021). Yavari's research in 2021 focused on students with autism spectrum disorder (ASD) during the lockdown, revealing that increased stress and anxiety often led to temper tantrums and meltdowns. Some students with ASD even refused to return to online learning, while others had to quit due to challenging behaviour, triggered by interruptions. Technology presented another hurdle, with Gilbert's research (2015) noting that a lack of reliable

26 N. H. Bte Md Daud

internet access at home was a common difficulty among respondents. Sorensen (2019) also highlighted the technological challenge, emphasising that access to technology, including the internet and devices, is essential for successful online learning. In Sorensen's study, based on Idaho virtual schools, it was found that even when virtual schools provide learners with devices, inadequate internet connectivity can greatly hinder their success. Younger students with disabilities, in particular, may spend excessive time learning how to use technology, which can become a barrier to their learning process.

Several studies, including those by Gilbert (2015), Gorbunovs et al. (2016), and Sorensen (2015), have identified a significant issue in online learning related to learner self-discipline and motivation. It is worth noting that these studies were conducted before the COVID-19 crisis. During the COVID-19 lockdown, a large-scale research study at a Dutch university (Meeter et al., 2020) found that students perceived online education as less satisfying compared to campus-based learning. The study revealed that school closures led to a decrease in student motivation. Furthermore, this qualitative survey involving more than 15,000 students indicated that while work efficiency increased with the transition to online education, satisfaction and motivation declined (Meeter et al., 2020).

Parents play a critical role in the online education of students with special needs. Greer, Rowland, and Smith (2014) note that as K-12 online learning becomes more common, parents or adult household members take on additional responsibilities to ensure the participation of students with disabilities. Teachers often expect parents to help students to complete lessons in the correct order, especially for primary school children with impairments who may require parental assistance even during synchronous classes. This reliance on parents can be challenging, as a lack of parental involvement on the online platform can lead to failing grades, truancy, and frustration (Sorenson, 2019). Effective communication between teachers and parents is crucial to ensure smooth lesson delivery, and family or guardian support is essential for learners with impairments in adapting to remote learning (Patretto et al., 2020). In online learning, caregivers primarily assume the roles that professionals typically handle in a school setting, and these additional responsibilities can be burdensome for parents or guardians who also work.

#### Learners with dyslexia and online learning

Dyslexia is a learning disorder characterised by difficulties in accurate word identification, decoding skills, and spelling. It is recognised as a specific learning disorder in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). People with dyslexia struggle with word decoding and spelling, even though their reading comprehension is typically unaffected (Snowling et al., 2020). While individuals with dyslexia may experience co-occurring challenges in language, motor coordination, mental calculation, concentration, and personal organisation, these are not markers for

dyslexia in themselves (Rose, 2009). Dyslexic students may encounter difficulties in various study skills, such as note-taking during lectures and composing written assignments (Mortimore and Crozier, 2006).

Murders (2017) suggests that the structure and organisation of the online environment can benefit students with special educational needs (SEN) by providing them with more time to process and understand information. However, this advantage is contingent on the online class being asynchronous, which is not always the case.

Habib et al. (2012) conducted a study involving twelve participants formally classified as dyslexic, including current university students and recent graduates. Their findings reveal that dyslexic students encounter various challenges when using virtual learning environments (VLEs). These challenges include dealing with information overload, inaccurate word processing tools, limited search options, and the need to interact with multiple systems simultaneously. Habib et al.'s (2012) findings align with Woodfine et al.'s (2008) earlier research, indicating that text-based synchronous activities like web conferencing and instant chat functions can pose difficulties for children with dyslexia.

Interestingly, nearly every participant in Habib et al.'s study reported struggling with writing, with many of them feeling that these challenges were exacerbated in an online setting. Two primary factors contributed to these difficulties. Firstly, some participants found that typing was more time-consuming than writing with pen and paper, possibly due to differences in hand-eye coordination required for the two tasks. Secondly, several participants had difficulty connecting what they typed with what they saw on the screen, making text recognition more challenging. Considering that the participants in this study were college-going adults, it raises questions about whether younger learners might face similar challenges.

In their 2021 study, Forteza-Forteza and colleagues delved into the experiences of dyslexic children and youth, aged 9 to 21, who were predominantly enrolled in primary and secondary schools, as they grappled with the challenges imposed by the COVID-19 pandemic and associated school closures. This exploratory investigation engaged 327 parents and 203 children with dyslexia. Rather than solely concentrating on diagnosing dyslexia and its associated specific learning difficulties, the study took a unique angle by shedding light on the emotional states of dyslexic students and their parents throughout the lockdown.

Building upon the findings of prior research conducted by Ghisi et al. (2016), Novita (2016), and Zuppardo et al. (2017), which collectively underscored the heightened emotional stress faced by dyslexic students, Forteza-Forteza and her team reaffirmed that these individuals exhibited significantly lower self-esteem, a more negative self-concept relative to their peers, and a heightened prevalence of anxiety and depression.

28 N. H. Bte Md Daud

Notably, these emotional challenges were attributed to instructional plans devised by educators, which often failed to accommodate the unique reading process needs of children with dyslexia (Forteza-Forteza et al., 2021).

Moreover, the study by Forteza-Forteza et al. (2021) emphasised how the disruptions caused by lockdowns and school closures exacerbated the learning difficulties experienced by dyslexic students, thereby adding to the strain faced by families. This strain became particularly pronounced as parents took on the role of educators amid the uncertainty and stress of the ongoing pandemic.

In a recent study conducted in Italy, researchers aimed to assess the impact of lockdown and emergency remote teaching on children with dyslexia. They recruited 65 children with dyslexia and 52 children without specific learning difficulties. To evaluate reading abilities, a neuropsychological test was administered, and an ad hoc questionnaire was designed to gather insights into the experiences of both parents and children during the lockdown. The study's findings, conducted amidst the COVID-19 lockdown in Italy, were less optimistic than anticipated. Children with dyslexia exhibited a slower-than-expected improvement in their reading skills (Bachenis et al., 2021).

Collectively, three studies, including Habib et al. (2012), Forteza-Forteza et al. (2021), and Bachenis et al. (2021), underscore the distinctive challenges faced by dyslexic learners compared to their typically developing peers. These findings emphasise the need for tailored considerations when preparing to educate dyslexic students via online platforms.

#### Teachers' perceptions of online teaching

Online education, once an optional component of teaching, has taken on newfound importance in the pandemic era, as statistics clearly illustrate. Educators who once had the choice to incorporate technology found themselves compelled to do so. Giovannella (2020) conducted a study on the Italian school system, investigating how teachers adapted to online education two months into the COVID-19 outbreak. The study involved 336 teachers from both primary (142) and secondary (194) schools. Results revealed that teachers exhibited a positive attitude towards technology integration, making every effort to maintain normalcy in their teaching by utilising familiar tools and online platforms. Nonetheless, the unanimous consensus among these educators was the necessity for digital skills training to better prepare for future teaching endeavors.

In China, Wang et al. (2020) conducted a comprehensive assessment of online learning platform usage in K-12 education during the COVID-19 outbreak. They employed surveys and case studies to gauge teachers' perspectives on platform functionality. An impressive 77.9% expressed a desire to continue using online platforms to enhance classroom instruction in the future, showing overall satisfaction with the experience.

Similarly, Rahayu and Wirza (2020) explored the attitudes of 102 EFL Junior High School teachers in Indonesia towards online English language learning during the pandemic. While teachers generally appreciated the utility and convenience of online systems, over half remained uncertain about the effectiveness of online learning, citing the lack of teacher-student interaction and engagement as a significant concern. Various challenges such as limited technological infrastructure, disengaged students, and teachers' digital proficiency hinder online education. In a smaller-scale study, Eftimie (2020) examined 20 university teachers in Romania to assess the pros and cons of online teaching. Responses often focused on the downsides of pandemics and online learning, but within the "professional advantages" of these situations, teachers can enhance their tech familiarity and digital skills.

Velichová, Orbánová, and Kúbeková (2020) view the COVID-19 pandemic as a unique opportunity for enhancing online education. Wang et al. (2020) share this perspective, emphasising that technological advancements should not be the sole focus. They argue that fostering digital literacy among teachers should come first, followed by the integration of online tools into standard teaching practices.

Giovannella's study (2020) reveals a widespread acknowledgment of the importance of digital pedagogy and its inclusion in teacher education programs. One-third of participants expressed a preference for a blended learning environment in their future teaching activities. Pelgrum (2001) underscores that the success of educational innovations hinges significantly on teachers' skills and knowledge. It is essential to gauge teachers' perspectives on online education and their technology integration needs.

#### **SAMR Framework**

The Substitution Augmentation Modification Redefinition (SAMR) model, developed by Puentedura, 2014, provides a lens through which the impact of computer technology on classroom teaching and learning can be understood. It delineates a progression that many educational technology users follow as they navigate different phases of teaching and learning with technological assistance. In essence, SAMR offers teachers a framework for scrutinising and assessing the technology employed in their classrooms.

The advent of the circuit breaker introduced educational therapists to the world of virtual educational therapy, marking their first foray into online intervention. The SAMR framework, originally a planning tool, emerges as a valuable guide for designing and improving future virtual educational therapy sessions. It is crucial to emphasise that SAMR primarily serves as a tool for crafting enhanced learning experiences for students. With online learning poised to become a permanent fixture in education, educational therapists should harness educational technology. SAMR offers pedagogical insights into how this integration can be achieved effectively. When applied thoughtfully, this model unveils the transformative potential of everyday technology.

30 N. H. Bte Md Daud

ENHANCEMENT	Substitution	Technology acts as a direct tool substitute with no functional change
CEMENT	Augmentation	Technology acts as a direct tool substitute with functional improvement
TRANSFORMATIONA	Modification	Technology allows for significant task redesign
MATIONAL	Redefinition	Technology allows creation of new tasks , previously inconceivable

Figure 1: The SAMR Model (Puentedura, 2014)

#### Impact of COVID-19 on Education and the Role of Virtual Educational Therapy

The COVID-19 pandemic brought about widespread disruptions across various sectors, including education, which is a fundamental aspect of human society. Despite these disruptions, the business of education had to persist. When governments worldwide enforced workplace and school closures to mitigate the virus's spread, educational institutions responded by adapting to ensure that students continued to have learning opportunities. Consequently, online learning swiftly became the new norm for educational institutions, including the DAS, as they adjusted to the changing landscape.

Research has shed light on the advantages and challenges of online learning, especially for students with special educational needs, as well as the experiences of dyslexic learners in remote emergency teaching and other online platforms. To the best of the researcher's knowledge, only a limited number of studies have delved into the diverse learning obstacles encountered by primary and secondary students with dyslexia during remote learning in the context of the COVID-19 pandemic. Given the uniqueness of everyone's online teaching experiences, the researcher, who works with dyslexic students, is eager to explore the experiences and perceptions of other educational therapists regarding virtual educational therapy and how this approach worked for them. With the ongoing and likely persistent disruptions caused by the COVID-19 pandemic, the shift to online teaching platforms may become a recurring occurrence. The insights from this study may contribute to future efforts aimed at enhancing the integration of technology

into classrooms, benefiting students with learning disabilities in general and, more specifically, learners with dyslexia.

#### **METHODOLOGY**

## Study design

This qualitative research focuses on the experiences of educational therapists at the Dyslexia Association of Singapore (DAS) during the shift from in-person to online teaching for dyslexic learners due to the COVID-19 pandemic. It utilises the phenomenology approach, selected from various qualitative methods, to explore this transition through indepth interviews with educational therapists. The research aims to capture the essence of their lived experiences (Creswell, 2013).

The present study was designed to explore the experiences and perceptions of educational therapists about delivering virtual educational therapy sessions to students with dyslexia. The research questions that will shape the current study are as follows:

- 1. How do educational therapists deliver virtual educational therapy sessions to students with dyslexia?
- 2. What are the benefits and challenges faced by educational therapists while conducting virtual educational therapy with students with dyslexia?

#### Setting

Originally planned as face-to-face interviews, the study adapted to COVID-19 restrictions by conducting virtual interviews using Google Meet. The choice of semi-structured interviews allowed for open-ended questions, fostering detailed interactions between the researcher and participants (DeJonckheere and Vaughn, 2019). These interviews were hosted within a dedicated virtual classroom on Google Classroom, streamlining the process. Google Meet was chosen as the video conferencing platform based on its familiarity among educational therapists, ensuring a comfortable environment that encourages honest responses (Lewis and Graham, 2007).

All interviews were conducted by the researcher from her classroom at the Parkway Parade branch of DAS, while the participants joined from the comfort of their homes or classrooms. Notably, Google Meet includes a video recording feature, ensuring that all interviews were video-recorded for reference. During individual interview recordings, the researcher maintained a closed classroom door to preserve audio quality, minimise distractions, and uphold privacy and confidentiality for the participants.

## **Participants**

This research study involved educational therapists from DAS as its participants. The selection of these participants followed a purposeful sampling technique, as recommended by Creswell and Plano Clark (2009). This technique involves the deliberate choice of individuals with direct experience related to the phenomenon under investigation. Unlike random sampling, purposeful sampling ensures that the chosen participants are more informative and representative of the population. To be eligible for participation in the research, educational therapists needed to have conducted online intervention classes during the 'circuit breaker' period. Following Creswell's (2013) guidance for phenomenology studies, a sample size of ten participants (all from DAS) was recruited to undergo the semi-structured interview process. In order to protect the anonymity of the participants, pseudonyms were assigned to them. Among the participants, there were two males and eight females. On average, they possessed seven years of teaching experience within DAS. It's noteworthy that most participants did not have prior teaching experience, and none of them had a background in information technology (IT) or held an IT degree. Detailed demographic information for each participant can be found in Table 1.

Table 1: Demographics of Participants

Participants' pseudonym	Gender	Years in DAS	Prior Teaching Background	IT Background
Amber	Female	8.5	Ten years preschool	No
Brooke	Female	6	6.5 years primary school	No
Chester	Male	6	Yes, tutoring	No
Diane	Female	9.5	Yes, tutoring	No
Elena	Female	3	Yes, tutoring	No
Faith	Female	5.5	Yes, tutoring	No
Gabrielle	Female	8	Yes, tutoring	No
Hector	Male	9	6 months primary school	No
Isla	Female	9	Yes, tutoring	No
Jade	Female	10	Yes, relief teaching	No

#### The Researcher's Role

The researcher and author, also an educational therapist at DAS, meticulously separated her own experiences and preconceptions from the study by practicing bracketing (Moustakas, 1994). This process aimed to prevent personal biases from influencing the research. Throughout the interviews, the researcher maintained a sharp focus on the educational therapists' experiences, avoiding the imposition of her own.

### Materials and data collection procedures

Conducting qualitative research involved securing access to the research site (DAS) and obtaining the necessary ethical clearances. The study was approved by the DAS Research Committee after initial university and supervisor clearances. An open invitation was sent to educational therapists through email, along with consent forms outlining study details, confidentiality, and participants' rights. All communication occurred through email, and interviews were conducted virtually on Google Meet. Participants were reassured about anonymity, non-disclosure of personal information, and the independence of their participation from their organisational roles. Data was meticulously recorded through video and audio backups.

#### Interview

Giorgi (2009) emphasises that phenomenological interviews typically adopt a broad and open-ended approach, allowing participants to freely express their viewpoints. The researcher's role is to temporarily set aside their personal ideas and experiences related to the phenomenon, as outlined by Creswell (2013). While there exists a fundamental structure for interview questions, it is essential to remain flexible. Depending on participants' responses, the researcher may deviate from the set questions, seeking clarification on specific points, as suggested by Kallio et al. (2016), and encouraging participants to elaborate further. It is paramount that interview questions are framed in the participants' everyday language, as recommended by Brinkmann and Kvale (2015), and that jargon is avoided, in line with Patton (2015). Refer to Table 2 for a detailed list of interview questions categorised for reference.

This semi-structured interview was designed to capture the perceptions and experiences of educational therapists engaged in online instruction with dyslexic students. Commencing with direct inquiries about each participants' tenure in the field and their IT knowledge, this approach aimed to establish essential demographic information, promoting a deeper understanding of how backgrounds might influence their experiences and perceptions. The introductory questions also served as rapport-building, fostering a comfortable environment to facilitate the flow of the subsequent core, openended questions. Concluding the interview, the final question provided participants with an opportunity to contribute additional insights and express their concluding thoughts on the subject.

Table 2: Interview questions

Inte	erview Questions	Category	
1	How long have you been working with DAS?  Do you have any experience in teaching or IT prior to DAS?	Demographic/ Background Information	
2	Describe how you deliver a typical online lesson. What specific online resources and tech tools do you choose to deliver your lesson? (Google Meet, Google classroom, Zoom etc)	Experience (provide prompt)	
3	What features from these resources are indispensable to engage your student during an online lesson?	Perception	
4	How do you facilitate a session with your class to provide an active teaching presence in a virtual classroom?  a. Is there EdT-student interaction? Elaborate.  b. Is there student-student interaction? Elaborate.	Experience (provide prompt)	
5	What are the benefits you perceive:  a. for students with dyslexia attending virtual educational therapy sessions online and b. for educational therapists teaching online?	Perception	
6	What are the challenges you perceive  a. for students with dyslexia attending virtual educational therapy sessions online and  b. for educational therapists teaching online?	Perception	
7	Share with me one or two examples of successes you have experienced with your student receiving lessons in the virtual environment. What factors contribute to those successes?	Experience and Perception	
8	Share with me one or two examples of challenges you or your student have experienced during lessons in the virtual environment. What factors contribute to those challenges?	Experience and Perception	
9	Identify areas which you, as an individual educational therapist and DAS, as an organisation, can make online delivery more effective for both students and educational therapists (administration, content knowledge/skills etc.)	Perception	
10	Can you describe some of your learning experiences throughout the online delivery period?	Experience	
11	Are there any more thoughts/feelings you would like to share before we conclude the interview?	Experience/ Perception	

This semi-structured interview was designed to capture the perceptions and experiences of educational therapists engaged in online instruction with dyslexic students. Commencing with direct inquiries about each participants' tenure in the field and their IT knowledge, this approach aimed to establish essential demographic information, promoting a deeper understanding of how backgrounds might influence their experiences and perceptions. The introductory questions also served as rapport-building, fostering a comfortable environment to facilitate the flow of the subsequent core, openended questions. Concluding the interview, the final question provided participants with an opportunity to contribute additional insights and express their concluding thoughts on the subject.

Table 3: Demographics of Participant in Pilot Interview

Participants' pseudonym	Gender	Years in DAS	Prior Teaching Background	IT Background
Xander	Male	13	More than Twenty years teaching English in mainstream school	No

The development of interview questions drew upon established guidelines for research interviews (Bolderstone, 2021; Castillo-Montoya, 2016) and insights derived from prior studies exploring educators' perspectives and experiences (Anderson et al., 2019; Crouse et al., 2016; Rice et al., 2018; Sorenson, 2019). Before engaging with the study's participants, the researcher conducted a pilot interview with a colleague, and the colleague's background information can be found in Table 3. This pilot interview served the dual purpose of addressing practical concerns that might arise during subsequent research stages, in line with the recommendations of Van Teijlingen and Hundley (2002), and honing interviewing techniques. Notably, Castillo-Montoya (2016) underlined the role of pilot interviews in enhancing the overall interview process and identifying any issues or limitations in the interview design, an approach in alignment with Kvale's perspective (2007).

The pilot interview proved instrumental in shaping a more refined interview guide, facilitating better estimations of interview duration, and informed improvements, such as the introduction of an additional question (question 11, as shown in Table 2) and the incorporation of prompts to elicit comprehensive participant responses. Furthermore, the insights from the pilot interview led to adjustments in the interview structure, including rephrasing and sequencing of questions, ultimately contributing to a more effective and polished interview process. Importantly, this preparatory pilot interview also allowed the researcher to enhance their interviewing skills and gain greater comfort with the conversational flow.

Following the pilot interview, the main interviews with all ten participants were conducted successfully and video-recorded using Google Meet. Although there was a brief internet disconnection during one interview session, it was promptly resolved, and the interview was completed within an hour. Subsequently, all interviews were transcribed and organised in QSR International's NVivo 12 software, released in March 2020, to facilitate systematic analysis. Participants were duly informed about the recording and storage of each session. Furthermore, it is essential to note that all data collected will be retained for a minimum of three years following the research's completion, after which it will be digitally disposed of, in adherence to data retention and disposal protocols.

#### **Data Analysis**

The study employed a six-stage thematic analysis by Braun and Clark (2006) to extract significant themes from the interviews. The analysis aimed to address the research questions by identifying recurring patterns and central themes within the data. This systematic approach ensured a comprehensive understanding of the educational therapists' experiences.

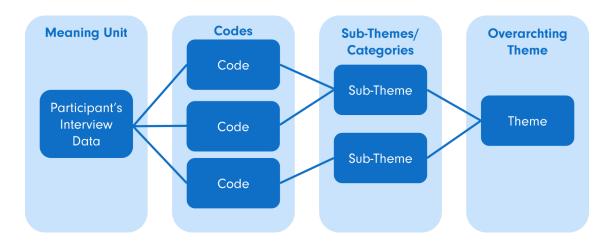


Figure 2. Data analysis process

Figure 2 shows the data analysis process. The first stage involved data familiarisation, achieved through transcription, multiple readings of transcripts, and highlighting recurring issues. The second stage focused on initial code development using NVivo software, which involved the creation of codes based on participants' words (in vivo codes). An inductive approach was employed, resulting in 96 nodes (codes) by the end (Vaismoradi et al., 2016).

In the third stage, themes were identified as the researcher reviewed and observed codes that cohesively fit together, such as those related to technological challenges. In

the fourth stage, themes were reviewed and refined to ensure they accurately represented the coded data. The fifth stage included the naming and fine-tuning of themes and subthemes to maintain clarity and explicit interrelationships. An example illustrating the evolution from participant data to a theme is provided in Appendix A. Finally, the sixth stage involved reporting the thematic findings and data interpretation to demonstrate the analysis's value and validity to the reader.

#### **Ethical considerations**

To protect the privacy and anonymity of the participants, a pseudonymous approach was applied throughout data collection, ensuring that their true identities remained undisclosed. All data, including recordings and transcriptions, were meticulously stored on an external hard drive, safeguarded with a password accessible exclusively to the researcher. These records were further encased in password-protected files. The external hard drive is securely housed in a drawer accessible solely to the researcher. During interviews, participants received explicit assurance that there were no definitive right or wrong answers, and all shared information and data were treated with the utmost confidentiality.

## **Results and Findings**

This section presents the thematic findings and data interpretation in alignment with the study's objectives: 1) exploring how educational therapists conduct virtual educational therapy sessions with dyslexic students, and 2) examining the benefits and challenges of educational therapists engaging in virtual educational therapy with dyslexic students. We will also introduce the key themes and subthemes that emerged during our inductive thematic analysis. Four overarching themes, each containing two to five subthemes, were identified. These themes are as follows:

- 1. Advantages of virtual educational therapy,
- 2. Challenges of virtual educational therapy,
- 3. Perceived success factors and conditions for effective virtual educational therapy, and
- 4. Post-effects of educational therapy on educational therapists.

The benefits of virtual educational therapy are encapsulated in Theme 1, while the drawbacks are detailed in Theme 2. Theme 3 highlights the insights shared by educational therapists regarding success factors and conditions for effective virtual educational therapy. Lastly, Theme 4 explores the transformative after-effects experienced by educational therapists due to their engagement in virtual educational

therapy. Throughout our presentation of findings, relevant quotes from the interviews are included, attributed to educational therapists by their respective initial pseudonyms (as shown in Table 1).

Table 4: Three overarching themes and related subthemes that emerged from the analysis.

Theme 1: Benefits of virtual educational therapy	Theme 2: Challenges of virtual educational therapy		
Subthemes 1.1 Self-directed learning 1.2 Flexibility and convenience 1.3 Useful online tools	Subthemes 2.1 Technological challenges 2.2 Dyslexia-related challenges 2.3 Lesson delivery challenges 2.4 Physical and digital distractions at home 2.5 Managing behaviours, attention span and students' engagement		
Theme 3: Perceived success factors and conditions for an effective virtual educational therapy	Theme 4 : After-effects of educational therapy for educational therapists		
Subthemes 3.1 Students and educational therapists' adaptability 3.2 Keeping them engaged 3.3 Number of students, age and ability 3.4 Support from stakeholders	Subthemes 4.1 Negative after-effects for educational therapists 4.2 Positive after-effects for educational therapists		

### Theme 1: Benefits of virtual educational therapy

Educational therapists, despite their initial concerns about online therapy, acknowledged several inherent benefits of conducting virtual educational therapy with dyslexic students. They emphasised these advantages during the interviews.

#### 1.1 **Self-directed learning**

The findings indicated that an online environment facilitated self-directed learning. Students not only developed phonics and language skills but also problem-solving, technical, and research skills. Educational therapists observed that students embraced their learning autonomy and exercised independence in the online setting.

"They enjoy this freedom online, do research, and then come back 15- 20 minutes later to share what they found. That was a very good experience, it empowers them also to learn independently, and it teaches them to source for information out there." – H

"I think being online, definitely they will have more access to certain tools and I would encourage, I'll encourage them also not just to copy everything, but if they need to find out more about something and then sure they can go ahead and use whatever they have to help them to learn, I mean at least they're taking ownership of their own learning." — E

Educational therapists noted that online education had a positive impact on students' writing abilities. In the online setting, students could focus on the content of their writing without being overly concerned about structure, spelling, or grammar. Unlike face-to-face sessions where students spent time on spelling, online tools like Grammarly allowed students to concentrate on other aspects of literacy, giving therapists more opportunities to address various literacy skills.

"In terms of writing composition, because that class has one who is very weak in spelling, technically they're not supposed to use autocorrect and such, but when we do writing, it actually helps him be more motivated to write because the spelling has been checked for him. We're working more on, for example, more ideas for his writing and a bit more grammar because he doesn't have worries about his spelling". - J

"For certain cases, it's even faster, especially for writing tasks, they type, they love it the topics we discuss we get to go on the spot, Google, show videos, read the articles, search for news articles"— H

These feedbacks indicated that students found writing tasks easier in the online environment, thanks to the availability of helpful applications for structuring and spelling. Consequently, they could focus more on the content of their writing, minimising concerns about structure and spelling.

The online platform offered educational therapists access to a plethora of resources for planning and organising their classes. They could choose from a wide array of both free and paid materials available on the internet, all while tailoring their selections to the

specific needs and objectives of their students. This included access to articles on current events, interactive games and quizzes, short movies, videos, and a diverse range of reading materials. Moreover, it was convenient for the therapists to distribute lesson content to their students.

"It's easy for me to send information to my students, especially, you know, like with things like Google Classroom and all that right, I have like a collection of resources there. For example, if my topic today is composition writing for robbery, right? I can I can upload like what 4-5 model compositions for them to take a look and comment on, and then I can give real-time feedback." — I

"For certain cases, it's even faster, especially for writing task, they type, they love it, the topics we discuss we get to go on the spot, Google, show videos, read the articles, search for news articles and there's one activity that they each had a theme, I think it was a practice for oral, so they had to search for articles so it was more of an independent work and it is very successful."— H

According to several educational therapists, certain students find online learning more engaging and invest greater effort compared to traditional face-to-face lessons. These students take pride in their work and strive for an aesthetically pleasing presentation. They personalise elements such as font styles and colors to suit their preferences.

"I can feel that they are very proud about their work when they want to add in pictures on their compo writing pieces, they want to add pictures, they even want to know how to change the font colour, the page colour, because when I show when I share my screen, I normally don't use the white Google document as white, I will usually change it to either a light grey or a very light yellow like very pale yellow, or very pale blue. So I keep changing the colours, and I also changed the font colours as well, so they want to know how they can do that because they want their work to look nicer." — I

"I can see that for some students at it really works, I have two students who were quite tasked avoidance during a physical lesson but suddenly online lesson they're active, and he's on the chair, he didn't even move around and the girl whom I cannot engage is a secondary school kid so she was busy, ahmm..because she likes the IT stuffs so she was tidying up my worksheet for me. For some kids it actually works because they find joy in IT." – J

#### 1.1 Flexibility and convenience

The transition to online learning provided flexibility and convenience, eliminating tardiness and absences. Previously, DAS remediation classes began after a full day of inperson school, leaving students physically weary when they arrived at the DAS center.

However, the move to virtual educational therapy alleviated these challenges. Students no longer had to commute, reducing fatigue and enhancing their focus.

"We definitely have 100% attendance, so that's what I like about online learning. Yeah, even if let's say they were to go somewhere, then they can still be online virtually via, you know, using their phone."— B

Handwriting issues are frequent among students with dyslexia (Gosse and Van Reybroeck, 2020). Students' inability to write clearly, legibly, and in an organised manner made it difficult for educational therapists to decipher their handwriting. It was convenient for educational therapists when students typed their work in an online setting; the work produced was legible, and students were less frustrated as they did not struggle with the physical aspect of writing.

"My P5 student, he has motor issues in terms of writing and grasping the pencil so when he writes a composition in class he has a lot of difficulty of physically writing, he finds it very tiring to write and he doesn't read back his work at all but when we go online, writing a composition using the vocab words he actually keep reading back and keep editing and keep adding information and this is very very good." – G

"So those with poor handwriting sometimes we have a problem trying to read what they've written, but when they type, it's like ok, now I can understand your handwriting."— C

Online learning proved to be a time and cost-efficient alternative for both students and educational therapists. According to the therapists, it significantly reduced the time lost in commuting and curtailed associated expenses. Additionally, the online platform streamlined the process of collecting lesson evidence and capturing screenshots when students exhibited misbehavior or deviated from the norm. This recording capability not only facilitated quality checks but also simplified grading procedures.

#### 1.3 Useful online tools

Various valuable online tools were explored by educational therapists during the lockdown, aimed at assisting dyslexic learners. These tools included speech-to-text and text-to-speech applications, Google Meet with real-time transcription and captions, along with Google Docs and Google Slides. The chat function in Google Meet served as a useful tool for communication and spelling. Game-based learning platforms like Kahoot!, Quizlzz, and Quizlet were also well-received, offering a more engaging and motivating learning experience for students who struggled in traditional environments. Additionally, educational platforms like Google Classroom, Classkick, YouTube, Nearpod, Padlet, and ScreenCastify were noted for their educational value.

"Another benefit could be, the online tools, I notice that there are a lot out there so you can you can really tap on it you can tap on those online tools so I would say because of the range of online tools, you get to explore different ways of delivering the lessons."

—A

"That function, which I found quite useful, and I think it is actually a must for special needs students, is the Google document has the speech to text function so this, this was especially useful when you know you when we're doing reading comprehension or even worksheets with instructions." -I

## Theme 2: Challenges of virtual educational therapy

In addition to the benefits, the educational therapists in this study also discussed the challenges they faced when transitioning to online lessons, especially at the start of the pandemic lockdown. These challenges fell into five subthemes under the main theme of "Challenges of virtual educational therapy." The difficulties they encountered encompassed technical issues, dyslexia-related challenges, executing lessons effectively, managing distractions at home, and handling students' behavior, attention span, and engagement.

## 2.1 Technological challenges

Internet connectivity is a critical factor for the smooth operation of online classes, affecting both educational therapists and students. Unfortunately, some educational therapists and students lacked reliable high-speed internet, leading to various technical challenges. Given that educational therapists are not IT experts, they often had to resort to trial and error to address unexpected technical problems, which ranged from slow internet connections to hardware and software issues. This situation left them feeling helpless, as students could not always articulate their technical issues clearly.

"We didn't anticipate all these issues that can happen in their homes, like for example we teach them how to go to Google Meet and then we taught them how to join, logged in with their DAS email account and all that right? But we didn't show them how to toggle between the share screen and the home screen, we also didn't realise there would be problem so when they went back home, then some have iPads, some don't have iPads, some have lap top, some don't have lap top, don't have this, don't have that right? Then it became like a different problem altogether." – I

Some students from low-income backgrounds received laptops, but these devices often had faulty components, like cameras, audio, or keyboards. While these may appear minor, they led to significant technical issues and distractions during lessons, including echoes and background noises that impacted the overall learning experience.

## 2.2 Dyslexia-related challenges

Educational therapists face a challenge in providing instructions to dyslexic learners during online classes. They are unsure whether to use verbal or written instructions, as both approaches can overwhelm students with information. Students are required to remember a new email address and password, and, since DAS classes occur at least once a week, most therapists create WhatsApp groups to send reminders to students and parents about class timings.

"I think because there is a lot of instructions, the method of giving instruction or the mode of giving instructions, I mean yes, they can read but it's like, it's a word doc right? I mean there are so many things on that thing, so you don't want it to get too wordy but at the same time you don't want to say too many things, but at the same time you want them to know how to navigate independently." — F

"Instructions are important for the kids, I also think that because they are dyslexic it's not easy to process, I think, scaffolding is much harder, it seems as if they forgot about everything." — F

Educational therapists noted the challenges that students faced when trying to access the online platform with their newly created Gmail accounts and assigned passwords. These issues were more pronounced when students used iPads or mobile phones, requiring additional time and effort from therapists to address.

"So, we would schedule the online lesson using the Google Meet. The initial, the first few lessons was a challenge because our students are having problems trying to get on it, logging in, password, things like that. Some students have problem logging in from (different devices), they're not using laptop, especially if they're using whether the phone or iPad then they have a lot of problems, that, the initial logging in problems took a couple weeks to iron out." — C

"Another challenge would be that. Not everyone (students) is tech-savvy; it's also understandable because at their age, I mean, when I was nine or ten, I might not have known how to log into Gmail and everything and use all the different tools." — E

## 2.3 Lesson delivery challenges

Online differentiation presented challenges for educational therapists working with students of varying abilities. High-achieving students often completed their tasks quickly, leading to idle time. Offering additional assignments sometimes made students feel penalised for their efficiency. Immediate feedback during online sessions could be

overheard by all students, unlike in face-to-face interactions where therapists could discreetly provide feedback.

"I think the one of the biggest challenge is differentiation. So when you have a class with different capabilities ah, the very fast ones will finish very fast and then he just wait. Online is very difficult to gauge. Some days they're fast, some days they're slow. So some days the fast ones will wait, some days the slow ones will take forever and then the class cannot complete what we want to do." — C

"There was suddenly a need to differentiate because of the students' pacing." — F

Online sessions made it difficult for educational therapists to observe facial and physical cues and assess students' comprehension effectively. They expressed concerns that learning goals, like spelling, were not adequately met and might have even regressed.

"I think it defeats the purpose for the whole therapy because the therapy is supposed to make them like accustomed when is it B, when is it D for example. They can be googling, typing with spell check, so it kinda defeats the purpose, for me." -G

Finally, educational therapists employed various methods for conducting their online lessons, with a common use of Google Meet for video conferencing. However, the way students' work was shared and graded varied. Some used Google Docs to share and mark worksheets in real-time, while others relied on email, asking students to print out worksheets. Marking via Google Docs was found to be more convenient, while assessing handwritten answers from physical worksheets, especially with suboptimal camera quality, presented challenges.

### 2.4 Physical and digital distractions at home

Educational therapists faced challenges in maintaining students' focus on their tasks at home. Despite efforts to create a conducive learning environment, distractions persisted. Some students had disruptive home surroundings, while others succumbed to digital diversions, and there were instances where students were unable to use their microphones due to background noise. A comfortable home setting sometimes led to students being overly relaxed during lessons, even lounging on their beds.

"This class is very hard going. We have people coming in half an hour late for class; the cam is on, they're still on their bed, Saturday morning, on their sofa, we can see them lying down, in a cross-leg position, can see their phones beside, you can hear the TV, you can see they're not comfortable turning on the camera." — H

"It's very disruptive to the flow of the lesson, for those who have a decent home environment they are too comfortable, they're on the bed." — F

Dyslexic students already face challenges with focus and concentration. Additional distractions in an online class may hinder their learning and worsen their condition over time. Once educational therapists lose the students' attention to these distractions, regaining their focus on the lesson becomes a significant challenge.

"I think in terms of distraction, it's really, really very, very hard, we're talking about distraction in terms of environment, in terms of their, their focus level, engagement level, I think it's really beyond our control, I cannot make that you only click on the Meet button and not other button, I cannot, I cannot make that happen. So, these are the things that are beyond our control." -G

## 2.5` Managing students' behaviours, attention span and engagement

The ten interviewed educational therapists, each with an average of seven years of experience teaching dyslexic learners at DAS, have encountered students with behavioral challenges previously. However, managing such challenges online presents a distinct set of difficulties.

"It's quite difficult, you have to teach her and then sometimes mid-way ,if she, if she's really disengaged she will start, she will start throwing tantrums, mute herself and then turn off the video, yeah that kind of thing, yeah I don't know , as a teacher I feel that when engaging students online right, I don't have, how do I say, the sense of control, it's not, it's not there." — I

When pupils are uncooperative or exhibit behavioural outbursts, educational therapists were lost on what to do, especially if they log out of the video conference. Educational therapists needed to continue with the lesson without the challenging student. For students who have their parents or guardians with them, educational therapists could seek their help, but students are by themselves most of the time.

"A student has some behavioral issues he's not able to maintain focus online so anytime he asked me a question and if I were to directly answer him, that's fine, but if I were to divert my attention to something else he will be online searching, Google search this, Google search that, YouTube this, YouTube that." – G

Not all students possess the self-discipline and motivation required to independently engage in hour-long sessions. Some students, especially younger ones, benefit from supervision and parental support to stay engaged with the lesson.

"I had to stop him from saying anything because he is affecting the overall mood of the class and he's putting his classmates down but I couldn't effectively do it because he was talking louder than me, he was, just practically shouting into the laptop, then I had to mute him and every time I mute him he will unmute himself so I got him out of the class." – I

"So, he is very hyper and he has a lot of attention need yeah so his mom has to be around patrolling making sure he is paying attention otherwise bring the cane around that kind of thing so it's very difficult for me to engage him." -G

# Theme 3: Perceived success factors and conditions for an effective virtual educational therapy

#### 3.1 Students and educational therapists' adaptability

Despite the numerous challenges faced by educational therapists, many of them remained optimistic. They expressed the belief that online teaching and learning can be effective under certain conditions. According to the educational therapists in the study, the flexibility of both students and themselves was a key factor in making online learning successful. Additionally, students' individual personalities and learning styles also played a significant role, as some of them mentioned.

"I think live interaction is important for dyslexic students, I think, to me the biggest difference between live and online lesson in the profile and personality of the students and on the bigger picture the profile of the class itself yeah so, yes so let's talk about personality first, even within the class you will find that some are comfortable, more comfortable than others using online, those who are very shy I think they're at a disadvantage." — H

"Certain students like IT and certain student doesn't, it's back to the individual? It's not because of their dyslexia per se? Because each student has different, different personalities." — J

Furthermore, students who actively engaged and communicated with the educational therapist received more feedback and appeared to benefit more from the lessons than their more reserved peers. It seemed that students who readily embraced the new online platform and enjoyed working digitally might have derived similar benefits as they did in face-to-face lessons. Throughout the process, students also acquired new digital skills, such as changing Google document backgrounds, using multiple fonts, and presenting their work on various digital platforms. This indicates that students valued learning these new skills and took pride in their work.

"I really liked it and I can feel that they are very proud about their work when they want to add in pictures on their compo writing pieces, they want to add pictures, they even want to know how to change the font colour, the page colour." – J

Certain lesson components were challenging to conduct effectively online, but educational therapists adapted their teaching methods to address this issue. While adjusting their procedures, they maintained the same underlying pedagogical approaches used in face-to-face classes, striving to make the lessons as multisensory as possible.

"So instead of the sound drill, because I think sound drill is it was quite hard to do it online because sometimes you say the 'th' sound and they can't hear and went "repeat, repeat we cannot hear" so it was it was quite hard. So, I tried to do it in a different way. So, the letters were already there. So they just had to like, you know, cut it out and then have it paste. Thinking along the lines of the multi-sensory approach, the cutting and pasting can trigger, some form of learning. Yeah so, I think that helped them. Better as compared to like the sound drill yeah. So, it was a different approach" — E

"So, for example, like Google Docs when you teach like new concept like phonograms, although it's not multisensory, you can get them to type 3 times and I will insist that the instruction will be like 'you need to type instead of copy and paste'. Try to have the multisensory aspects (in the lesson) so that they (students) can retain it (concept) better" — J

## 3.2 Keeping them engaged

Educational therapists found that students' continued interest and engagement were evident when students wanted to prolong the lesson after its conclusion or demonstrated strong retention of concepts during gamified activities. The use of gamified learning platforms contributed to higher student engagement and attentiveness. Incorporating visual stimuli like animations, memes, and GIFs further enhanced student engagement, making the lessons more enjoyable and engaging.

"So when I use animation in my Google Slides , I found that my students were more engaged, more engagement, more attentive compared to the beginning times when I didn't use the animation." - I

"For Google Slides, I think what's really necessary is things like the animation panel because of students looking at very static, non-moving things, especially when the teacher is yakking on right? Sometimes they get disengaged because they're not seeing anything interesting on the screen and then I'm just sitting there, talking and talking so

I realised that when I have animation like you know I have circles flying down to highlight specific things that I'm saying, or you know pictures that you know, especially gif pictures that are very, very relatable, gif pictures, then I realise that they are really paying attention." — I

Many educational therapists noted that students displayed higher engagement on weekends when they had no prior school commitments compared to weekdays. On weekdays, students had to attend their regular school classes online, and by the time they joined DAS classes, some experienced digital fatigue from prolonged screen time.

#### 3.3 Number of students, age and ability

Educational therapists in this study suggested that the feasibility of online learning is influenced by factors such as the number of students, their age, and their ability. They typically conducted lessons with four to five students simultaneously, allowing for more effective one-on-one communication. Larger groups made it challenging to provide immediate feedback. The therapists found that older students, with their greater proficiency in handling digital devices and enhanced digital skills, could describe technical issues and navigate online platforms more easily. Additionally, students with stronger literacy skills adapted better to the online learning environment. Overall, these factors were perceived as facilitators for successful online lessons.

"I think is very beneficial for my upper sec students, they are at the Band C level and I think online learning, number 1, they are comfortable with it and so they do churn out the work, actually the same quality (compared to physical), so the maturity level must be there."—H

"So, let say I have a MLP class that is all secondary and above, like upper secondary is even better rights? And they know their devices so well, right? Then I think I don't mind online MLP class for that group because they can, if they have a problem. They also know how to describe the problem to me instead of saying 'I don't know'." – I

#### 3.4 Support from stakeholders

Educational therapists largely credit the success of online teaching to the support of various stakeholder groups. They maintain close communication with parents, especially those of younger students, to ensure that students attend online sessions punctually. During the circuit breaker, many parents were working from home, allowing them to actively support online learning. Some parents, particularly those with students displaying challenging behaviors, even sat alongside their children during lessons. The DAS EdTech team played a vital role in providing comprehensive support to the therapists. They shared numerous resources, offering guidance on lesson delivery, worksheet templates,

and digital content. Educational therapists found instructional videos demonstrating the use of specific technological tools and applications to be highly beneficial.

"We have been given a lot of support. I am ..! don't know how they do it, every week they come out with something. I'm truly appreciative, although I didn't have time to look at all of it, but I did find something that is suitable. I like the part where the team actually showed videos on how to do things because they make it easier for people like me to learn." — J

"I think DAS send those weekly email, EdTech right? Those are useful, I think it will also help to, there's so many resources, I think we also want to find one that works um so more may not be better in that sense ,right? So, DAS can collectively decides on one or two that really works and then do a demo on it." — H

#### Theme 4: After-effects of educational therapy for educational therapists

The theme encapsulates the consequences of virtual educational therapy for educational therapists. During the first half of 2020, students and educational therapists engaged in two months of virtual educational therapy, followed by an additional one and a half months in the latter half of the year. This experience had distinct effects, with some therapists highlighting positive outcomes and others acknowledging negative impacts.

#### 4.1 Negative after-effects

While the primary duty of educational therapists is providing educational therapy to their students, they indicated that virtual educational therapy sessions required them to assume additional roles. In addition to fostering literacy and language development, they found themselves acting as mentors, communicators, and, in some instances, IT support. The majority of educational therapists possess minimal to no IT training and were thrust into this new role without alternative options. The absence of extensive IT support left them to address technical challenges independently.

"I still think that DAS should support our colleagues by having ICT personnel on standby dedicated just for certain programs for certain periods of time when we are doing the online lessons. Someone who the teachers can immediately go to during distress" – I

Educational therapists voiced worries about the potential impact of online lessons on both students' and their own mental and physical well-being. There is a call for increased awareness and support from DAS for the well-being of educational therapists. Some educators conducted three consecutive classes in a single day, resulting in six hours of screen time. This prolonged sitting had physical implications for educational therapists. Teaching online proved to be mentally and physically draining.

"Honestly if you had back to back classes, it's very, very, tiring. It's mentally and physically exhausting, I mean for younger people I guess like you, are OK yes OK but for like older people like us right, you sit for more than 2 hours, honestly right after CB, I've been getting a lot of backaches, a lot! Sitting for long stretches for long hours it may not be healthy? So there has to be you have to stagger the classes? So, I guess you cannot have like back to back for for such prolong periods is very unhealthy and I think for students also I think 2 hours is quite a stretch for some students" — A

"When I say 6 hours session, so our session is a solid six hours. No break in between. So very, very tired. So I think yeah, online classes next time if we really did it, I think for sanity, sanity of teachers. 6 hours class in a day is not something I would advise. — C

#### 4.2 Positive after-effects

The experience of teaching online has motivated educational therapists to explore innovative ways to improve students' virtual educational therapy. This exposure has provided them with a platform to experiment with new technological tools, apps, and teaching methods. As a result, educational therapists have gained confidence in conducting online lessons and have taken the initiative to find ways to make the online teaching experience engaging, enjoyable, and effective for their students.

"That was the first application that I actually explored all of my own so yeah, I was quite proud of myself for that, this CB (circuit breaker) right, is a very steep learning curve definitely but you become more comfortable, and gradually become more confident user of tech tools." — A

"I guess the urge for the EdT to actually read up more on how to actually make their lessons more fun and interesting, so you, at the same time you're equipping yourself with IT knowledge. You're always thinking on how to make your lessons interactive you know, using what kind of apps, tools online? So, so there's much more curiosity involved. Now you will feel more engaged to learn more about IT stuff to apply them in your lesson delivery." — A

Educational therapists experienced mutual learning with their students, especially in the realm of technology. As they ventured into the new teaching platform, there were instances where students played a role in teaching them how to perform specific tasks online. Given that students are digital natives, their familiarity with technological devices allowed them to share their expertise in using these tools, highlighting the collaborative nature of the learning experience.

"Most of the students are very IT savvy. So, they take to this online thing like ducks to water. They can even tell you what they can do with it, or how they would add some

features or change some of the documents that I've sent them. It's quite interesting, so I'm also learning from them. " — C

In addition to enhancing their tech proficiency, this experience solidified the idea that remote teaching is feasible, despite its challenges. As a result, educational therapists are optimistic about their ability to continue virtual educational therapy in the future. Some even proposed a regular schedule of at least one virtual therapy session per term.

#### DISCUSSION

The advantages of virtual educational therapy will be the first topic of discussion. One of the benefits mentioned was; that a self-directed learning environment may be fostered in an online setting. Educational therapists shared that students take charge of their learning and can exercise a degree of freedom when they are online, for example sourcing out information on the Internet by themselves. This benefit can apply to both dyslexic and non-dyslexic learners. From the literature, we learn that there is a lack of self-discipline and motivation for online learning (Gilbert,2015; Gorbunovs et al., 2016; Sorensen,2015). Meeter et al. (2020) discovered that students perceived online education to be less gratifying than on-campus education and that their motivation had waned due to the school closure. On the contrary, according to the findings of this study, educational therapists perceived that students are motivated to learn as they take control of their learning and explore certain components and functions of online learning themselves, which is commendable.

For most educational therapists, the most appealing feature of online learning is its flexibility and convenience. This finding corroborated Murders' (2015) and Allday and Allday's (2011) findings that college students with learning disabilities value the ease and flexibility offered by online classes. For educational therapists, flexibility meant students could get to the class via different platforms (laptops, iPads, mobile phones). In contrast, in Murders' (2015) study, college students with learning difficulties meant flexibility of schedule afforded by online classes. Students at the DAS do not have the flexibility of schedule as classes are fixed at specific timing and conducted synchronously. The flexibility experienced by the educational therapists was possible since the entire transition to online was unprecedented, and there was no precise blueprint (from DAS) for how the online session should proceed other than everyone would be using Google Meet as the video conferencing platform. The conveniences of online learning mentioned in the findings, such as learning from the comfort of one's own home, cost-effectiveness, and less time spent commuting, are comparable to those of typical online lessons, not just for dyslexic learners. Another convenience mentioned in the findings was that educational therapists found work produced by students legible. Students are less frustrated as they do not struggle with the physical aspect of writing. On the other hand, the issue with handwriting is a double-edged sword. After returning to a physical class, educational therapists noticed that the students' handwriting had

deteriorated. Educational therapists claimed that students had forgotten how to write after being compelled to type their work for an extended period of time. According to an Ofsted (2022) report on the pandemic's ongoing effects and education recovery in schools, school closures throughout the epidemic had a negative impact on students' knowledge and skills, including writing stamina. The usage of apps such as Text-to-speech (TTS) and Speech-to-text (STT) are reported to be beneficial to learners with dyslexia; however, only one of the educational therapists interviewed recommended and used these applications. As students, especially the younger ones, are still developing their reading, writing, and spelling skills, it is possible that using these applications will be detrimental to them in the long run. Students attended educational therapy lessons to build on these skills; using the applications appears to be counterproductive to the original goal. This does not imply that TTS and STT are not beneficial for students with dyslexia, but they are unlikely to be practical while students are still developing reading and spelling skills.

To learn effectively through an online system, students with dyslexia must understand the inner workings of numerous software programs, which creates a high learning curve. Educational therapists reported challenges of students logging in to Google Meet and navigating through multiple learning platforms (Google Classroom, Classkick, Kahoot!). In this study, the challenges of online learning corresponded with Habib et al.'s (2012) findings; dyslexic students have a range of challenges while interacting with virtual learning environments (VLEs), including connecting with numerous systems concurrently. Students need to know their devices and which apps to use for which class. For example, most schools in Singapore use the video conferencing app Zoom and the online learning portal, Student Learning Space (SLS), for home-based learning. For students attending classes at the DAS, the video conferencing platform (Google Meet) differed from their daily norm. To improve engagement, some of the educational therapists experimented with additional Google Suite products, such as Jamboard, Google Slide, and Google Classroom. Quizlzz and Kahoot!, two popular online quiz generators, are often accessed. An extensive selection of online teaching and learning applications is readily available. Each has its own set of advantages and disadvantages, and they should be utilised in accordance with their respective strengths and limitations. When selecting a website to share with their students, educational therapists must ensure that the site is not cluttered with too many pages and overly-busy design features, which might confuse students on which section they should concentrate on. Students with dyslexia may get overwhelmed if too many apps are introduced. Educational therapists are highly encouraged to stick to a few apps and use them consistently, giving the student ample time to get attuned to the apps' technical aspects and navigate through them.

Apart from the typical reading, spelling and writing difficulties, students with dyslexia also face memory retention and organisational skills problems (BDA,2010). Based on these symptoms, it is plausible to expect that some students with dyslexia may have significant challenges in several areas of their participation during virtual educational

therapy. As in the findings, educational therapists stated that students have difficulties toggling between windows, applications and browsers. At the same time, they need to focus on their given work and listen to the instructions of the educational therapists concurrently. When a dyslexic learner who struggles with working memory is presented with a large number of instructions or information without adequate time to absorb what they need to do with the knowledge, it is possible that some of this information may be forgotten. Educational therapists may need to pace their online sessions appropriately to avoid overwhelming learners and ensure that they have adequate time to digest what was taught. Additionally, picking up the right digital tools and applications that work for an individual student is crucial.

The subsequent discussion revolves around the perceived success factors and conditions for an effective online lesson. One of the perceived success factors is 'Keeping them engaged'. Students' brains develop stronger connections when they are exposed to audio and visual stimuli. Introducing new concepts to dyslexic learners in this manner facilitates their learning, engages them and keeps them interested (Manasa et al., 2020). Before online learning, some educational therapists were already employing manipulatives and technology-aided tools to help dyslexic students learn. When the lesson went online, all educational therapists got to try out multiple apps and multimedia learning platforms to see which suited their dyslexic learners and could engage them best. Educational therapists perceived this as one of the ways that make online lessons effective. Students' engagement with online learning resources is greatly influenced by the visual design and aesthetics of the contents (Reyna, 2020). Educational therapists made full use of available applications online, which are helpful and suitable for dyslexic students. They created digital worksheets which are more engaging by using more creative visuals like animations, gifs, and memes to capture students' attention and engagement. Gamification is an efficient method of improving student engagement (Looyestyn et al., 2017), and engagement will enhance knowledge retention (Tosco, 2015). Gamified activities have been associated with the students' increased intrinsic and extrinsic motivation (Nieto-Escamez and Roldán-Tapia, 2021). Educational therapists in this study believe that gamified activities improved students' engagement. Hence even though the preparation to gamify certain activities took a little more time, most of them did try it out to capture students' interest and engagement.

Additionally, the majority of educational therapists cited students' age and ability as factors that facilitate online teaching better. It was shared that secondary school students (aged 13 to 17) faced lesser challenges during virtual educational therapy than primary school students (aged 7 to 12) as they are more familiar with the technicalities involved in online learning. An essential component regarded by educational therapists to have contributed to the effectiveness of online education is stakeholders' support. This resonates with the literature that family or guardian support is crucial for learners with disabilities to adapt to distant learning (Greer et al., 2014, Forteza-Forteza et al., 2021,

Patretto et al.,2020, Sorenson, 2019). Parent-teacher collaboration and communication are crucial for virtual educational therapy.

The last theme from this study's findings is the after-effects of online learning on educational therapists. The negative after-effects are health-related, while the positive after-effects are related to the teachers' beliefs. We will discuss them more in the next section.

#### **RECOMMENDATIONS**

Educational therapists in this study mentioned health and mental well-being as one of the negative after-effects of the online teaching experience. Over 80% of teachers reported that their work during the COVID-19 outbreak had a negative effect on their mental health (Ang, 2021). Of those surveyed, more than half (62 per cent) reported that their physical health had deteriorated as well. DAS as an organisation can explore ways to support staff's mental health and well-being. During the online teaching, some educational therapists have 6 hours of back to back teaching. This is not healthy mentally and physically too. Better planning of class schedules can be done at the management level. While conducting lessons, some educational therapists face technological challenges or students' behavioural problems; having a dedicated IT personnel to assist them in their time of distress might also be helpful.

Support from colleagues personally and professionally was reported to be one of the perceived success factors for an effective virtual educational therapy. Educational therapists shared that they had benefitted from the resources shared by the EdTech team. Hence creating online learning resources might be a beneficial idea. Videos demonstrating the operation of specific technological tools or applications could be compiled on a platform and made accessible for all educational therapists.

Using SAMR model as a framework to improve virtual educational therapy. Currently, there is no standardised approach to delivering virtual educational therapy. Educational therapists have individually adapted their methods to cater to the specific needs of dyslexic students, utilising various online teaching and learning tools. To assist in this process, the SAMR framework can be a valuable tool for educational therapists to evaluate the suitability of online teaching and learning applications. The SAMR model classifies online learning into four categories based on complexity and transformative potential: substitution, augmentation, modification, and redefinition. Each category represents a different approach to content delivery during a lesson:

a. **Substitution:** Worksheet is uploaded in Classkick or Google Docs, simply digitising the task, with no functional change.

- b. **Augmentation:** The worksheet is uploaded in Google Classroom, with an attached link to videos for students to watch. Additional use of technology is included and applied.
- c. Modification: A self-recorded video of introduction of concept by an educational therapist and how to use resources on the website. In modification, multimedia and collaboration are used to redesign parts of the whole activity to enhance student learning.
- d. Redefinition: Physical QR codes or augmented reality are created and used with physical worksheets. Technology is being utilised to develop new tasks and activities that were previously impossible to implement in a typical classroom setting.

In the study, most educational therapists predominantly employed the substitution and augmentation approaches within the SAMR model. It is important to note that SAMR represents a spectrum, and redefinition is not necessarily the superior approach. Mere integration of technology into activities may not significantly enhance the learning experience. However, strategically modifying activity content to address current and future learning needs can significantly improve educational outcomes for all students. The findings from this study highlight that one of the key success factors in virtual educational therapy is "keeping students engaged." The SAMR model can serve as a guide for educational therapists to consider the role of technology in maintaining student engagement within an online platform. One positive outcome of virtual educational therapy for educational therapists is increased motivation to explore methods for enhancing online student learning, potentially leading to greater integration of technology in future instructional designs for virtual educational therapy.

#### LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The present study has several limitations. Firstly, the findings may have limited applicability beyond the context of educational therapists from DAS. As the study exclusively involved this group of participants, generalising the results to educators or therapists working in different settings may not be warranted. Moreover, the study's sample size was relatively small due to scheduling constraints, with only ten educational therapists interviewed out of approximately 250 working across 14 different centers. Therefore, the data may not be representative of the broader community of teachers supporting dyslexic learners in local mainstream schools and programs.

Another limitation pertains to the familiarity of the settings and peer interviews. Conducting research within a familiar environment and engaging in peer interviews has advantages and drawbacks. On the positive side, there is a lack of culture shock or confusion regarding the setting, which can foster trust and rapport with participants,

leading to richer and more meaningful responses. Additionally, it allows the researcher to assess the accuracy and honesty of the responses. However, the researcher must navigate multiple roles during the interviews, including that of a researcher and a colleague. This role ambiguity could lead to potential misinterpretations of the interviewee's data. Furthermore, pre-existing friendships with participants could introduce conflicts. Engaging in self-reflective processes becomes crucial for mitigating role conflicts.

Lastly, the study's potential was limited by the inability to observe how educational therapists conducted virtual educational therapy. Observing lessons could have provided deeper insights into the challenges and successes of virtual educational therapy. However, due to time and logistics constraints, this aspect was not included in the study.

While this study provides valuable insights, it also opens the door to various possibilities for further investigation. Future research could consider including the perspectives of dyslexic learners themselves, delving into their experiences with online learning during school closures, their preferences, and the challenges they encountered. Moreover, DAS offers a range of programs beyond the Main Literacy Programme (MLP), and analysing different programs may shed light on which content is more suitable for online learning. Additionally, the study revealed the impact on the mental health and well-being of educational therapists, suggesting the need to explore similar concerns among children and adolescents undergoing virtual educational therapy during the pandemic in future research.

#### **CONCLUSION**

The onset of the COVID-19 pandemic disrupted daily routines for students and educational therapists at the DAS, necessitating a sudden shift to virtual educational therapy sessions. Existing literature emphasises the overall benefits of online learning for students with special educational needs, yet it often overlooks the unforeseen difficulties that both instructors and students may face in adapting to an unplanned online teaching environment. This study provides valuable insights into the strategies employed by educational therapists in delivering virtual educational therapy.

During this transition, educational therapists encountered a spectrum of challenges, encompassing technological hurdles, dyslexia-related concerns, issues related to lesson delivery, as well as physical and digital distractions and behavioral management. It is noteworthy that despite these challenges, all the educational therapists expressed a positive outlook on online learning. While acknowledging that online platforms may not be the most ideal for dyslexic learners, they underscore the significance of age and technological proficiency in rendering virtual educational therapy feasible. The consensus among educational therapists is that online education will persist as a significant component of the future learning landscape.

Rather than rejecting online education outright, educational therapists are motivated to explore innovative approaches that can enhance the effectiveness of virtual learning for dyslexic students. This commitment reflects a proactive stance in overcoming challenges and making virtual educational therapy more conducive for dyslexic learners.

#### REFERENCES

- Allday, C. M., & Allday, R. A. (2011). Effects of Pacing Options on Final Grades of Students with Disabilities in Virtual High School, *Quarterly Review of Distance Education, 12*(4), pp. 223–234. Available at: https://search-ebscohost-com.ergo.southwales.ac.uk/login.aspx? direct=true&db=a9h&AN=78098492&site=ehost-live (Accessed: 7 March 2022)
- Allen, I., & Seaman, J. (2013). Changing Course Ten Years of Tracking Online Education in the United States. [ebook] Babson Survey Research Group. Available at: <a href="https://www.bayviewanalytics.com/reports/almanac/national\_almanac2019.pdf">https://www.bayviewanalytics.com/reports/almanac/national\_almanac2019.pdf</a> [Accessed 6 April 2022].
- Alsobhi, A., Khan, N., & Rahanu, H. (2015). Personalised Learning Materials Based on Dyslexia Types: Ontological Approach., *Procedia Computer Science, 60,* 113-121.
- Anderson, T., Rourke, L., Garrison, R., & Archer, W. (2019). Assessing Teaching Presence In A Computer Conferencing Context. *Online Learning*, *5*(2).
- Ang, Q. (2021). More than 80% of S'pore teachers say COVID-19 pandemic has hurt their mental health: Survey. The Straits Times, [online] Available at: <a href="https://www.straitstimes.com/singapore/parenting-education/more-than-80-of-teachers-say-the-pandemic-has-hurt-their-mental-health">health</a>: [Accessed 5 April 2022].
- Austin, Z., & Sutton, J. (2014). Qualitative Research: Getting Started. *The Canadian Journal of Hospital Pharmacy, 67*(6).
- Bahr, C., Nelson, N., & Meter, A. (1996). The Effects of Text-Based and Graphics-Based Software Tools on Planning and Organizing of Stories. *Journal of Learning Disabilities, 29*(4), pp.355-370.
- Barbour, M. K., Brown, R., Hasler Waters, L., Hoey, R., Hunt, J., Kennedy, K., Ounsworth, C., Powell, A., & Trimm, T. (2011). *Online and blended learning: A survey of policy and practice from K-12 schools around the world.* Vienna, VA: Singapore's Secondary Schools International Association for K-12 Online Learning. Retrieved from http://www.inacol.org/resource/online-and-blended-learning-a-survey-of-policy-and-practice-from-k-12-schools-around-the-world/
- Baschenis, I., Farinotti, L., Zavani, E., Grumi, S., Bernasconi, P., Rosso, E., Provenzi, L., Borgatti, R., Termine, C., & Chiappedi, M. (2021). Reading Skills of Children with Dyslexia Improved Less Than Expected during the COVID-19 Lockdown in Italy. *Children, 8*(7), p.560.
- Bolderston, A. (2012). Conducting a Research Interview. *Journal of Medical Imaging and Radiation Sciences, 43*(1), pp.66-76.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), pp.77-101.
- Brinkmann, S., & Kvale, S. (2015). *Interviews: Learning the craft of qualitative research interviewing* (3rd ed.). Thousand Oaks, CA: Sage
- Burdette, P. J., Greer, D. L., & Woods, K. L. (2013). K-12 Online Learning and Students with Disabilities: Perspectives from State Special Education Directors, *Journal of Asynchronous Learning Networks*, 17(3), pp. 65–72. Available at: https://search-ebscohost-

- com.ergo.southwales.ac.uk/login.aspx?direct=true&db=eric&AN=EJ1018283&site=ehost-live (Accessed: 17 December 2021).
- Byrne, E., Brugha, R., Clarke, E., Lavelle, A., & McGarvey, A. (2015). Peer interviewing in medical education research: experiences and perceptions of student interviewers and interviewees. BMC Research Notes, 8(1). pp. 1-12
- Carr-Chellman, A., (2005). *Global perspectives on e-learning*. Thousand Oaks, Calif.: Sage Publications.
- Castillo-Montoya, M. (2016). Preparing for Interview Research: The Interview Protocol Refinement Framework. *The Qualitative Report*.
- Chapelle, C. (2007). Challenges in Evaluation of Innovation: Observations from Technology Research. *Innovation in Language Learning and Teaching, 1*(1), 30-45.
- Christner, N., Essler, S., Hazzam, A., & Paulus, M., (2021). Children's psychological well-being and problem behavior during the COVID-19 pandemic: An online study during the lockdown period in Germany. *PLOS ONE, 16*(6), p.e0253473.
- Clark, A., (2020). What Is Educational Therapy. [online] Understood.org. Available at: <a href="https://www.understood.org/en/articles/what-you-need-to-know-about-educational-therapy">https://www.understood.org/en/articles/what-you-need-to-know-about-educational-therapy</a> [Accessed 20 April 2022].
- Creswell, J., & Plano Clark, V. (2009). Designing and conducting mixed methods research. 2nd ed. Thousand Oaks, CA: SAGE Publications.
- Creswell, J. (2013). *Qualitative inquiry & research design: choosing among five approaches.* 3rd ed. Sage.
- Creswell, J. (2014). *Research Design Qualitative, Quantitative and Mixed Methods Approaches.*4th ed. Thousand Oaks, California: SAGE, p.42.
- Crouse, T., Rice, M., & Mellard, D. (2016). "How did I survive?" Online Teachers' Describe Learning to Teach Students with Disabilities. [online] Kuscholarworks.ku.edu. Available at: <a href="https://kuscholarworks.ku.edu/handle/1808/22567">https://kuscholarworks.ku.edu/handle/1808/22567</a>>
- Dawson, K., Antonenko, P., Lane, H., & Zhu, J. (2018). Assistive Technologies to Support Students With Dyslexia. *TEACHING Exceptional Children, 51*(3), 226-239. Available at: doi:10.1177/0040059918794027. (Accessed: 18 December 2021).
- DeJonckheere, M., & Vaughn, L. (2019). Semi-structured interviewing in primary care research: a balance of relationship and rigour. *Family Medicine and Community Health, 1*(2), pp p.e000057.
- Delaney, M. (2016). Special educational needs. Oxford: Oxford University Press.
- DiPietro, M., Ferdig, R., Black, E., & Preston, M. (2010). Best practices in teaching K-12 online: lessons learned from Michigan virtual school teachers, *Journal of Interactive Online Learning*, 9 (3), 10–35.
- Eftimie, S. (2020) 'Online Education Teachers' Perspective', *Jus et Civitas,* (2), pp. 35–42. doi: 10.1016/j.chb.2020.106675.
- Forteza-Forteza, D., Rodríguez-Martín, A., Álvarez-Arregui, E., & Menéndez Álvarez-Hevia, D., (2021). Inclusion, Dyslexia, Emotional State and Learning: Perceptions of Ibero-American Children with Dyslexia and Their Parents during the COVID-19 Lockdown. *Sustainability, 13*(5), p.2739.
- Fostick, L., & Revah, H. (2018). Dyslexia as a multi-deficit disorder: Working memory and auditory temporal processing, *Acta Psychologica*, *183*, 19–28. doi: 10.1016/j.actpsy.2017.12.010.
- Frederick, J., Raabe, G., Rogers, V., & Pizzica, J., (2020). *A Model of Distance Special Education Support Services Amidst COVID-19.* [online] Available at: <a href="https://psyarxiv.com/q362v/">https://psyarxiv.com/q362v/</a> [Accessed 24 April 2022].

- Ghisi, M., Bottesi, G., Re, A. M., Cerea, S., & Mammarella, I. C. (2016). Socioemotional Features and Resilience in Italian University Students with and without Dyslexia. *Frontiers in Psychology, 7*, 478. https://doi.org/10.3389/fpsyq.2016.00478
- Giorgi, A. (2009). *The descriptive phenomenological method in psychology : A modified Husserlian approach.* Pittsburgh: Duquesne University Press.
- Giovannella, C., Passarelli, M., & Persico, D. (2020). The Effects of the COVID-19 Pandemic on Italian Learning Ecosystems: the School Teachers' Perspective at the steady state. *Interaction Design and Architecture(s)*, (45), 264-286.
- Gorbunovs, A., Kapenieks, A., & Cakula, S. (2016). Self-discipline as a Key Indicator to Improve Learning Outcomes in e-learning Environment. *Procedia Social and Behavioral Sciences, 231*, pp.256-262.
- Gosse, C., & Van Reybroeck, M. (2020). Do children with dyslexia present a handwriting deficit? Impact of word orthographic and graphic complexity on handwriting and spelling performance, *Research in Developmental Disabilities*, *97*. doi: 10.1016/j.ridd.2019.103553.
- Greer, D., Rowland, A. L., & Smith, S. J. (2014). Critical Considerations for Teaching Students With Disabilities in Online Environments, *Teaching Exceptional Children, 46*(5), 79–91. doi: 10.1177/0040059914528105.
- Guidemesingapore.com. (n.d.). Edtech in Singapore opportunities and growth. [online] Available at: <a href="https://www.guidemesingapore.com/business-guides/industry-guides/education-industry/edtech-in-singapore#">https://www.guidemesingapore.com/business-guides/industry-guides/education-industry/edtech-in-singapore#</a>: <a href="https://executed.com/execute/education-industry/edtech-in-singapore#">https://executed.com/executed
- Habib, L., Berget, G., Sandnes, F., Sanderson, N., Kahn, P., Fagernes, S., & Olcay, A. (2012).
  Dyslexic students in higher education and virtual learning environments: an exploratory study. *Journal of Computer Assisted Learning*, 28(6), 574-584.
- Hartman, R. J., Townsend, M. B., & Jackson, M. (2019). Educators' perceptions of technology integration into the classroom: a descriptive case study, *Journal of Research in Innovative Teaching & Learning*, 12(3), 236–249. doi: 10.1108/jrit-03-2019-0044.
- Hodges, C., Moore, S., Bond, A., & Lockee, B. (2020). The Difference Between Emergency Remote Teaching and Online Learning. [online] Academia.edu. Available at: <a href="https://www.academia.edu/42679104/">https://www.academia.edu/42679104/</a> The\_Difference\_Between\_Emergency\_Remote\_Teaching\_and\_Online\_Learning> [Accessed 17 July 2021].
- Jha, A. K., & Arora, A. (2020). The neuropsychological impact of E-learning on children, *Asian journal of psychiatry*, *54*, p. 102306. doi: 10.1016/j.ajp.2020.102306.
- Kallio, H., Pietilä, A., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. *Journal of Advanced Nursing*, 72(12), 2954-2965.
- Kentnor, H. E. (2015). *Distance* Education and the Evolution of Online Learning in the United States, *Curriculum & Teaching Dialogue, 17*(1/2), 21-34. Available at: https://search-ebscohost-com.ergo.southwales.ac.uk/login.aspx?direct=true&db=a9h&AN=109574262&site=ehost-live (Accessed: 18 December 2021)
- Kopcha, T., & Sullivan, H. (2006). Self-presentation bias in surveys of teachers' educational technology practices. *Educational Technology Research and Development, 55*(6), 627-646.
- Kryszewska, H. (2017). Teaching Students with Special Needs in Inclusive Classrooms Special Educational Needs. *ELT Journal, 71*(4), 525-528.

Kvale, S. (2007). *Transcribing Interviews. In: Doing Interviews, Qualitative Research Kit.* London: SAGE Publications, Ltd. Available at: <a href="http://www.doi.org/10.4135/9781849208963">http://www.doi.org/10.4135/9781849208963</a> [Accessed 1 Aug 2021]

- Lancaster, P. E. (2009). Effects of a Computerised Program on Use of the Test-Taking Strategy by Secondary Students with Disabilities, *Learning Disability Quarterly*, 32(3), 165–179. https://doi.org/10.2307/27740366
- Lee, D., Watson, S. L., & Watson, W. R. (2020). "The Relationships Between Self-Efficacy, Task Value, and Self-Regulated Learning Strategies in Massive Open Online Courses", *The International Review of Research in Open and Distributed Learning, 21*(1), 23-39. doi: 10.19173/irrodl.v20i5.4389.
- Lewis, J., & Graham, J. (2007). Research Participants' Views on Ethics in Social Research: Issues for Research Ethics Committees, *Research Ethics*, 3(3), 73–79. doi: 10.1177/174701610700300303.
- Long, C., (2021). What COVID-19 Taught Us About Special Education | NEA. [online] Nea.org. Available at: <a href="https://www.nea.org/advocating-for-change/new-from-nea/what-COVID-19-taught-us-about-special-education">https://www.nea.org/advocating-for-change/new-from-nea/what-COVID-19-taught-us-about-special-education</a> [Accessed 2 July 2021].
- Looyestyn, J., Kernot, J., Boshoff, K., Ryan, J., Edney, S., & Maher, C. (2017). Does gamification increase engagement with online programs? A systematic review. *PLOS ONE, 12*(3), p.e0173403.
- Manasa, R., Shukla, R., Bhattacharyya, B., & Agarwal, R. (2020). A Comprehensive Study of Audio Visual Aids for Dyslexic Children. *International Journal of Electrical Engineering and Technology (IJEET)*, 211-218.
- Marchand-Krynski, M., Morin-Moncet, O., Bélanger, A., Beauchamp, M., & Leonard, G. (2017). Shared and differentiated motor skill impairments in children with dyslexia and/or attention deficit disorder: From simple to complex sequential coordination. *PLOS ONE, 12*(5), p.e0177490.
- Marteney, T., & Bernadowski, C. (2016). Teachers' perceptions of the benefits of online instruction for students with special educational needs, *British Journal of Special Education, 43*(2), pp. 178–194. doi: 10.1111/1467-8578.12129.
- Meeter, M., Bele, T., Hartogh, C., Bakker, T., de Vries, R. & Plak, S. (2020). College students' motivation and study results after COVID-19 stay-at-home orders. Motivation and Emotion, 44(6), pp. 1-7.
- Ministry of Education Singapore (MOE), (2020). Support for students with SEN during full HBL. [online] Available at: <a href="https://www.moe.gov.sg/news/parliamentary-replies/20200505-support-for-students-with-sen-during-full-hbl">https://www.moe.gov.sg/news/parliamentary-replies/20200505-support-for-students-with-sen-during-full-hbl</a>
- Ministry of Education Singapore (MOE). (2020). Schools and Institutes of Higher Learning to Shift to Full Home-Based Learning; Preschools and Student Care Centres to Suspend General Services. [online] Available at: <a href="https://www.moe.gov.sg/news/press-releases/20200403-schools-and-institutes-of-higher-learning-to-shift-to-full-home-based-learning-preschools-and-student-care-centres-to-suspend-general-services">https://www.moe.gov.sg/news/press-releases/20200403-schools-and-institutes-of-higher-learning-to-shift-to-full-home-based-learning-preschools-and-student-care-centres-to-suspend-general-services</a> [Accessed 25 June 2021].
- Ministry of Education Singapore (MOE). (2021). *Educational technology journey*. [online] Available at: <a href="https://www.moe.gov.sg/education-in-sg/educational-technology-journey">https://www.moe.gov.sg/education-in-sg/educational-technology-journey</a> [Accessed 25 June 2021].
- Mortimore, T., & Crozier, W. R. (2006). Dyslexia and difficulties with study skills in higher education. *Studies in Higher Education, 31*(2), 235–251. https://doi.org/10.1080/03075070600572173

- Moustakas, C. (1994). *Phenomenological research methods.* Sage, Thousand Oaks, California. Murders, M. (2017). *A Phenomenological Study of the Online Education Experiences of College Students with Learning Disabilities.* [online] ScholarWorks@UARK. Available at: <a href="https://scholarworks.uark.edu/etd/2518">https://scholarworks.uark.edu/etd/2518</a>> [Accessed 18 April 2022].
- Nagro, S. A., Fraser, D. W., & Hooks, S. D. (2019). Lesson Planning With Engagement in Mind: Proactive Classroom Management Strategies for Curriculum Instruction, *Intervention in school and clinic, 54*(3), 131–140. doi: 10.1177/1053451218767905
- Nguyen, T. (2015). The Effectiveness of Online Learning: Beyond No Significant Difference and Future Horizons, *Journal of Online Learning and Teaching*, 11(2), 309–319.
- Nieto-Escamez, F., & Roldán-Tapia, M. (2021). Gamification as Online Teaching Strategy During COVID-19: A Mini-Review. *Frontiers in Psychology, 12,* pp. 1-7
- Novita, S. (2016). Secondary symptoms of dyslexia: a comparison of self-esteem and anxiety profiles of children with and without dyslexia. *European Journal of Special Needs Education, 31,* 279 288.
- OECD, (2012). *Special Educational Needs (SEN).* [online] Oecd.org. Available at: <a href="https://www.oecd.org/els/family/50325299.pdf">https://www.oecd.org/els/family/50325299.pdf</a>> [Accessed 4 April 2022].
- Ofsted. (2022). Education recovery in schools: spring 2022. [online] Gov.uk. Available at: <a href="https://www.gov.uk/government/publications/education-recovery-in-schools-spring-2022/education-recovery-in-schools-spring-2022#identifying-gaps-in-learning">https://www.gov.uk/government/publications/education-recovery-in-schools-spring-2022/education-recovery-in-schools-spring-2022#identifying-gaps-in-learning</a> [Accessed 18 April 2022].
- Oldfield, J., Humphrey, N., & Hebron, J. (2017). Risk factors in the development of behaviour difficulties among students with special educational needs and disabilities: A multilevel analysis. *British Journal of Educational Psychology*, 87(2), 146-169.
- Pang, L., Chen, C., Teh, C., & Anding, P. (2015). Online Learning for Individuals with Dyslexia: A Literature Review. *International Journal of Learning and Teaching, 1*(1), pp. 1-9
- Patrick, S., & Dawley, L. (2009) Redefining teacher education: K-12 online-blended learning and virtual schools. Brief prepared for the Summit on Redefining Teacher Education for Digital Age Learners. Austin, TX: The University of Texas
- Patton, M. Q. (2015). *Qualitative research & evaluation methods* (4th ed.). Thousand Oaks, CA: Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education: results from a worldwide educational assessment, *Computers & education. 37*, 2, 163-178. https://doi.org/10.1016/S0360-1315(01)00045-8
- Perelmutter, B., McGregor, K., & Gordon, K. (2017). Assistive technology interventions for adolescents and adults with learning disabilities: An evidence-based systematic review and meta-analysis. [online] Available at: <a href="https://doi.org/10.1016/j.compedu.2017.06.005">https://doi.org/10.1016/j.compedu.2017.06.005</a> [Accessed 7 July 2021].
- Petretto, D. R., Masala, I., & Masala, C. (2020). School Closure and Children in the Outbreak of COVID-19, Clinical practice and epidemiology in mental health: *CP & EMH, 16,* 189–191. doi: 10.2174/1745017902016010189.
- Powell, A., & Patrick, S. (2006). *An international perspective of K-12 online learning: A summary of the 2006 iNACOLinternational e-learning survey.* Vienna, VA: International Association for K-12 Online Learning. Retrieved from http://www.inacol.org/resource/an-international-perspective-of-k-12-online-learning-a-summary-of-the-2006-nacol-international-e-learning-survey/
- Puentedura, R. R. (2014). *SAMR, learning, and assessment.* Retrieved from http://www.hippasus.com/rrpweblog/archives/2014/11/28/SAMRLearningAssessment.pdf
- Rahayu, R. P., & Wirza, Y. (2020). Teachers' perception of online learning during pandemic COVID-19. *The Journal of Educational Research (JPP), 20*(3), 392–406.

Reyna, J., (2020). Twelve Tips for COVID-19 friendly learning design in medical education. *MedEdPublish, 9,* 103.

- Rice, M., Deschaine, M., & Mellard, D. (Eds). (2018). Describing Online Learning Programs and Practices that Serve Diverse Learners. *Journal of Online Learning Research (4*)2, pp
- Richardson, J. T. E. (2015). Academic Attainment in Students with Dyslexia in Distance Education. *Dyslexia (10769242), 21*(4), 323–337. doi: 10.1002/dys.1502.
- Rose, J. (2009). *Identifying and teaching children and young people with dyslexia and literacy difficulties.* [Nottingham]: DCSF.
- Schuck, R. K., & Lambert, R. (2020) .'Am I Doing Enough?' Special Educators' Experiences with Emergency Remote Teaching in Spring 2020. *Education Sciences. [Online] 10* (11), 320. [online]. Available from: http://dx.doi.org/10.3390/educsci10110320.
- Seaman, J., & Seaman, J. (2019). *Distance Education State Almanac*. [ebook] Bay View Analytics. Available at: <a href="https://www.bayviewanalytics.com/reports/almanac/national\_almanac2019.pdf">https://www.bayviewanalytics.com/reports/almanac/national\_almanac2019.pdf</a> [Accessed 6 April 2022].
- Simonson, M., Smaldino, S., & Zvacek, S. (2012). *Teaching and learning at a distance. 6th ed. Charlotte, North Carolina:* IAP-Information Age Publishing, Inc., p.6.
- Smith, S., Burdette, P., Cheatham, G., & Harvey, S. (2016). Parental Role and Support for Online Learning of Students with Disabilities: A Paradigm Shift. *Journal of Special Education Leadership, 29,* 101-112.
- Smith-Spark, J. H., Fawcett, A. J., Nicolson, R. I., & Fisk, J. (2004). Dyslexic students have more everyday cognitive lapses. *Memory*, *12* (2), 174-182. doi: 10.1080/09658210244000450.
- Snowling, M. J. Hayiou-Thomas, M. E., Nash, H. M., & Hulme, C. (2020). Dyslexia and Developmental Language Disorder: comorbid disorders with distinct effects on reading comprehension, *Journal of Child Psychology & Psychiatry, 61*(6), 672–680. doi: 10.1111/jcpp.13140.
- Sorensen, T. (2019). Special Education in Idaho Virtual Schools: An Analysis of the Efficacy of Service Delivery, Northwest Nazarene University
- Taylor, J. (2011). The intimate insider: negotiating the ethics of friendship when doing insider research. *Qualitative research*, 11(1), 3-22.
- Tosco, J. E. (2015). *The Effects of Technology on Engagement and Retention Among Upper Elementary Montessori Students*. Retrieved from Sophia, the St. Catherine University repository website: https://sophia.stkate.edu/maed/122
- Tsai, M.-J. (2009). The model of strategic e-learning: understanding and evaluating student e-learning from metacognitive perspectives, *Educational Technology & Society, 12* (1), 34–48.
- UNESCO (2020). Distance Learning Strategies in Response to COVID-19 School Closures. Available at:https://unesdoc.unesco.org/ark:/48223/pf0000373305 (Accessed 25 June 2021).
- UNESCO (2020). Education for Sustainable Development Goals: Learning Objectives. 2020.

  Available at:https://unesdoc.unesco.org/ark:/48223/pf0000247444 (Accessed 25 June 2021).
- UNESCO (2021). *COVID-19 Education disruption and response*. Available at: <a href="https://en.unesco.org/COVID19/educationresponse">https://en.unesco.org/COVID19/educationresponse</a> (Accessed 25 June 2021).
- Vaismoradi, M., Jones, J., Turunen, H., & Snelgrove, S. (2016). Theme development in qualitative content analysis and thematic analysis. *Journal of Nursing Education and Practice, 6*(5), pp
- Van Teijlingen, E., & Hundley, V. (2002). The importance of pilot studies. *Nursing Standard, 16*(40), 33-36.
- Velichová, Ľ., Orbánová, D., & Kúbeková, A. (2020) The COVID-19 Pandemic: Unique Opportunity to Develop Online Learning. *TEM Journal*, 1633-1639.

- Wang, P., Chen, T., Liu, J., & Luo, H. (2020). *K-12 Teachers' Attitude Towards Online Learning Platfoms During COVID-19 Epidemic in China. 2020* Ninth International Conference of Educational Innovation through Technology (EITT),
- Watson, J., Murin, A., Vashaw, L., Gemin, B., & Rapp, C. (2011). *Keeping pace with K-12 online learning: An annual review of state-level policy and practice. Evergreen Education*Group.Available at https://www.digitallearningcollab.com/keeping-pace-reportspubs.
  [Accessed 16 December 2021].
- Watson, J., & North Central Regional Educational Lab., N. I. (2005). Keeping Pace with K-12 Online Learning: A Review of State-Level Policy and Practice, Learning Point Associates / North Central Regional Educational Laboratory (NCREL). Learning Point Associates / North Central Regional Educational Laboratory (NCREL). Available at: https://search-ebscohost-com.ergo.southwales.ac.uk/login.aspx?direct=true&db=eric&AN=ED489514&site=ehost-live (Accessed: 20 April 2022).
- Welsh Government. (2012). Research into dyslexia provision in Wales. Available at: https://gov.wales/sites/default/files/statistics-and-research/2019-08/120824-dyslexia-provision-literature-review-en.pdf
- WHO COVID-19 Dashboard, (2021). [online] *Geneva: World Health Organization*. Available at: <a href="https://COVID19.who.int/">https://COVID19.who.int/</a> [Accessed 1 August 2021].
- Woodfine, B. P., Nunes, M. B., & Wright, D. J. (2008). Text-based synchronous e-learning and dyslexia: Not necessarily the perfect match!, *Computers & Education, 50*(3), 703–717. doi: 10.1016/j.compedu.2006.08.010.
- Worthy, J., DeJulio, S., Svrcek, N., Villarreal, D. A., Derbyshire, C., LeeKeenan, K., Wiebe, M. T., Lammert, C., Rubin, J. C., & Salmerón, C. (2016). Teachers' Understandings, Perspectives, and Experiences of Dyslexia. *Literacy Research: Theory, Method, and Practice, 65*(1), 436–453. Available at: https://search-ebscohost-com.ergo.southwales.ac.uk/login.aspx? direct=true&db=eric&AN=EJ1119731&site=ehost-live (Accessed: 20 April 2022).
- Yavari, G. F. (2021). Phenomonological Study of the Experiences of Special Education Teachers Teaching Students with Autism Spectrum Disorders in Online Learning Environments during the COVID-19 Pandemic (Doctoral dissertation, New Mexico State University).
- Zawadka, J., Miękisz, A., Nowakowska, I., Plewko, J., Kochańska, M., & Haman, E. (2021). Remote learning among students with and without reading difficulties during the initial stages of the COVID-19 pandemic. *Education and Information Technologies*, 26(6), 6973-6994.
- Zuppardo, L., Serrano, F., Pirrone, C., & Rodriguez-Fuentes, A. (2021). More Than Words: Anxiety, Self-Esteem and Behavioral Problems in Children and Adolescents With Dyslexia. *Learning Disability Quarterly*, p.073194872110411.

## APPENDIX — Example of transcripts with code, subtheme and theme

MEANING UNIT	CODES	SUB-THEME / CATEGORIES	OVER- ARCHING THEME
--------------	-------	------------------------	---------------------------

MEANING UNIT	CODES	SUB-THEME/ CATEGORIES	OVERARCHING THEME
"We didn't anticipate all these issues that can happen in their homes, like for example we teach them how to go to Google Meet and then we taught them how to join , logged in with their DAS email account and all that right but we didn't show them how to toggle between the share screen and the home screen, we also didn't realise there would be problem so when they went back home, then some have ipad, some don't have ipads, some have lap top some don't have lap top, don't have this , don't have that right?"	Unanticipated tech issues.  Knowledge to navigate online with different apps and devices	Technological challenges	CHALLENGES OF ONLINE TEACHING AND LEARNING
I think because there is a lot of instructions, the method of giving instruction or the mode of giving instructions, I mean yes, they can read but it's like, it's a word doc right? I mean there are so many things on that thing, so you don't want it to get too wordy but at the same time you don't want to say too many things, but at the same time you want them to know how to navigate independently.  Instructions is important for the kids, I also think that because they are dyslexic it's not easy to process (all given instructions).	Too many instructions	Dyslexia- related challenges	



MEANING UNIT	CODES	SUB-THEME/ CATEGORIES	OVERARCHING THEME
"I think the one of the biggest challenge is the. Yeah. Differentiation. So when you have a class with different capabilities ah, the ones who are very fast, will finish very fast and then he just wait, just wait" "You can't talk over one another so it's just I'm talking, listen, do it ,let's take turns talking and we just constantly just waiting for our turn (to talk)"	Waiting time	Lesson delivery challenges	
"I think in terms of distraction, it's really really very very hard, we're talking about distraction in terms of environment, in terms of their, their focus level, engagement level, I think it's really beyond our control, I cannot make that you only click on the Meet button and not other button, I cannot, I cannot make that happen. So these are the things that are beyond our control."	Surrounding distraction	Physical and digital distractions at home	CHALLENGES OF ONLINE TEACHING AND LEARNING
"It's quite difficult, you have to teach her and then sometimes mid way ,if she, if she's really disengaged, she will start throwing tantrums, mute herself and then turn off the video, yeah that kind of thing, yeah I don't know, as a teacher I feel that when engaging students online right, I don't have, how do I say, the sense of control, it's not, it's not there."	Managing behaviours online	Managing students' behaviours, attention span and engagement	



Asia Pacific Journal of Developmental Differences Vol. 11, No. 1, July 2024, pp. 67—98 DOI: 10.3850/S2345734124001678



# Blended Synchronous Learning Environment-Perceptions and Experiences of Educational Therapists at Dyslexia Association of Singapore

Praba Siva<sup>1\*</sup>

1. Dyslexia Association of Singapore

#### Abstract

The emergence of Blended Synchronous Learning Environment (BSLE) as an innovative teaching method has gained traction during the COVID-19 pandemic. While it is mostly used in higher education, its potential to help students with dyslexia has not been explored much. This study delves into the views of educational therapists from the Dyslexia Association of Singapore (DAS) who integrated BSLE during the pandemic. Using interviews and thematic analysis, the research uncovers key themes like BSLE's benefits, challenges, and its impact on therapists. It sheds light on issues like effective teaching, student engagement, and inclusivity. Despite not being ideal for dyslexic students, BSLE offers advantages like ongoing support and flexibility. The study suggests strategies for improvement, such as tailored implementation for older students and better technology support. Future research could explore students' experiences, evaluate training programs, and assess parental support's impact during BSLE for remote learners.

Keywords: blended synchronous learning environment, dual mode teaching, COVID-19, dyslexia, remote learning, face-to-face students, hybrid, educational therapy

Praba Siva, Senior Educational Therapist, English Language and Literacy Division (ELL), Dyslexia Association of Singapore Email: praba.siva@das.org.sg

<sup>\*</sup> Correspondence to:

#### INTRODUCTION

The onset of the COVID-19 pandemic in 2020 triggered a global crisis marked by widespread border closures and substantial disruptions to daily life, profoundly impacting various facets of society, including a tragic loss of lives (WHO COVID-19 Dashboard, 2024). In response to this unprecedented situation, the Singaporean government swiftly implemented a series of measures to contain the viral outbreak (Tan et al., 2020). Consequently, COVID-19 brought unprecedented changes in educational systems, teaching methodologies, and student learning experiences worldwide (Sahu, 2020; Bhamani et al., 2020).

Amid the pandemic, online learning, known as Home-Based Learning (HBL) in Singapore (Tay et al., 2021), emerged as the primary mode of instruction as countries worldwide enforced lockdown measures. This transition necessitated educators to adapt their resources to facilitate online lessons. While mainstream teachers turned to platforms like the Student Learning Space for teaching during lockdowns, they encountered challenges such as limited device availability, technical expertise, and unsuitable learning environments (Reimers, 2022; Lee, 2020).

These obstacles were not limited to educators of mainstream students but also affected Special Educational Needs (SEN) educators and tutors at enrichment centres, who were mandated by the government to conduct online lessons to prevent student intermingling (Ministry of Education, 2020).

With the gradual relaxation of COVID-19 safety restrictions, some educators began implementing a Blended Synchronous Learning Environment (BSLE), also known as 'dual-mode teaching' in Singapore, to support students unable to attend physical classes while adhering to safety protocols. Although not mandated by the government, BSLE became essential for providing continuous education.

Educational therapists from the Dyslexia Association of Singapore (DAS) embraced BSLE upon the return to physical classrooms. BSLE integrates face-to-face and remote learning in real-time, requiring a focus on pedagogy, lesson materials (Zydney et al., 2019), student communication, inclusivity (Szeto and Cheng, 2016), logistical considerations, and class sizes (Lakhal et al., 2021). Understanding the complexities of BSLE is crucial for assessing its effectiveness as a mode of instruction and identifying areas for improvement.

As someone with first-hand experience implementing BSLE as an educational therapist, the researcher encountered challenges in lesson delivery. Apart from preparing comprehensive lesson materials for both groups of students, the researcher managed classes comprising one remote learner and three to four in-person students. Despite technological and workload challenges, the researcher acknowledged BSLE's pivotal

role in sustaining learning during challenging times. This prompted her to explore the experiences of fellow educational therapists in utilising BSLE and its impact on students with dyslexia.

# **Existing Research Gaps**

The current research landscape regarding BSLE still lacks thorough exploration, especially with a limited focus on tertiary institutions in the available literature. Despite the increased adoption of BSLE due to the pandemic (Olsen-Reeder, 2022; MacKevett and Feubli, 2022), its application in SEN classrooms, specifically for students with dyslexia, remains largely unexplored. Hence, this study aims to enhance understanding regarding SEN educators' perspectives on implementing BSLE and their related experiences.

#### **Research Aim**

This research aims to:

- Identify the challenges and opportunities that DAS educational therapists experienced in a BSLE
- Identify strategies that can improve the delivery of BSLE in classrooms

# **Research Questions**

- 1. What are the challenges and opportunities in implementing BSLE for students with dyslexia?
- 2. What strategies can improve the delivery of BSLE in classrooms?

# Study's Objective

This study aims to offer insights into the experiences, challenges, and recommendations related to BSLE instructional mode. Given the innovative nature of this teaching approach for educational therapists, gaining a better understanding of lesson delivery and resource utilisation could shed light on areas requiring enhancement. Additionally, it presents an opportunity to reflect on teaching practices and refine existing methods. The outcomes of this research may pave the way for further investigations aimed at developing evidence-based practices or suitable pedagogical frameworks to enhance the quality of BSLE lessons provided to students with dyslexia.

# Literature Review: Blended Synchronous Learning Environment

BSLE, or Blended Synchronous Learning Environment, integrates technology to deliver simultaneous instruction to both in-person and remote students (Bower et al., 2014). This approach, also known as 'Dual-Mode Teaching' (Soesmanto and Bonner, 2019), 'HyFlex' (Abdelmalak and Parra, 2016), or 'Blended Synchronous Learning' (Lakhal et al., 2021), has gained prominence, particularly in tertiary education.

Primarily utilised in higher education institutions, BSLE serves as a vital tool not only during crises like pandemics (Lakhal et al., 2021) or disasters (Wang et.al., 2018) but also to accommodate students unable to attend physical classes. It empowers learners to select their preferred mode of learning (Lakhal et al., 2021; Norberg, 2012), considering their commitments, health concerns (Pope, 2010), or geographical constraints (Bower et al., 2014). To engage remote students effectively, instructors employ video conferencing or equip classrooms with cameras and microphones (Olt, 2018; Bower et al., 2014).

Advancements in technology have further enhanced BSLE, with platforms like Moodle offering interactive whiteboard features, and Adobe Connect facilitating seamless communication between students (Lakhal et al., 2021). Additionally, the role of teaching assistants is indispensable, providing crucial support to instructors who juggle multiple responsibilities (Bell et al., 2013; Bower et al., 2014).

Bower et al.'s (2014) case studies in Australian tertiary institutions, based on extensive data collection and observations, delve into various aspects of BSLE, such as technology integration, classroom setup, lesson delivery, and its impact on learning outcomes. The research underscores BSLE's ability to offer flexibility and convenience to remote learners, fostering a sense of connectedness. Drawing from their findings, the researchers propose a BSLE Design framework, focusing on pedagogical, technological, and logistical considerations. However, the practical application of these recommendations may vary across different educational contexts.

### Challenges of BSLE

Studies on BSLE often explore various dimensions including pedagogical, social, logistical, and technological aspects (Lakhal et al., 2021; Wang and Huang, 2018; Zydney et al., 2020). Previous research in these areas has highlighted challenges such as the difficulty of preparing lessons that cater to both face-to-face and remote learners (Lakhal et al., 2021). Moreover, instructors face the additional task of ensuring inclusivity and effective communication among both groups of students (Bower et al., 2014), as remote learners may feel isolated due to their physical absence from the classroom (Szeto and Cheng, 2016).

Technology poses a significant challenge in BSLE, as unreliable technology can disrupt lessons (Zydney et al., 2019). Instructors must also make a conscious effort to distribute their attention evenly, as remote students may feel neglected if more focus is placed on face-to-face learners (Wang et al., 2017), especially when the remote group is smaller in size compared to the in-person cohort (Lakhal et al., 2021).

In response to these challenges, much research has centreed on enhancing the design of BSLE to improve the learning environment, instructional resources, and teaching strategies (Zydney et al., 2020; Wang and Huang, 2018; Bower et al., 2014). However, it is important to note that existing studies predominantly focus on higher education contexts. As a result, there is a lack of literature supporting the implementation of BSLE in special educational needs (SEN) classrooms or for students with specific learning difficulties like dyslexia.

# **Dyslexia**

Dyslexia, classified as a "neurodevelopmental disorder," profoundly affects an individual's reading, spelling (Snowling, 2012, p.7), writing abilities, and phonological awareness (Snowling et al., 2020). Often, individuals with dyslexia also contend with additional coexisting conditions such as Dyscalculia, Developmental Language Disorder (Snowling et al., 2020), and Attention Deficit Hyperactivity Disorder (ADHD) (Boada et al., 2012). Beyond these comorbidities, individuals with dyslexia may grapple with challenges related to motor skills, executive functions, and concentration (Rose, 2009), all of which could potentially hinder their online learning experiences, as evidenced by Woodfine et al.'s (2008) qualitative study involving students with and without dyslexia.

Given the challenges and impediments in reading and learning faced by students with dyslexia, it is imperative to comprehend their educational needs and tailor lessons and materials accordingly. Renowned researchers such as Rose (2009), Snowling (2012), and Torgesen (2006) underscore the significance of ongoing, structured, and systematic interventions targeting phonological skills and phonemic awareness. Consequently, the Orton Gillingham (OG) method stands out as a widely recognised evidence-based teaching approach for students with dyslexia, emphasising a sequential, explicit, and multisensory educational approach (Sayeski et al., 2018).

Nevertheless, the feasibility of implementing this approach within a Blended Synchronous Learning Environment (BSLE) remains uncertain. Therefore, it is essential to identify the critical factors to consider when conducting BSLE for students with dyslexia. Given the unexplored nature of this realm, a comprehensive examination of the diverse challenges and considerations for dyslexic learners in an online setting is warranted.

# Challenges of online learning and dyslexia

Over time, researchers have highlighted the challenges that dyslexic learners face in the realm of online education. For instance, Gabay et al. (2012) found that individuals with dyslexia encounter difficulty transitioning between tasks and effectively engaging in sequential activities within online environments. Similarly, Habib et al. (2012) conducted a study involving twelve dyslexic students, either graduated or pursuing tertiary education, using a learning management system. Their findings underscored additional hurdles such as disorganised interfaces inundated with irrelevant information, leading to cognitive overload, non-intuitive functions, and struggles with understanding abbreviations for effective peer communication.

Woodfine et al. (2008) further contributed insights into the challenges faced by dyslexic students in text-based synchronous learning environments. They revealed that these students often experience embarrassment due to difficulties in articulating themselves effectively, stemming from reading, spelling, and typing challenges. Additionally, they grapple with following and executing multiple instructions swiftly compared to their non-dyslexic peers, owing to heightened cognitive demands. Consequently, educators must take these factors into consideration when designing and delivering online lessons tailored to dyslexic students' needs.

This perspective is reinforced by Tay and Asmuri's (2021) investigation, which conducted four case studies on dyslexic students undergoing Home-Based Learning (HBL) in Singapore. Beyond the challenges in reading, writing, typing, and limited support in navigating online resources, the findings unveiled a lack of differentiated instructions or resources for these students, despite educators being aware of their learning difficulties. Moreover, students were expected to juggle multiple tasks, including listening to the teacher, navigating various websites, and responding to chat messages. However, the study's focus primarily on students from mid-income families leaves a notable gap in understanding the experiences of low socio-economic status (SES) students, which could illuminate additional obstacles such as accessibility to learning devices or home support.

Nevertheless, the researchers advocate for heightened awareness among educators regarding the cognitive load faced by dyslexic students and suggest leveraging dyslexic friendly technology to enhance their learning experience. They propose designing lessons with familiar and uncluttered screen layouts, maintaining appropriate text spacing, and incorporating titles and headings for reading texts. These recommendations hold relevance for dyslexic students in a BSLE, urging educators to develop learning resources that align closely with their needs, thus fostering a dyslexic-friendly remote learning experience.

As such, teaching individuals with dyslexia, whether in a traditional classroom or through online platforms, demands careful deliberation. The introduction of BSLE prompts

questions about its effectiveness in meeting the educational needs of dyslexic students and the potential adaptability of traditional teaching methods and materials. While BSLE may be a familiar learning environment for many university students proficient in multitasking and technology use, its suitability for dyslexic learners is uncertain due to the specialised instructional approaches designed for them. Consequently, understanding the feasibility of integrating BSLE is crucial, given the unique learning requirements of students with dyslexia.

### **METHODOLOGY**

This research employs a qualitative methodology to collect data from individuals within a natural setting (Creswell, 2013). Specifically, the study centres on the experiences and perspectives of educational therapists, making a qualitative approach well-suited for gaining in-depth insights into the phenomenon of Blended Synchronous Learning Environments (BSLE) through the lens of the participants involved (Yin, 2011), thus providing rich and detailed insights.

Considering Creswell's (2013) qualitative research strategies, a case study approach is selected due to the limited sample size. A case study delves deeply into a real-life situation involving one or more participants, employing a variety of data collection techniques (Creswell, 2013). However, this method presents limitations in generalising findings due to small sample sizes (Farquhar, 2012) and the potential for biases or personal influence if adequate precautions are not taken (Yin, 2008).

Nevertheless, the case study design is chosen to explore the unique phenomenon of BSLE comprehensively, allowing for a detailed examination of participants' perspectives in addressing the research questions. Following Stake's (1995) categorisation, this research design aligns with an instrumental case study, which prioritises understanding the phenomenon itself over the individuals involved. The study is specifically bounded to the implementation of BSLE at DAS for dyslexic students and aims to understand the experiences and perceptions of educational therapists.

# Sampling, participants & selection criteria

A purposive sampling technique was employed to select participants capable of offering comprehensive and detailed insights into the research topic (Suri, 2011) and effectively addressing the research questions (Forman et al., 2008). This sampling strategy was considered appropriate as participants needed to possess experience teaching in a Blended Synchronous Learning Environment to share their perceptions and experiences.

The focus of this case study centres on the implementation of BSLE at DAS, involving educational therapists responsible for teaching the Main Literacy Program (MLP) to students aged 7 to 16. While a case study can encompass one or multiple cases

(Creswell, 2013), a sample size of three was deemed optimal to explore distinct cases and gather diverse perspectives on the phenomenon under investigation for this research. To be eligible for participation in the study, educational therapists were required to have implemented BSLE in at least two MLP classes during the COVID-19 pandemic.

**Table 1: Demographics of Participants** 

Participant's Pseudonym	Gender	Years in DAS	Prior teaching Background	IT Background
Hayley	Female	3	9 years (tutoring and relief teaching)	No
Tracy	Female	3	A short period of teaching at a private school	No
Jane	Female	12	No	No

#### **Ethical considerations**

The research study adhered to ethical guidelines outlined by Creswell (2009). Firstly, approval was obtained from the DAS Research Committee to conduct interviews at a DAS centre involving educational therapists. Secondly, participants provided informed consent to ensure their understanding and agreement with their involvement, as recommended by Gregory (2003). Thirdly, measures were implemented to maintain confidentiality and anonymity, following the guidelines of the British Educational Research Association (2018). Participants were assigned pseudonyms in quotations, and all collected materials were encrypted and securely stored. Data will be retained until the completion and submission of the project, after which it will be responsibly disposed of.

### **Data collection method**

The researcher obtained authorisation for the study on the 4th of May, 2023. An open invitation comprising of the study's agreement form and information leaflet was forwarded via the DAS company email to request participants on the 10th of May, 2023. Following a thorough evaluation, three interested individuals who met the selection requirements were asked to take part.

To gather information, the researcher conducted face-to-face, semi-structured interviews. Interview appointments were arranged using the Google calendar to accommodate the participants' schedules. Subsequently, the interviews were held face-to-face at the DAS Rex House learning centre. The audio was recorded with the laptop's sound recording tool. Each interview lasted between 45 minutes to an hour. After the interview, transcripts were shared with participants for member checking.

A semi-structured interview involves posing open-ended questions to participants with the flexibility to probe further based on responses to address the research inquiries (McIntosh and Morse, 2015), enabling a deeper exploration of the subject and discovery of new insights. This approach encourages participants to openly discuss their viewpoints and encounters with BSLE, fostering a conversational setting (Adams, 2015).

#### **Pilot interview**

Researchers have emphasised the significance of pilot studies in acquainting researchers with the interview process, refining interview questions, and making necessary adjustments to mitigate complexities in the main study (Shakir and ur Rahman, 2022; Young et al., 2018; Majid et al., 2017). Consequently, a pilot study of the semi-structured interview was conducted prior to the main study. An educational therapist with a similar profile, representing the main study's participants, was selected for the pilot study. The preparation of the interview guide and questions was guided by Bolderston's (2012) article.

The pilot interview was conducted face-to-face at the DAS Rex House centre, lasting 46 minutes. Subsequent to the interview, the researcher identified areas for improving interview questions by refining them to be concise and explicit. To prevent confusion, questions pertaining to online learning were omitted, and the term "BSLE" was substituted with "dual-mode teaching," a terminology familiar to educational therapists. This alteration enhanced participants' comprehension and elicited responses, aligning with Bolderston's (2012) recommendation to employ familiar terms for ease of conversation and understanding. Additionally, the interview questions were adjusted to effectively address the research inquiries.

Table 2: Demographics of Pilot Interview Participant

Participant's pseudonym	Gender	Years in DAS	Prior Teaching background	IT background
Susan	Female	6	2 years, Behaviour Therapist	None

# Main interview and member checking

The main study was held in-person at the DAS centre. Subsequently, the audio recordings of the interviews were transferred to a Microsoft document and a preliminary transcription was generated using the 'dictate' feature. Following this, the researcher meticulously reviewed the audio content and revised the transcription to ensure precision. The final transcriptions were presented to the participants for member checking, a method aimed at enhancing the trustworthiness of qualitative research and diminishing researcher bias by guaranteeing an accurate representation of the participants' perspectives (Lincoln and Guba, 1985). Consequently, member checking enabled the researcher to seek clarifications from participants regarding specific elements of the interview necessitating further clarification and to objectively interpret the interview.

# **Data analysis**

Braun and Clarke's (2006) six-stage thematic analysis model served as the framework for identifying primary themes within the interview data through an inductive approach. Thematic analysis aims to identify raw data, identify, examine, and pinpoint crucial themes or patterns within the data, facilitating exploration of the research inquiry. This method holds significant importance in qualitative research, as it yields profound, intricate, and detailed data, aligning well with the objectives of the current study (Braun and Clarke, 2006). However, thematic analysis lacks extensive literature guidance for novice researchers compared to other methodologies, potentially hindering their ability to conduct it with confidence and rigor, thus jeopardising the validity, reliability, and credibility of the research data (Nowell et al., 2017). Moreover, due to its adaptable nature, the quality of the analysis largely depends on factors such as the research question, the researcher's discretion, and proficiency in managing large volumes of data (Braun and Clarke, 2006).

# **Procedure**

The analysis process comprised several stages. Initially, the researcher thoroughly acquainted herself with the data by actively and repeatedly reading it to identify patterns and gain understanding. Transcribing the data and listening to audio files assisted in achieving a deep understanding and honing analytical skills (Lapadat and Lindsay, 1999).

Secondly, codes were generated by identifying initial thoughts and intriguing aspects emerging from the data. This manual coding process involved writing notes, highlighting potential patterns, and utilising the 'comment' function in Microsoft Word for codes.

In the third phase, themes were sought from the generated codes and organised into prospective themes. The researcher transferred highlighted texts and corresponding

codes into an Excel sheet. Subsequently, a thematic map was constructed to categorise the codes and establish connections between themes and codes, following Braun and Wilkinson's (2003) recommendations. This step facilitated the identification of main themes and sub-themes.

The fourth phase entailed reviewing the themes through meticulous evaluation to determine their relevance and consider merging or excluding weak themes. This resulted in a set of refined and reviewed themes accurately representing the overall data. To ensure accuracy, the researcher shared the interpretations of findings with participants to confirm their alignment with the sample's perceptions, as suggested by Birt et al. (2016).

The fifth phase involved defining and naming themes. This included analysing the data for each theme, grasping the core idea of themes, and identifying the data features they represent. A thorough analysis was conducted for each theme, and the narrative for the research questions was identified, leading to the establishment of distinct and clearly defined themes.

In the final phase of thematic analysis, writing commenced, and the analysed themes and data were presented in a concise, logical, and sequential manner. Throughout this analysis process, the researcher remained mindful of 'researcher bias,' which can impact qualitative studies due to personal opinions and background (Johnson, 1997). Hence, reflexivity was practiced to ensure the validity and credibility of the study, involving the maintenance of a personal memo to record personal thoughts and ethical considerations, as recommended by Hammarberg et al. (2016) and Johnson (1997).

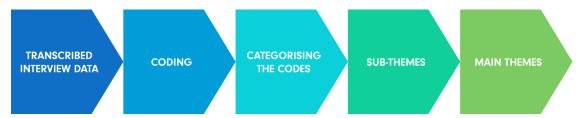


Figure 1: Data Analysis Process

#### **RESULTS & DISCUSSION**

The study's purpose was to understand DAS educational therapists' experiences and perceptions of implementing BSLE. It sought to address the following research questions:

- 1. What are the challenges and opportunities in implementing BSLE for students with dyslexia?
- 2. What strategies can improve the delivery of BSLE in classrooms?

Four major themes and additional sub-themes emerged from the findings.

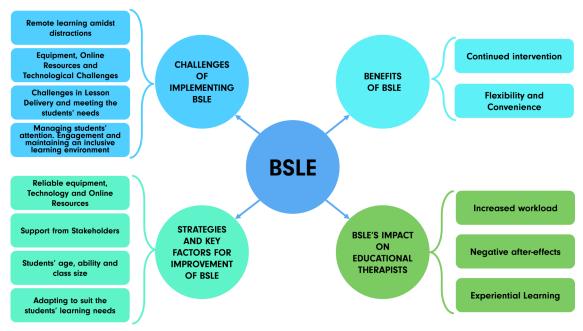


Figure 2 BSLE Findings

#### Theme 1: Benefits of BSLE

The abrupt shift from remote instruction to Blended Synchronous Learning Environments (BSLE) allowed minimal time for educational therapists to adapt to the novel instructional approach. Nevertheless, educational therapists recognised the advantages of BSLE, such as ensuring ongoing academic support and offering students enhanced flexibility and convenience.

#### Continued intervention

During the pandemic, students impacted by factors such as quarantine, being immunocompromised, or choosing to avoid in-person interactions, chose to participate in remote learning. Educational therapists recognised the prompt implementation of Blended Synchronous Learning Environments (BSLE) to cater to these students' instructional preferences and facilitate uninterrupted learning experiences.

"If the student is unwell, but still able to be attentive for lesson. I think this dual mode promises that they do not miss their lessons." — Jane

One educational therapist highlighted the potential advantages of utilising BSLE for their professional practice, notably in decreasing the necessity for review sessions.

# Flexibility and convenience

BSLE presented a beneficial chance for students to acquire knowledge from the comfort of their homes, bolstering adaptability and ease. By removing the necessity for travel, learners were able to engage in studies without encountering exhaustion. An educational therapist further acknowledged the potential business prospects associated with BSLE and proposed the prospect of expanding its services outside the borders of Singapore.

# Theme 2: Challenges of implementing BSLE

Educational therapists faced numerous difficulties while putting BSLE into practice, despite its advantages.

# Equipment, online resources, and technological challenges

Google Meet functioned as the chosen video conferencing tool, with remote learners engaging through either laptops or iPads. Various challenges such as poor audio and camera performance, improper device positioning, insufficient screen dimensions, slow device response, and the requirement to switch between different websites hindered the successful integration of BSLE for students attending remotely. Additionally, the absence of suitable devices further impeded effective communication.

"The laptop screen is not ideal as it comes with restrictions because I need to use it for sharing screen. Once you share your screen, you cannot see who's online. And the iPad comes with even more restrictions. The screen is really small and we can easily forget the students who are online. There was a student who was trying to put up their hand online. But because the iPad was away from me, I couldn't see that he was putting up his hand and his laptop has audio issues." – Jane

The positioning of devices played a critical role in establishing an ideal learning atmosphere. Laptops were frequently adjusted to face either the educational therapists or fellow classmates, thereby obstructing a comprehensive view of the class. This suboptimal placement of devices not only impeded remote students' auditory experience but also constrained the movement of educational therapists around the devices.

The occurrence of technical difficulties was so prevalent that educational therapists resorted to utilising WhatsApp as an alternative method to ensure continuous communication and aid students in resolving issues. Notably, in instances of microphone malfunctions, educational therapists initiated WhatsApp calls to enable students to hear their instructions while participating in Google Meet sessions.

In addition to these obstacles, educational therapists attended to remote students' queries and technical challenges. This support involved assisting students in logging into their accounts, clarifying basic online terms, instructing on screen-sharing functions, and navigating digital resources. However, students often encountered compatibility issues and navigation difficulties with their devices. Common devices like laptops, iPads, and smartphones frequently posed compatibility issues with the online learning materials, with smartphones being particularly unsuitable due to their limited screen size.

"When we set assignments on these fancy tools, the first thing the student will ask is, Teacher what to do, how to do it'. You find that you need to spend at least a good 10-15 minutes to get them some hands-on." — Jane

Furthermore, students resorted to online resources for quick access to information, where the auto-correction feature negatively impacted spelling exercises beyond the control of educational therapists. While some remote learners struggled with the demands of online learning due to these technological hurdles, educational therapists had to allocate additional time to support students in familiarising themselves with the digital tools before engaging in the learning process.

Educational therapists faced an additional technological hurdle when it came to online resources, affecting their capacity to provide timely feedback to remote students. For instance, a therapist relied on Liveworksheets.com, where access to student work was only available upon completion.

"There were so many different materials to be used and so many platform to juggle."

— Hayley

Additionally, maneuvering between different online platforms posed a challenge. Moreover, younger students were particularly affected due to their limited proficiency in using digital tools efficiently, requiring additional time to complete tasks such as uploading materials or typing.

### Challenges in lesson delivery and meeting the students' learning needs

The integration of BSLE had a significant impact on lesson delivery, posing considerable challenges in effectively meeting the diverse learning needs of both in-person and remote student groups. Educational therapists faced notable difficulties in providing corrective measures for remote learners, primarily due to time constraints and the prioritisation of attending to the needs of physically present students.

"I didn't get the students to trace. I just gave him the answer a few times because I was pressed for time and I was tired. My mind was constantly on finishing the component

because there's so much else to do that I cut short. In fact, I didn't even do the correction procedure with him." — Jane

Moreover, the virtual environment presented inherent obstacles for delivering corrective interventions, particularly in activities like reading and spelling, resulting in remote students requiring repeated guidance due to technical issues affecting audio clarity.

Monitoring the progress and assessing the academic and emotional development of remote learners proved challenging for educational therapists, as their focus was mainly on students in face-to-face interactions.

"If it's online, I totally cannot gauge. I don't know what's happening to them. You know Google doc- yeah, they might get it correct, but I would still not be confident enough to know whether they really understood what's happened in the classroom, or what I taught, so my objective is at least one word that they need to remember." — Tracy

Consequently, remote students often struggled to grasp concepts, lagging behind their peers receiving in-person instruction and experiencing communication breakdowns and frustrations.

"I find that the remote students had a higher number of 'I don't knows' compared to the face-to-face." — Jane

Educational therapists unanimously recognised the daunting task of developing a multisensory learning framework tailored for remote students. While successful in implementing such an approach for in-person learners, adapting it for remote participants proved challenging, as online resources designed for multi-sensory engagement were often perceived as exhaustive and redundant.

"The multi-sensory part, it's just basic and after a while it gets boring when you do it over and over again. Whereas for face-to-face, I can always change where you write it and all the materials I bring in class for them. Online, they can only watch from afar."

— Hayley

# Managing students' attention, engagement, and maintaining an inclusive learning environment

Educational therapists found it challenging to juggle the needs of both in-person and remote student groups, as they tended to prioritise those physically present in class over those participating remotely. This preference stemmed from the remote students' less tangible presence in the BSLE, leading to lower levels of interaction and motivation compared to their in-person counterparts. Consequently, maintaining engagement and

fostering inclusivity became difficult for therapists, resulting in occasional unintentional neglect of remote learners and delayed support for them.

"There's so much going on that I completely didn't look at that screen for a long period of time. Then that student called another student who is face-to-face on the phone to tell the student, "Tell teacher to look at me," I feel so terrible even now you know."

— Jane

The unequal distribution of attention was partly due to in-person students dominating discussions and enjoying the spotlight, which overshadowed the contributions of remote participants.

"They are always just by the side, listening to our conversation because the students in class overpower everything. Which I feel to be honest, the students in class would still be more outspoken. No matter how quiet they are, they will still be the loudest than those online" — Hayley

Efforts to establish an inclusive learning atmosphere were largely unsuccessful due to limitations such as time constraints and the educational setting. Additionally, endeavors to standardise lesson materials through exclusive use of digital resources, aiming for equal learning opportunities, were met with resistance from face-to-face students who preferred hands-on activities.

"The students online were engaged, but the ones who are face-to-face, they were not into it. They like that multi-sensorial, tactile feel so they felt like- well, I'm already here in class, so why are you asking me to do it on a tablet? They feel that they are being restricted just because somebody else is online and they all have to do it online"— Jane

As a result, navigating student engagement across various instructional tasks proved to be daunting. Therapists felt pressured to keep students consistently involved, especially since remote learners tended to disengage more easily in the absence of a physical authority figure. A lack of intrinsic motivation among remote students, stemming from limited participation in activities, sometimes made online learning burdensome, leading to requests for early lesson endings due to fatique.

"The online student was getting frustrated because she cannot follow through his story. So she said she's going to the toilet and then went missing for a long period of time." — Jane

# Remote learning amidst distractions

Remote students encountered increased distractions compared to their in-person counterparts, as they utilised personal devices, exposing them to digital distractions. Additionally, they had to consistently monitor the microphone's mute feature to avoid picking up background sounds, further disrupting their learning experience.

"Once I could hear my student's grandma, she's cooking. He's sitting in dining table at the kitchen. He's sitting there and the grandma is cooking. And she's asking him like, what he wants, whether he wants it more spicy, less spicy. And I'm like. 'Hello', then he has a baby sister who's, like, crying and at one point the grandma picked up the baby sister and put her on his lap. So, he was holding onto the baby sister and he's attending the lesson. I felt very bad about that."—Jane

# Theme 3: Strategies and key factors for improvement of BSLE

Despite encountering a multitude of obstacles, educational therapists posit that enhancements to BSLE are attainable through the deliberate consideration of specific factors and strategies.

# Students' age, ability, and class size

Educational therapists have pinpointed students' age and skill level as pivotal elements for enhancing performance in BSLE. Proficiency in manoeuvring through online tools and autonomously resolving technical issues has been identified as crucial for facilitating a seamless BSLE experience. Remarkably, this was particularly noticeable among older learners starting from Primary 5, who exhibited reduced dependency on educational therapists for technical assistance and displayed enhanced participation throughout instructional sessions.

Moreover, the significance of class size was underscored by an educational therapist, emphasising its influence on their capacity to provide adequate support to student cohorts. The majority of MLP classes consisted of four to five students, with a fraction of them being remote participants.

"Don't put as many kids in one classroom. When you are dual, the total number of students in a class should be maintained as low as possible so that they can have your undivided attention. Online should only be one. Never more than one."- Hayley

# Reliable equipment, technology, and online resources

Technological advancements are essential for enhancing the BSLE. Suggestions have been put forth regarding the incorporation of visualisers to streamline the sharing of written materials among remote students and educational facilitators. Additionally, it is recommended to utilise functional iPads and similar devices to enhance the online presence of remote learners during class sessions. An optimal learning experience can be achieved by simultaneously displaying video content and class materials on the screen, allowing students to engage with the lesson seamlessly.

The inclusion of high-quality cameras and microphones is crucial for providing students with an immersive learning environment. In cases where laptops and iPads are not suitable, educational therapists propose installing an LCD screen or Apple TV near the whiteboard to project video conferences. This approach could boost remote students' engagement, facilitate eye-level interactions, and minimise the chance of missing digital cues.

"To think of it as a benefit for students, I think it comes along with a lot of assumptions. Assumptions that the student has the proper technology at home, Wi-Fi connectivity and the technology that they're using, whether it's a desktop or a laptop, right, it has working audio too. And the camera is good and they know how to position the camera so that they can be seen." — Jane

In addition to enhancing classroom equipment, it is essential for remote students to be in conducive learning environments with access to quality technology and reliable internet connections. Furthermore, educational therapists advocate for tools with easy navigation and user-friendly annotation features. Various digital platforms such as Google Documents, Google Slides, Jamboard, Trello, KAMI, Quizizz, Classkick, Bamboozle, Wordwall, and Liveworksheets.com have proven invaluable for assigning tasks to remote learners. Additionally, applications like Padlet, Wakelet, and Trello facilitate collaboration and brainstorming activities among student cohorts.

Importantly, educators encourage the use of familiar tools by students and the integration of more teacher-guided resources to mitigate navigation challenges and obstacles encountered with online tools.

"We have to stick to what we have been using in class. Stick to that same variety when you go dual mode so that the students are familiar with the interface. Once they go online, it's not a time to try something new unless the teacher shares the screen and the teacher controls the system." — Jane

# Adapting to suit the student's learning needs

Educational therapists exhibited adaptability and flexibility in evaluating the proficiency of remote learners in utilising online tools and adjusting to digital learning environments. They employed diverse strategies, such as sending lesson materials via email to aid younger students struggling with platform navigation and integrating modifications tailored to the needs of remote learners compared to their face to face peers. Notably, efforts were made to streamline tasks, particularly in activities like sound drills and spelling exercises, by simplifying instructions and providing necessary phonograms to reduce cognitive load. This approach aimed to lessen the typing workload and instead introduced a drag-and-drop activity. For learners encountering challenges with spelling, visual aids were leveraged, with one practitioner utilising Google Slides to enhance comprehension through imagery. Additionally, thematic instruction focused on topics like environmental issues, pollution, and sleep hygiene was favoured by some educators, emphasising reading comprehension and writing tasks over phonics instruction.

"It's a challenge to actually teach phonograms. Reading Comprehension and writing is much easier to do dual mode." — Tracy

To enhance student engagement, a variety of visual aids and interactive online activities were integrated into the lessons. This approach aimed to foster active participation among students in the digital learning setting.

#### Support from stakeholders

Support from stakeholders, notably from parents and the DAS, was deemed crucial for the success of BSLE. Fostering a strong rapport with students' guardians through frequent communication was identified as essential for garnering assistance for remote learners, encompassing supervision and creation of an optimal learning setting.

Nevertheless, it is crucial for parents to maintain a delicate balance in their involvement, being able to discern when to offer support and when to step back. Excessive surveillance by parents could evoke discomfort in students, thereby detrimentally impacting their educational engagement and involvement in a BSLE.

Beyond parental engagement, the DAS Educational Technology team supported the initiative by suggesting online materials, supplying templates, and maintaining a resource repository. Nonetheless, educational therapists voiced a necessity for more holistic support, encompassing training sessions and curated educational materials.

"DAS has to train teachers in how to handle things like correction procedure, student engagement, student motivation and give us a standard set of tools like if I want to do reading comprehension for a dual class and I have a PDF of the reading

comprehension, how should I share it with the student because PDF printed out would look better than a PDF on the screen." — Jane

# Theme 4: BSLE's impact on educational therapists

The implementation of the BSLE had significant adverse effects on the mental and physical well-being of educational therapists, stemming from heightened work demands and the challenges of experiential learning.

# **Experiential learning**

Introducing BSLE proved challenging because of the educational therapists' lack of experience and their diverse individual approaches. They encountered uncertainties when pushed beyond their comfort zones, facing a steep learning curve marked by trial and error as they advanced through each lesson.

"How I prepare is, I over prepare because I don't know what will work and what will not work. It took me some time to really know what, how the students do well...To be honest, I just over-prepare and then I decide on that day. Like, OK, this works and this doesn't and then let's move on." — Hayley

#### Increased workload

The extended preparation period was a result of accommodating the diverse learning requirements of both student groups, which increased the workload for educational therapists.

"If I were to do it on paper for them, then in terms of preparation for me is double work. The same activity, I have to plan it in two ways. I think it's a lot of preparation. Like for every component you need to think." — Jane

### **Negative after-effects**

Educational therapists admitted to not finding the BSLE enjoyable and experiencing emotional difficulties, including a range of conflicting emotions such as regret, guilt, anxiety, and even feelings of dissatisfaction and resentment towards the BSLE due to associated stress.

"Whenever I finish my dual mode lesson, I will not be satisfied with what I've done for the day. There's always a void. The reflection part was lacking when I did dual mode, because I'm so conscious about all other things and I'm so stressed about how things are going to go on. You know, there are so many things going on compared to a physical lesson." — Tracy

The emotional strain also impacted their teaching approach, as they struggled to address students' learning needs, maintain focus, and deliver lessons effectively. This led to doubts about whether they were adequately meeting students' needs and treating them fairly. While acknowledging areas for improvement, therapists empathised with remote students who did not receive the same level of support as those in physical classrooms. Moreover, the lack of connection with remote students and challenges in maintaining engagement during teaching diminished the enjoyment of the teaching process and made it challenging to deliver lessons with care.

"Because my mind is just so conscious about managing, handling the whole thing like the technical issue and all, sometimes I don't really put my heart and soul out for teaching." — Tracy

#### DISCUSSION

#### **Benefits**

The implementation of BSLE ensures ongoing support for students with dyslexia, which is crucial for maintaining, enhancing, and reinforcing their educational progress. This assertion is supported by the findings of the National Reading Panel (2000) and Torgesen et al. (2001), who conducted research on students facing challenges in reading. Additionally, the consistent provision of support guarantees that remote learners encounter fewer educational gaps upon their return to physical classrooms. This observation is corroborated by Olsen-Reeder's (2022) two-year investigation at a university in New Zealand, which implemented BSLE during the pandemic period. However, the overall quality of instructional sessions was subpar, impacting student learning outcomes negatively. Nonetheless, the flexibility and convenience offered by BSLE allow students to engage in learning from their residences, reducing the risk of exposure during the pandemic. This phenomenon is highlighted in Lakhal's (2021) research, where students appreciated the flexible nature of remote learning, especially those residing far from the campus.

### Challenges

Numerous challenges arose during the execution of the BSLE. Technological impediments impacted the auditory and visual components within the BSLE, thereby influencing the overall learning experience. Previous studies by Olsen-Reeder (2022), Zydney (2020), Szeto and Cheng (2016), and Lakhal et al. (2021) have also documented similar challenges. For example, a two-year case study involving 150 undergraduate students revealed recurrent disruptions in lessons due to delays and poor quality transmission of audio and visual content (Szeto and Cheng, 2016). Furthermore, students were required to navigate the technological aspects of the BSLE as educational therapists observed the

necessity to guide remote learners in utilising online learning platforms, consequently affecting lesson progression and meeting students' learning requirements.

# **Challenges in Multi-sensory Learning Environments**

Although a multi-sensory learning environment is deemed beneficial for students with dyslexia to enhance their understanding and acquisition of concepts and skills (Birsh, 2005), implementing this approach online posed significant challenges. Incorporating tactile and kinesthetic activities was particularly limited. Likewise, Olsen-Reeder's (2022) research illustrates an educator's decision to omit kinesthetic lesson components for face-to-face students in favour of promoting inclusivity for remote learners. Instead, both cohorts received digital lessons, which were initially well-received but declined over time. While Olsen-Reeder's (2022) study was limited to the perspective of one teacher, the findings align with the present study, in which an educational therapist noted the preference of her face-to-face students for tactile learning compared to the digital learning materials used by remote students.

# **Challenges in Correction Procedures and Student Engagement**

Effective correction procedures for remote students posed challenges, potentially impacting their learning and retention of concepts. Previous research by Torgesen (2006), Lindamood and Lindamood (1998), and Alexander et al. (1991) underscored the significance of explicit instructions in decoding and encoding skills for students with dyslexia. However, difficulties in correcting remote learners may have led to a decline in learning quality, compounded by therapists' inability to assess remote students' progress due to passive participation and task lag. These challenges hindered the provision of necessary support, contradicting an essential Orton-Gillingham principle (Sayeski et al., 2018). Furthermore, educational therapists have adjusted their teaching focus from phonics to thematic concepts due to the acknowledged challenges of teaching phonics. This shift highlights potential difficulties for dyslexic students in a remote learning environment. Existing research supports the notion that dyslexic students often struggle with phonological processing (Snowling, 1998; Navas et al., 2014). Therefore, auditory issues in online learning may compound these challenges. Additionally, managing students' attention and engagement during lessons proved challenging, with remote students exhibiting higher disengagement compared to face-to-face peers, potentially due to limited participation opportunities. The disparity in interactions between face-to-face and remote students further emphasised the complexities of a BSLE.

Creating an inclusive environment also presented obstacles, with therapists inadvertently focusing more on face-to-face students, overlooking remote participants. Similar studies highlighted challenges faced by remote students in actively engaging, as they often muted themselves and hesitated to contribute unprompted. This lack of engagement led to feelings of disconnect and reduced participation. Notably, the remoteness of online

learning further hindered natural engagement, impacting the presence of remote students in the learning environment. As a result, remote students faced challenges in actively participating in lessons, leading to restlessness and diminished motivation.

Addressing these challenges necessitates a nuanced approach that considers the diverse needs of both face-to-face and remote students to foster an inclusive and engaging learning environment for all participants.

# BSLE's impact on educational therapists

The integration of BSLE has significantly influenced the teaching approaches, workload, and emotional well-being of educational therapists. Through an iterative experiential learning process, these professionals have continuously modified their lesson plans and teaching strategies. This adaptation has resulted in an increase in workload and lesson preparation time as they strive to meet the diverse learning needs of their students, aligning closely with the findings of Bower et al. (2014). The research conducted by Zydney et al. (2019) further supports this notion by highlighting the exhaustion experienced by educators due to the high demands and multitasking involved in the implementation of BSLE.

It is noteworthy that educational therapists have expressed strong concerns against the adoption of BSLE, pointing out more disadvantages than advantages. This negative perception has been shaped by their encounters with various challenging situations, including stress, burnout, and feelings of guilt. The survey responses from 600 language teachers by MacIntyre et al. (2020) accentuate this sentiment, indicating that the shift to online teaching during the COVID-19 pandemic has amplified stress levels and negative emotions. MacIntyre suggests that educators are frequently required to adapt swiftly to changes in teaching practices and instructional delivery, often without adequate acknowledgment from educational institutions regarding the added stress and workload pressures placed upon them.

#### RECOMMENDATIONS

The study identified key strategies and factors for enhancing the implementation of BSLE. Firstly, it suggests that BSLE is most effectively utilised with upper primary or secondary school students due to their familiarity with technology, which ensures a smoother learning experience. Moreover, considering the unique learning needs of students with dyslexia, it is advisable to limit the number of remote students to one as suggested by one of the educational therapists. This allows for tailored adjustments based on the dynamics of the classroom. While many studies did not specify class size limitations, possibly because they focused on tertiary level students who are generally more independent, Zydney et al.'s (2019) study revealed that larger class sizes demand more effort from teachers, such as multitasking and setting up additional equipment. Notably,

teachers in their study delegated some duties to face-to-face students to handle technological problems and monitor remote students' chat. However, this approach may not be suitable for students with dyslexia, who are often perceived as having limited "cognitive flexibility" and may struggle with transitioning between tasks (Poljac et al., 2010, p.402).

In contrast, Lakhal et al.'s study reported instructors' varying preferences regarding class size. Thus, the ideal class size may depend on the dynamics of a particular classroom, students, and educators. Secondly, ensuring reliable equipment, technology, and online resources is crucial for a smooth learning experience. While most studies emphasise educators' familiarity with technology (e.g. Yang et al., 2019; Olt, 2018; Zydney et al., 2019), this study highlights the importance of educational therapists understanding their students' abilities and utilising familiar tools and resources to ensure students navigate online resources without difficulty. Therefore, integrating online tools frequently in physical classes can prepare students for remote learning.

Thirdly, educational therapists should adapt and practice flexibility by tailoring their planning and execution of BSLE to accommodate students' learning needs. One key consideration is minimising cognitive load for remote students by reducing typing activities, especially considering that students with dyslexia often have poor working memory (Kizilaslan and Tunagur, 2021; Menghini et al., 2011). Thus, demanding tasks on working memory such as navigating online learning platforms and following instructions simultaneously could potentially impact their learning.

Lastly, the study emphasises the invaluable support from students' parents and the Dyslexia Association of Singapore (DAS) for educational therapists. Evidence shows that parental involvement in students' online learning is crucial (Black, 2009), especially in providing an ideal learning environment and resources (Lawrence and Fakuade, 2021). Educational therapists have frequently cited a lack of control as a major factor affecting their intervention with remote students. Therefore, relying on parents could alleviate this strain and help with monitoring students' at-home learning.

Furthermore, educational therapists suggest that DAS could further support them through training opportunities, equipping them with the skills to confidently implement BSLE. Similarly, Gacs et al. (2020) recommend that educators receive sufficient time to create online lessons of good quality and have the opportunity to undergo training to enhance their skills. Hence, with support from training opportunities and sufficient time for lesson preparations, it could substantially alleviate stress, potentially enhancing the emotional well-being of educational therapists implementing BSLE.

#### LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The implementation of BSLE amidst the pandemic was not widespread among educational therapists at the time of the study. Consequently, the data collected depended on the ability of educational therapists to recollect experiences from the previous year. To address this constraint, interview questions were meticulously formulated to facilitate memory recall. Moreover, the limited sample size in the study hinders broad generalisation of the findings, particularly as only three educational therapists were interviewed from a potential pool of at least 140. Nevertheless, future investigations could gain from a more extensive and diverse sample group, encompassing various stakeholders like students and educational institutions, to offer a comprehensive outlook on students' encounters and the enduring impacts of BSLE on their intervention. Additionally, exploring the suitability of DAS training programs and resources, and assessing the influence of parental assistance in BSLE implementation for remote learners, are crucial for grasping the complete context and efficacy of this instructional approach. Furthermore, engaging in lesson observations could yield valuable insights into lesson delivery and challenges, thereby augmenting the depth and quality of forthcoming studies.

#### CONCLUSION

This study explores the perspectives and experiences of educational therapists who implemented BSLE, with a focus on the challenges, opportunities, and potential improvement strategies. The findings offer valuable insights into current BSLE research, particularly from a SEN perspective. Through qualitative analysis, it is evident that BSLE presents both benefits and challenges. The challenges primarily revolve around technological obstacles, access to online resources, lesson delivery, and student engagement. Despite these hurdles, remote students enjoyed advantages such as flexible learning, convenience, and ongoing support during the pandemic. However, the adoption of BSLE also increased the workload for educational therapists, leading to negative impacts as they grappled with implementation and associated emotions. Nonetheless, the study identifies strategies to enhance BSLE. Tailoring technology and online resources to students' age, ability, and class size could alleviate challenges for both therapists and students. Additionally, adaptability and flexibility are crucial qualities for therapists, while parental support in creating a conducive learning environment and receiving professional training for BSLE implementation are seen as essential elements for improvement. The identified benefits, challenges, and recommendations for BSLE could have broader implications for the field of online education, influencing instructional design, teacher training, and policy-making.

#### **REFERENCES**

Abdelmalak, M., & Parra, J. L. (2016). Expanding learning opportunities forgraduate students with HyFlex course design. *International Journal of Online Pedagogy and Course Design (IJOPCD), 6*(4), 19–37. Available at: https://www.researchgate.net/publication/305347642\_Expanding\_Learning\_Opportunities\_for\_Graduate\_Students\_with\_Hy Flex Course Design (Accessed: 4 November 2022)

- Adams, W. C. (2015). Conducting semi-structured interviews. Handbook of Practical Program
  Evaluation, 492–505. Available at: https://doi.org/10.1002/9781119171386.ch19 (Accessed: 9 October 2022)
- Alexander, A., Anderson, H., Heilman, P. C., Voeller, K. S., & Torgesen, J. K. (1991). Phonological awareness training and remediation of analytic decoding deficits in a group of severe dyslexics. *Annals of Dyslexia* 41, pp.193-206.
- Bell, J., Cain, W., & Sawaya, S. (2013). Introducing the role of technology navigator in a synchromodal learning environment. In J. Herrington, A. Couros, & V. Irvine (Eds.), Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications, 1629–1634. Association for the Advancement of Computing in Education (AACE). Available at: https://www.researchgate.net/publication/264218966\_Introducing\_the\_Role\_of\_a\_Technology\_Navigator\_in\_a\_Synchromodal\_Learning\_Environment (Accessed: 7 October 2022)
- Bhamani, S., Makhdoom, A. Z., Bharuchi, V., Ali, N., Kaleem, S., & Ahmed, D. (2020). Home learning in times of COVID: Experiences of parents. *Journal of Education and Educational Development, 7*(1), 9. Available at: https://doi.org/10.22555/joeed.v7i1.3260 (Accessed: 3 November 2022)
- Birt, L., Scott, S., Cavers, D., Campbell, C., & Walter, F. (2016). Member checking: a tool to enhance trustworthiness or merely a nod to validation? *Qualitative health research, 26*(13), 1802-1811. Available at: https://journals.sagepub.com/doi/abs/10.1177/1049732316654870 (Accessed: 1 August 2023)
- Birsh, J. R. (2005). Multisensory teaching of Basic language skills. P.H. Brookes Pub. Co.
- Black, E. W. (2009). An evaluation of familial involvements' influence on student achievement in K–12 virtual schooling. Available at: https://www.proquest.com/openview/d97ed5dad5b56aa10611a18d4c95c664/1?pq-origsite=gscholar&cbl=18750 (Accessed: 17 August 2023)
- Boada, R., Willcutt, E. G., & Pennington, B. F. (2012). Understanding the comorbidity between dyslexia and attention-deficit/hyperactivity disorder. *Topics in Language Disorders, 32*(3), pp.264–284. Available at: https://doi.org/10.1097/tld.0b013e31826203ac (Accessed: 9 October 2022)
- Bolderston, A. (2012) Conducting a Research Interview. *Journal of Medical Imaging and Radiation Sciences, 43*(1), 66-76. Available at: https://www.jmirs.org/article/S1939-8654(11)00132-9/fulltext (Accessed: 26 April 2023)
- Bower, M., Dalgarno, B., Kennedy, G., Lee, M. J. W., & Kenney, J. (2014). *Blended synchronous learning: A handbook for educators. Office for Learning and Teaching, Department of Education.* Available at: https://blendsync.org/handbook/ (Accessed: 11 October 2022)
- Braun, V., & Clarke, V. (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101. Available at: https://www.tandfonline.com/doi/abs/10.1191/1478088706qp063oa (Accessed: 11 October 2022)

- Braun, V. & Wilkinson, S. (2003). L'iability or asset? Women talk about the vagina. *Psychology of Women Section Review. 5*(2). pp.28-42. Available at: https://www.researchgate.net/publication/288906696\_Liability\_or\_asset\_Women\_talk\_about\_the\_vagina (Accessed: 10 October 2022)
- British Educational Research Association. [BERA] (2018). *Ethical Guidelines for Educational Research,* fourth edition, London. Available at: https://www.bera.ac.uk/researchers-resources/publications/ethical-guidelines-for-educational-research-2018 (Accessed: 17 October 2022)
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approach* (3rd edition). SAGE Publications, Inc.
- Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches.*Sage Publications.
- Farquhar, J. D. (2012). *Case study research for business*. SAGE Publications Ltd, Available at: https://doi.org/10.4135/9781446287910 (Accessed: 9 September 2023)
- Forman, J., Creswell, J. W., Damschroder, L., Kowalski, C. P., & Krein, S. L. (2008). Qualitative research methods: Key features and insights gained from use in Infection Prevention Research. *American Journal of Infection Control, 36*(10), 764–771. Available at: https://doi.org/10.1016/j.ajic.2008.03.010 (Accessed: 9 October 2022)
- Gabay, Y., Schiff, R., & Vakil, E. (2012). Dissociation between online and offline learning in developmental dyslexia. *Journal of Clinical and Experimental Neuropsychology, 34*(3), 279–288. Available at: https://doi.org/https://www.tandfonline.com/doi/epdf/10.1080/13803395.2011.633499?needAccess=true&role=button (Accessed: 28 July 2023)
- Gacs, A., Goertler, S., & Spasova, S. (2020). Planned online language education versus crisisprompted online language teaching: Lessons for the future. *Foreign Language Annals, 53* (2), 380–392. Available at: https://doi.org/10.1111/flan.12460 (Accessed: 3 August 2023)
- Greogory, I. (2003). 'Ethics in research.' London: Continuum
- Habib, L., Berget, G., Sandnes, F. E., Sanderson, N., Kahn, P., Fagernes, S., & Olcay, A. (2012). Dyslexic students in higher education and Virtual Learning Environments: An exploratory study. *Journal of Computer Assisted Learning*, 28(6), 574–584. Available at: https://doi.org/https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1365-2729.2012.00486.x?saml\_referrer (Accessed: 28 July 2023)
- Hammarberg, K., Kirkman, M., & de Lacey, S. (2016). Qualitative research methods: When to use them and how to judge them. *Human Reproduction, 31*(3), 498–501. Available at: https://doi.org/10.1093/humrep/dev334 (Accessed: 17 October 2022)
- Johnson, R. B. (1997). Examining the validity structure of qualitative research. *Education, 118*(2), 282-292. Available at: https://www.researchgate.net/publication/246126534\_Examining\_the\_Validity\_Structure\_of\_Qualitative\_Research (Accessed: 17 October 2022)
- Kizilaslan, A., & Tunagur, M. (2021). Dyslexia and working memory: Understanding reading comprehension and high level language skills in students with dyslexia. *Kastamonu Eğitim Dergisi, 29*(5), 941–952. Available at: https://www.researchgate.net/publication/357469680\_Dyslexia\_and\_working\_memory\_understanding\_reading\_comprehension\_and\_high\_level\_language\_skills\_in\_students\_with\_dyslexia (Accessed: 7 July 2023)
- Lakhal, S., Mukamurera, J., Bédard, M. E., Heilporn, G., & Chauret, M. (2021). Students and instructors perspective on blended synchronous learning in a Canadian graduate program. *Journal of Computer Assisted Learning, 37*(5), 1383–1396. Available at: https://doi.org/https://onlinelibrary.wiley.com/doi/abs/10.1111/jcal.12578 (Accessed: 11 October 2022)

Lapadat, J. C., & Lindsay, A. C. (1999). Transcription in Research and Practice: From Standardization of Technique to Interpretive Positionings. *Qualitative Inquiry, 5*(1), 64-86. Available at: https://doi.org/10.1177/107780049900500104 (Accessed: 11 October 2022)

- Lawrence, K. C., & Fakuade, O. V. (2021). Parental involvement, learning participation and online learning commitment of adolescent learners during the COVID-19 lockdown. *Research in Learning Technology, 29.* Available at: www.jamanetwork.com/journals/jamapediatrics/fullarticle/2769434 (Accessed: 17 August 2023)
- Lincoln, Y., & Guba, E. (1985). Naturalistic inquiry, Sage, Beverly Hills, CA.
- Lindamood, P., & Lindamood, P. (1998). *The Lindamood Phoneme Sequencing Program for Reading, Spelling, and Speech, Austin, TX: PRO-ED, Inc*
- Lee, V. (2020). Home-based learning-a look at three homes. The Straits Times. Available at: https://www.straitstimes.com/lifestyle/home-based-learning-a-look-at-three-homes (Accessed: 27 July 2023)
- MacIntyre, P. D., Gregersen, T., & Mercer, S. (2020). Language teachers' coping strategies during the COVID-19 conversion to online teaching: Correlations with stress, wellbeing and negative emotions. *System, 94*, 102352. Available at: https://www.sciencedirect.com/science/article/pii/S0346251X20307120 (Accessed: 3 August 2023)
- MacKevett, D., & Feubli, P. (2022). *The hybrid classroom: Post-COVID19 success factors and specifications for dual-mode teaching and learning.* ICERI2022 Proceedings. Available at: https://library.iated.org/view/MACKEVETT2022HYB (Accessed: 27 July 2023)
- Majid, M. A. A., Othman, M., Mohamad, S. F., Lim, S. A. H., & Yusof, A., (2017). Piloting for interviews in qualitative research: Operationalization and lessons learnt. *International Journal of Academic Research in Business and Social Sciences, 7*(4), 1073-1080. Available at: https://www.researchgate.net/publication/317696788\_Piloting\_for\_Interviews\_in\_Qualitative\_Research\_Operationalization and Lessons Learnt (Accessed: 26 April 2023)
- McIntosh, M. J., & Morse, J. M. (2015). Situating and constructing diversity in semi-structured interviews. *Global Qualitative Nursing Research, 2*, 233339361559767. Available at: https://doi.org/https://journals.sagepub.com/doi/epub/10.1177/2333393615597674 (Accessed: 9 October 2022)
- Menghini, D., Finzi, A., Carlesimo, G. A., & Vicari, S. (2011). Working memory impairment in children with developmental dyslexia: Is it just a phonological deficity? *Developmental Neuropsychology, 36*(2), 199–213. Available at: https://www.tandfonline.com/doi/citedby/10.1080/87565641.2010.549868?scroll=top&needAccess=true&role=tab (Accessed: 7 July 2023)
- Ministry of Education. (2020). Schools and Institutes of Higher Learning to Shift to Full Home-Based Learning; Preschools and Student Care Centres to Suspend General Services. Available at: https://www.moe.gov.sg/news/press-releases/20200403-schools-and-institutes-of-higher-learning-to-shift-to-full-home-based-learning-preschools-and-student-care-centres-to-suspend-general-services (Accessed: 25 July 2023)
- Navas, A. L., Ferraz, É., de, & Borges, J. P. (2014). Phonological processing deficits as a universal model for dyslexia: Evidence from different orthographies. *CoDAS*, *26*(6), 509–519.

  Available at: https://doi.org/10.1590/2317-1782/20142014135 (Accessed: 1 August 2023)
- National Reading Panel. (2000). Teaching Children to Read: An Evidenced-Based Assessment of the Scientific Research Literature on Reading and Its Implications for Reading Instruction.

  Presented at the National Institutes of Child Health and Human Development, Washington, DC

- Norberg, A. (2012). Blended learning and new education logistics in Northern Sweden. In D. G. Oblinger (Ed.), *Game changers: Education and information technologies*, 327-330. Boulder, CO: EDUCAUSE.
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis. International *Journal of Qualitative Methods, 16*(1), 160940691773384. Available at: https://journals.sagepub.com/doi/epub/10.1177/1609406917733847 (Accessed: 31 July 2023)
- Olsen-Reeder, V. I. (2022). Dual-mode teaching in the language classroom: Reconciling the pandemic, equity, and the future of quality language teaching pedagogy. New Zealand *Journal of Educational Studies*, *57*(2), 335–349. Available at: https://doi.org/10.1007/s40841-022-00258-z (Accessed: 11 July 2023)
- Olt, P. A. (2018). Virtually there: Distant Freshmen blended in classes through synchronous online education. *Innovative Higher Education, 43*(5), 381–395. Available at: https://doi.org/10.1007/s10755-018-9437-z (Accessed: 11 October 2022)
- Poljac, E., Simon, S., Ringlever, L., Kalcik, D., Groen, W. B., Buitelaar, J. K., & Bekkering, H. (2010). Impaired task switching performance in children with dyslexia but not in children with autism. *Quarterly Journal of Experimental Psychology, 63*(2), 401–416. Available at: https://journals.sagepub.com/doi/epub/10.1080/17470210902990803 (Accessed on: 14 September 2023)
- Pope, C. L. (2010). Breaking down barriers: Providing flexible participation options for on-campus courses. In ERGA Conference (5th: 2010: Adelaide, Australia)
- Reimers, F. (2022). *Primary and secondary education during COVID-19: Disruptions to educational opportunity during a pandemic.* Springer.
- Rose, J. (2009). *Identifying and teaching children and young people with dyslexia and literacy difficulties: an independent report.* Available at: http://www.thedyslexia-spldtrust.org.uk/media/downloads/inline/the-rose-report.1294933674.pdf (Accessed: 9 October 2022)
- Sahu, P. (2020). Closure of universities due to coronavirus disease 2019 (COVID-19): Impact on education and mental health of students and academic staff. Cureus. Available at: https://doi.org/https://www.cureus.com/articles/30110 (Accessed: 3 November 2022)
- Sayeski, K. L., Earle, G. A., Davis, R., & Calamari, J. (2018). Orton Gillingham: Who, what, and how. TEACHING Exceptional Children, 51(3), 240–249. Available at: https://doi.org/10.1177/0040059918816996 (Accessed: 27 July 2023)
- Shakir, M., & Rahman, A. (2022). Conducting Pilot Study In A Qualitative Inquiry: Learning Some Useful Lessons. *Journal of Positive School Psychology, 6*(10), 1620-1624. Available at: https://journalppw.com/index.php/jpsp/article/view/13459 (Accessed: 26 April 2023)
- Snowling, M. J. (2012). Early identification and interventions for dyslexia: A contemporary view. *Journal of Research in Special Educational Needs, 13*(1), 7–14. Available at: https://doi.org/10.1111/j.1471-3802.2012.01262.x (Accessed: 9 October 2022)
- Snowling, M. J., Hulme, C., & Nation, K. (2020). Defining and understanding dyslexia: Past, present and future. *Oxford Review of Education, 46*(4), 501–513. Available at: https://doi.org/10.1080/03054985.2020.1765756 (Accessed: 9 October 2022)
- Snowling, M. (1998). Dyslexia as a phonological deficit: Evidence and implications. *Child Psychology and Psychiatry Review, 3*(1), 4–11. Available at: https://doi.org/10.1017/s1360641797001366 (Accessed: 10 July 2023)
- Soesmanto, T., & Bonner, S. (2019). Dual mode delivery in an introductory statistics course: Design and evaluation. *Journal of Statistics Education, 27*(2), 90–98. Available at: https://doi.org/10.1080/10691898.2019.1608874 (Accessed: 4 November 2022)
- Stake, R. E. (1995). The Art of Case Study Research. Sage.

Suri, H. (2011). Purposeful sampling in qualitative research synthesis. *Qualitative Research Journal,* 11(2), 63–75. https://doi.org/https://www.emerald.com/insight/content/doi/10.3316/QRJ1102063/full/html (Accessed: 9 October 2022)

- Szeto, E., & Cheng, A. Y. (2016). Towards a framework of interactions in a blended synchronous learning environment: What effects are there on students' social presence experience? *Interactive Learning Environments, 24*(3), 487–503. Available at: https://www.tandfonline.com/doi/abs/10.1080/10494820.2014.881391 (Accessed: 13 October 2022)
- Tan, J. B., Cook, M. J., Logan, P., Rozanova, L., & Wilder-Smith, A. (2020). Singapore's pandemic preparedness: An overview of the first wave of COVID-19. International Journal of *Environmental Research and Public Health, 18*(1), 252. Available at: https://www.mdpi.com/1660-4601/18/1/252 (Accessed: 19 September 2023)
- Tay S. Y. & Asmuri S. A. (2021). Dyslexia Children's Experience of Home-Based Learning During School Closures: 4 case studies. *Asia Pacific Journal of Developmental Differences.* 8(2) 190-217 Available at: https://das.org.sg/images/publications/apjdd/VOL8NO2/APJDD-8-2-YONG.pdf (Accessed: 19 September 2023)
- Tay, L. Y., Lee, S.-S., & Ramachandran, K. (2021). Implementation of online home-based learning and students' engagement during the COVID-19 pandemic: A case study of singapore mathematics teachers. *The Asia-Pacific Education Researcher, 30*(3), 299–310. Available at: https://doi.org/10.1007/s40299-021-00572-y (Accessed: 11 October 2022)
- Torgesen, J. K. (2006). Recent Discoveries from Research on Remedial Interventions for Children with Dyslexia. In M. Snowling & C. Hulme (Eds.). *The Science of Reading: A Handbook.* Oxford: Blackwell Publishers
- Torgesen, J. K., Alexander, A. W., Wagner, R. K., Rashotte, C. A., Voeller, K. K., & Conway, T. (2001). Intensive remedial instruction for children with severe reading disabilities. *Journal of Learning Disabilities, 34*(1), 33–58. Available at: https://pubmed.ncbi.nlm.nih.gov/15497271/ (Accessed: 1 August 2023)
- Wang, Q., & Huang, C. (2018). Pedagogical, social and technical designs of a blended synchronous learning environment. *British Journal of Educational Technology, 49*(3), 451–462. Available at: https://doi.org/10.1111/bjet.12558 (Accessed: 7 October 2022)
- Wang, Q., Huang, C., & Quek, C. L. (2018). 'Students' perspectives on the design and implementation of a blended synchronous learning environment. *Australasian Journal of Educational Technology, 34*(1), 1–13. Available at: https://repository.nie.edu.sg/ handle/10497/19789 (Accessed: 8 October 2022)
- Wang, Q., Quek, C. L., & Hu, X. (2017). Designing and improving a blended synchronous learning environment: An educational design research. *The International Review of Research in Open and Distributed Learning*, 18(3). Available at: https://doi.org/10.19173/ irrodl.v18i3.3034 (Accessed: 7 October 2022)
- WHO COVID-19 Dashboard, (2024). [online] *Geneva: World Health Organization.* Available at: https://COVID19.who.int/ (Accessed: 22 March 2023)
- Woodfine, B. P., Nunes, M. B., & Wright, D. J. (2008). Text-based synchronous e-learning and dyslexia: Not necessarily the perfect match! *Computers & Education, 50*(3), 703–717. Available at: https://www.sciencedirect.com/science/article/pii/S0360131506001217 (Accessed: 9 October 2022)
- Yang, J., Yu, H., & Chen, N. (2019). Using blended synchronous classroom approach to promote learning performance in rural area. *Computers & Description (Accessed: 3 August 2023)* www.sciencedirect.com/science/article/pii/S0360131519301721 (Accessed: 3 August 2023)
- Yin, R. K. (2011). Qualitative research from start to finish. New York, NY: The Guilford Press.

- Yin, R. K. (2008). Case study research: Design and methods (4th ed.). SAGE.
- Young, J. C., Rose, D. C., Mumby, H. S., Benitez-Capistros, F., Derrick, C. J., Finch, T., Garcia, C., Home, C., Marwaha, E., Morgans, C., & Parkinson, S., (2018). A methodological guide to using and reporting on interviews in conservation science research. *Methods in Ecology and Evolution, 9*(1), 10-19. Available at: https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/2041-210X.12828 (Accessed: 26 April 2023)
- Zydney, J. M., McKimm, P., Lindberg, R., & Schmidt, M. (2019). Here or there instruction: Lessons learned in implementing innovative approaches to blended synchronous learning. *TechTrends*, 63(2), 123–132. Available at: https://link.springer.com/article/10.1007/s11528-018-0344-z (Accessed: 13 Oct 2022)
- Zydney, J. M., Warner, Z., & Angelone, L. (2020). Learning through experience: Using design based research to redesign protocols for blended synchronous learning environments. Computers & Education, 143, 103678. Available at: https://doi.org/10.1016/j.compedu.2019.103678 (Accessed: 7 October 2022)

# **APPENDIX—INTERVIEW QUESTIONS**

NO	INTERVIEW QUESTIONS
1	Please share your teaching background.
2	Share with me some preparations required to plan and deliver a dual-mode class?
3	Share with me some resources or tools that you used for dyslexic learners and why?  A. Which tools or resources were effective or not effective?
4	How did you adapt your lesson materials or lesson delivery to cater to the learning needs of dyslexic learners?  A. Application of Orton-Gillingham principles
5	How has the teaching and learning process been impacted by dual-mode teaching?  A. Students' ability to fully participate in a dual mode class
6	Share with me some significant areas of challenges that you or your students faced in a dual-mode class?  A. How did you address these challenges?
7	Share with me your students' motivation and engagement level during a dual- mode class
8	In your opinion, what strategies are key for implementing a successful dual-mode class?
9	Tell me about your learning experiences from adopting dual-mode teaching in the classrooms.  A. Share your perceived advantages or disadvantages of dual-mode teaching based on your own experiences
10	How can the implementation of dual-mode teaching be improved for future practices?
11	Would you like to share anything else about dual-mode teaching before we end the interview?

Asia Pacific Journal of Developmental Differences Vol. 11, No. 1, July 2024, pp. 99—121

DOI: 10.3850/S2345734124001990



# The impact of social-emotional competencies on drama students with dyslexia during the pandemic

Muzdalifah Hamzah<sup>1\*</sup> and Amrit Kaur Gill<sup>1</sup>

1. Dyslexia Association of Singapore

#### **Abstract**

During the pandemic, many children around the world were affected by school closures and the suspension of outdoor activities. There are articles reporting the worsening emotional state of children due to many reasons that are linked back to the pandemic. In addition, some research mentioned that children with SpLD were hard hit by the pandemic when compared to their non-SpLD peers in mainstream schools. The research aims to discover the impact of the COVID-19 crisis on students with learning difficulties in the Speech and Drama Arts (SDA) programme in the Dyslexia Association of Singapore (DAS) by exploring the fluctuating children's SEL survey results and the possibility of drama taught online being the protective outlet for children during this challenging period. The results indicate that the majority of students diagnosed with dyslexia encountered challenges with online learning within mainstream school settings. Nonetheless, the research determined that despite exhibiting a decline in their social-emotional scores due to the pandemic, these students showed favourable experiences while engaging in drama lessons via online platforms. Thus, while they encountered challenges in their school's online learning environments, they found enjoyment and satisfaction in the online delivery of drama education.

Keywords: dyslexia, social-emotional competencies, drama, online learning

Muzdalifah Hamzahı, Programme Manager Speech & Drama Arts &Lead Educational Therapist, Dyslexia Association of Singapore Email: Muzdalifah@das.org.sg

<sup>\*</sup> Correspondence to:

100 M. Hamzah & A. K. Gill

#### INTRODUCTION

Social-emotional competency is becoming increasingly important in the ever-changing educational landscape, especially for students who struggle with dyslexia. It can be defined as knowing how to comprehend and regulate one's own emotions, skillfully interpret and react to the emotions of others, cultivate constructive connections with peers, make well-informed decisions, and adeptly navigate conflicts (Faupel, 2003; Joronen et al., 2011; Darling-Churchill and Lippman, 2016).

Due to the significant changes that the COVID-19 pandemic has brought about in the educational system, economic structures, and societal norms, numerous researchers worldwide have documented the relationship between the pandemic and students' social-emotional health. The pandemic produced conflicting emotions among children, for example, feeling scared, nervous, sad and bored, but they also felt safe and happy with their families (Idoiaga et al., 2020; Soriano-Ferrer et al., 2021; Watts, & Pattnaik, 2023)

In the wake of the pandemic, schools around the world focused their efforts on facilitating a rapid shift to an uncharted realm of online education and assessments. This move had its perceived benefits, such as enhancing students' familiarity with technologies and e-learning tools, allowing students to watch playbacks and access recorded materials, strengthening self-discipline and bolstering self-esteem and challenges such as mixed media and visual readability presented in e-learning platforms, for all students, even more so for students with dyslexia.

According to Li (2022), this shift yielded perceived advantages, including the enhancement of students' proficiency with technological resources and elearning platforms, enabling access to recorded materials and playback features, fostering self-discipline, and enhancing self-esteem. However, perceived challenges such as technical problems, physical and emotional state when attending online classes, those related to the presence of mixed media, and issues of visual readability within elearning platforms were encountered, posing significant hurdles for students, particularly those with dyslexia (Gürbüz, 2021; Tay & Asmuri, 2021, Li, 2022).

This paper investigates the effects of the COVID-19 pandemic on students with dyslexia enrolled in the Speech and Drama Arts (SDA) program by examining the results of the student's Pupil Checklist from Southampton Emotional and Literacy Scale (SELS) and the data gathered from the interviews with student participants. It also assessed the potential of online drama lessons as a protective mechanism for children amidst this challenging period.

### LITERATURE REVIEW

The pandemic has had a big impact on the lives and social-emotional experiences of students (Hamilton & Gross, 2021). In March 2020, the world was hit by the COVID-19 pandemic. Schools were unexpectedly shut down, and social activities came to a halt. Educators and schools had to unexpectedly find ways to meet the needs of the students. Students from lower socioeconomic backgrounds faced the most difficulties with remote learning, this was projected in the measure of their academic progress (Kuhfeld et al., 2020; Tay & Asmuri, 2021; Li, 2022). In addition to being excluded from hands-on learning, in-person discussions, and collaborative learning, students were unable to communicate with their teachers and peers. Simultaneously, many students were also dealing with other personal issues, such as mental health issues, space constraints and family financial difficulties (Ogurlu, et al.,2020; Ramirez, et al.,2021). On the other hand, some students thrived during the pandemic as they did not have to face peer pressure or bullying, whereas another group of students enjoyed spending more time with their families and bonded well, boosting their sense of security (Hamilton & Gross, 2021; Idoiaga et al., 2020; Soriano-Ferrer et al., 2021; Watts & Pattnaik, 2023).

# Dyslexic Learners and the Social-Emotional Impact

The International Dyslexia Association (2023) defines dyslexia as:

" a specific learning disability that is neurobiological in origin. It is characterised 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 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."

As dyslexia is a condition that affects the reading, spelling and writing abilities of a person (Everatt et al., 2008; Marzocchi et al., 2009; Thomson, 2009, Soriano-Ferrer et al., 2021), most times, the social and emotional ramifications of dyslexic learners are not regarded as primary attributes of the condition. Ever since COVID-19 hit the world, there has been extensive literature on dyslexia and its social-emotional impact.

Researchers have noted that certain children diagnosed with dyslexia exhibit subpar social-emotional development attributed to their experiences with personal setbacks, particularly within academic realms (Casserly, 2013; Antonelli et al., 2014). It's widely acknowledged that academic struggles significantly contribute to this phenomenon. Interestingly, even fundamental aspects such as forming and maintaining friendships can impact this facet of development. These findings have remained relevant, albeit much

102 M. Hamzah & A. K. Gill

worse, throughout the pandemic. Recent studies indicate that the pandemic has been associated with heightened rates of mental health challenges, including anxiety and depression, as well as difficulties in emotional regulation, behaviour, and interpersonal relationships, which also align with studies in the same period involving children who do not have learning differences (Idoiaga et al., 2020; Soriano-Ferrer et al., 2021; Ramirez et al., 2021; Brow, 2023).

Sako (2016) mentioned that one of the most commonly missed areas in individuals with dyslexia is the social-emotional aspect. Educators often prioritise assessing and teaching children in areas like reading, spelling, and writing due to the tangible outcomes and observable errors. However, this focus may overlook crucial aspects such as self-awareness and motivation, which are pivotal for holistic development. Research indicates that schools can effectively instil social-emotional learning competencies in students. Integrating components of drama pedagogy, such as tableaux, role-play, and improvisation, is essential for implementing effective social-emotional learning intervention programs. (Ebert et al., 2015).

Goleman identified that emotional intelligence holds equal significance to cognitive abilities and may be strengthened and developed (Hamzah, 2019; Brow, 2023). His theoretical framework presented five fundamental factors of emotional intelligence, which are classified into two overarching domains: Personal Competence and Social Competence. Within Personal Competence, self-awareness, self-regulation, and motivation are encompassed, whereas empathy and social skills are encompassed within Social Competence.

#### **Self-Awareness**

Dyslexia is a learning difficulty, which affects spelling, reading and writing skills (Snowling, 2020). With this learning difficulty, it may affect an individual's academic ability such as solving math problems sums, reading between the lines in comprehension passages and writing a narrative essay. This learning disability may interfere with social-emotional development (Rahmawati et al., 2019). Self-awareness is the capability to recognise emotions and distinctive urges, and their influence on individuals (Goleman, 2011). Therefore, there is a need to increase self-awareness in children with dyslexia to improve their social-emotional development.

In a study by Rahmawati et al., (2019), a technology was developed to help children with dyslexia increase their self-awareness. The study develops CISELexia (Computer-Based Method for Improving Self-awareness in Children with Dyslexia) technology, which utilises a gamification approach that caters to children with dyslexia. The study was carried out on five children diagnosed with dyslexia, with an age range of 7-13 years old. A pre-test was conducted on self-awareness capability before using the CISELexia system and a post-test was conducted on self-awareness capability after using the CISELexia system.

Based on the findings, it was derived that the data showed an increase in self-awareness in children with dyslexia, the results showed an increased mean score of self-awareness of about 10%. With this result, it shows that children with dyslexia do have the motivation to improve themselves and the potential to increase their self-awareness.

## **Self-Regulation**

Executive function allows self-regulation and the enactment of focusing on the desired goals and ignoring distractions, using and coordinating various cognitive processes over time (Smith et al., 2016). It includes a superior level of cognitive capacity such as selfmonitoring, thinking through verbal responses, problem-solving, and retrieving information from long-term memory in a direct and adaptable way (Miyake et al., 2012). Executive functioning (EF) deficits are seen in children with dyslexia (Smith-Spark et al., 2016). The executive function deficits in children with dyslexia were investigated in a study by Akyurek and Bumin (2019), which sampled 158 dyslexic children and 167 children without learning disabilities. The results showed that children with dyslexia had more issues with executive functions and were falling behind their peers in this area. When comparing both sets of scores from the two different groups, the average score of the executive functions of children diagnosed with dyslexia in terms of inhibition, emotional control, initiation, working memory and self-monitoring appeared to be particularly low and the differences between both groups were significant in statistics. In terms of self-control in emotions, children with dyslexia tend to be adversely affected as compared to typical children with no learning disabilities. Executive functions such as self-regulation do play an important part in a child's life, it is necessary to assess executive functions for the development of programs to help our children with dyslexia (Akyurek & Bumin, 2019).

## Motivation

From the early stage of education, children with dyslexia often experience failures in several areas, due to their struggles (Lowdygowska, 2017). They are unable to meet the academic requirements or meet their goals in other developmental milestones, hence facing disappointments at an early age (Bajaj & Bhatia, 2019). Children with dyslexia may struggle with reading, writing and spelling (Barnett, Connelly & Miller, 2020). Since spelling, reading and writing encompass the core dimensions of subjects at schools, they may struggle in examinations, leading to failure for some. As a result, a child may feel that he or she cannot succeed and may perceive him or herself negatively (Livingston, Siegel & Ribary, 2018). The situations and challenges presented to the child and how he or she perceives himself or herself influence the motivation to take action or avoid the situation (Lowdygowska, 2017). According to Bandura's social cognitive theory (2021), it anticipates that internal and external reinforcements affect an individual's motivation (Bandura, 2012). External reinforcements (e.g. environment) and attaining favourable outcomes of one's actions (e.g. obtaining a desired score, achieving a set goal etc.)

can have an impact on forming and reinforcing motivation in replicating similar behaviours (Bandura, 2012). In Internal reinforcements, the child then gains the belief that he or she can reach the set goals and this understanding provides fulfilment, thus motivating him or her to take the same steps in the future (Lowdygowska, 2017).

On the other hand, experiencing failure can cause an individual to feel negative about one's self (Livingston, Siegel & Ribary, 2018). Children with dyslexia often experience setbacks from an early age in school, thus creating negative emotions (Gibby-Leversuch, Hartwel & Wright, 2021). Hence, they may start to identify school events with negative consequences, thus making them anxious and hampering their ability to conquer difficulties induced by a lack of motivation (Kim & Lorsbach, 2005). In a study by Polychroni, Koukoura, & Anagnostou (2006), which aims to explore motivation for students with dyslexia as compared to their peers, it was found that children with dyslexia who experienced failures at educational institutions begin to doubt their potential to learn, which leads to their motivation being strongly affected.

## **Empathy**

In addition to literacy difficulties, students with dyslexia often face social-emotional difficulties, such as affective symptoms that occur in non-academic settings (Carroll & Iles, 2006). Affective symptoms may present impairment of fundamental systems that induce emotions (Etkin, 2010). Emotions do play a part in influencing an individual's actions and behaviour (Levenson, 2003).

Individuals with dyslexia display inactivity in the left lateralised language systems, however, inactiveness in one part of the brain can accompanied by prominent activeness in the right hemisphere of the brain, where emotional sensitivity is heightened in individuals with dyslexia Palser et al., 2021). In a study conducted by Sturm et al., (2021), emotional reactivity was measured in 32 children with dyslexia and 22 without dyslexia, ages 7-12, where they were asked to watch emotion-inducing films and underwent magnetic resonance imaging. Children with dyslexia showed prominent reactions in emotional facial behaviour, respiration rate and skin conductance as compared to those without dyslexia. Prominent emotional facial behaviour in children with dyslexia may relate to negative symptoms of mental health such as depression and anxiety, but also be associated with greater interpersonal skills (Sturm et al., 2021). Interpersonal skills may constitute an area of resilience and strength in children with dyslexia, if developed, it may aid in cushioning individuals with dyslexia from the probable disadvantage of their learning differences (Haft, Myers, & Hoeft, 2016).

In a study by Palser et al., (2021), 24 children with dyslexia and 24 children without dyslexia, ages between 7-12, were tasked to watch an empathy-based film, where the autonomic nervous system activity was measured both during film viewing and at rest. It was found that the cardiac deceleration during the empathy film-based task was

significantly higher in those with dyslexia. Individuals with dyslexia exhibited increased facial expressions of concentration during the film-based empathy task as compared to those without dyslexia. Children with and without dyslexia were able to recognise the emotions in the films, however, children with dyslexia had lower word consciousness as compared to those without dyslexia. The results suggest that activity in the resting parasympathetic nervous system and reactions to others' emotions are elevated in dyslexia.

#### The role of drama in social-emotional development

The use of drama can also be a crucial tool for aiding children with dyslexia to increase their self-awareness. According to Davidson (2012), people have varied emotional styles and these styles can be altered, shaped and shifted by using mindfulness exercises. Mindfulness exercises can modify brain patterns that encompass an individual's emotional approach, and which can enhance one's determination and self-awareness (Davidson, 2012). Drama is a multimodal form of pedagogy that engages students at different levels of entry (Winston, 2012). A multimodal format integrating visual, auditory, verbal, and kinesthetic elements enhances students' ability to deeply internalise a learning encounter. Drama, serving as a multimodal approach, uses props, bodily gestures, facial expressions, sounds, and visuals in conjunction with language to communicate concepts. Through engaging in dramatic activities, students are given the chance to derive significance not solely from verbal cues but also from the environmental setting intertwined with visual and auditory prompts.

Drama methods do play a role in mindfulness, they not only encompass visualising ideas in their minds but also create moments for individuals to express the ideas formed in their brains with the use of their bodies and movements (Van de Water, 2021). A relationship with drama, from a young age, could potentially affect people's emotional style (Van de Water, 2021).

Given the potential that drama lessons can offer, the Dyslexia Association of Singapore (DAS) has a drama program for the same reason. The Speech and Drama Arts (SDA) programme aims to transform students into confident communicators, as well as to empower them to be inquisitive and compassionate individuals. The programme's main objectives are to build language skills, social-emotional skills, drama skills and critical thinking skills. While developing the main objectives, it is evident that many of the drama activities conducted in SDA classes serve to improve a child's motivation, self-awareness, self-regulation, and empathy. For example, in the SDA curriculum, hot-seating is used to help deepen our students' understanding of the characters and motives. In this activity, it requires the student to put him or her in the character's shoes and to be questioned of the choices made in the story. Therefore, it requires students to think and explore various outcomes, experiences and perspectives, hence building on their empathy and self-awareness. In SDA classes, group work is central to the lessons, with many activities

requiring students to collaborate to achieve a common objective. Consequently, students learn to function effectively in a group, regulate their responses, and enhance their motivation within a team environment.

During the pandemic, drama classes were not excluded from the online delivery wagon. Learning is social, very much so in a drama class. Many drama teachers struggled to transform many drama elements, including teaching methods and techniques into online education (Gürbüz, 2021; Karaosmanoglu, 2022). The reason for this is that in-person activities do not translate well in an online environment. However, the Speech and Drama Arts (SDA) team in the Dyslexia Association of Singapore (DAS) had many discussions on whether online drama classes and virtual performances were feasible. SDA's curricula were first reviewed, then followed by adapting drama activities to digital platforms, and modifying those that can be carried out by students independently at home. Among the games that were modified were "Simon Says," "Rock Paper Scissors," and "Guess Who Am I?" These activities helped students focus and improve their listening comprehension while also adding fun to their online learning experience. By engaging in activities like "Rock Paper Scissors," "Simon Says," and "Guess Who Am I," students were not only building on their quick thinking and problem-solving skills but also developing their self-regulation, self-awareness, empathy, and motivation. In games like "Rock Paper Scissors" and "Simon Says," the need for quick decision-making provided a platform for students to practise managing their emotions and behavior, especially when faced with challenges, hence working on their self-regulation. By openly discussing emotions in these contexts, students were able to develop a deeper understanding of empathy by learning how to relate to one another. Similarly, "Guess Who Am I" fostered a sense of self-awareness and motivation among students as they worked together to help their classmates succeed. Overall, these games are examples that aided in creating an enriching learning environment where students developed their social-emotional learning skills

During the pandemic, students may experience a sense of longing for their friends, educators, and the communal atmosphere, potentially impacting their social-emotional competencies. With the SDA curriculum, social-emotional learning serves as a significant element in the lessons. Online SDA classes integrate various aspects of social-emotional learning; for instance, establishing routines is seamlessly transitioned into the virtual setting, and educators consistently cultivate a supportive environment by regularly checking in with students regarding their well-being. Most importantly, all students are provided ample opportunities to interact with one another during the online classes. With pieces of literature on the social-emotional condition of students during the pandemic and drama as a tool to build social-emotional skills, the SDA teachers embarked on this study to unravel the impact this disruption has had on drama students with dyslexia.

#### **METHODOLOGY**

This research employed both qualitative and quantitative research methodologies. Results of pre-tests and post-tests of the Southampton Emotional Literacy Scale (SELS) Pupil Checklist for age 7 - 11 years old (Faupel, 2003) were analysed, followed by interviews with each participant. The interview questions were based on their experience and recollection of the lockdown, attending drama class online and their experience performing virtual showcases during the pandemic.

#### **Research Question**

This study sought to answer the research question: What is the impact of the COVID-19 pandemic on the social-emotional competency of students with dyslexia in the Speech and Drama Arts programme?

#### **Ethics Protocol**

The proposal for this study was accepted by the research committee and this study complied with the ethical protocols set by DAS where the study was conducted. Once the participants were identified, their parents were briefed over either a phone call or a WhatsApp message on the nature of the study. This was followed by a hard copy of the Study Information Sheet given to parents, to seek written consent. The research objectives and procedures were mentioned and matters about consent, anonymity, confidentiality and the right to withdraw were explicitly addressed.

## **Participants**

They were selected from among students with dyslexia who attended the Speech and Drama Arts programme (SDA) in Dyslexia Association of Singapore (DAS) learning centres located at Bedok and Bishan. Like students worldwide during the pandemic, SDA students attended drama classes online. In total, these selected SDA students attended 23 online dama classes from March 2020 to Oct 2021. There were staggered returns to the classroom in between those periods as the government closely monitored the COVID-19 situation. As students transitioned in and out between 2020 and 2021, seven students aged 9 to 11 met the requirement of participating in the program since the onset of the 2020 lockdown, engaging in both online and in-person classes throughout 2020 and 2021.

## **Data Collection**

When the school closure happened in 2020, there were so many changes as we transitioned to conducting classes online. Like other educators during the COVID-19 pandemic, teaching online was something new .SDA teachers were unable to collect any

data when they began teaching online. The data was collected at the beginning of 2021 for the pre-test when online classes had started a few months prior. It was collected once again in 2022 for the post-test.

#### **Procedure**

## The Southampton Emotional Literacy Scale (SELS)

The Southampton Psychology Service created the SELS checklists by thoughtfully adapting American psychologist, Goleman's classification of abilities and skills that are pertinent and will support children's social and emotional growth. The domains covered in SELS are Personal Competence (motivation, self-awareness and self-regulation) and Social Competence (empathy and social skills).

For this research, only the Pupil Checklist was used. This checklist comprises 25 items that evaluate students' emotional literacy based on the opinions of the individuals themselves. When administering the checklist, researchers will ensure that the participants understand how to complete the checklist by going through the example on the form before they start. Participants will complete the checklist independently once they understand how to fill it up. Each participant's emotional literacy score will be tabulated with the use of the scoring key for each item in the checklist. A higher score indicates better emotional literacy.

## **Student Perspective Interview**

In addition to the SELS Pupil Checklist, the participants were interviewed between May and July 2023. The interviews provided insight into the students' perspectives on the pandemic, the online drama lesson and any challenges they faced during that period. The researchers chose to use a semi-structured interview style because it gave them the opportunity to ask follow-up questions, seek additional information, or simply express interest in what they were saying. It also gives the participants the freedom to express their views on their own terms. The semi-structured interview was in three main parts: first, the child's overall experience during lockdown in Singapore; second, the child's overall experience of online learning (school) and thirdly, the child's perspective of attending drama lessons online. The interview for each participant was scheduled 30 minutes before or after SDA class, depending on both parties' availability.

#### Interview Questions:

## Part 1: Your experience during the lockdown

Do you remember what it was like when there was a lockdown in Singapore? Yes/No If yes, can you describe it to me and how do you feel about it?

## Part 2: Your experience with online learning (school work)

Generally, how do you find online learning for school work?

## Part 3: Your experience attending drama lessons online

- Do you remember attending drama lessons online? Yes/ No
- If yes, can you describe it to me?
- Did you feel connected with your teacher and friends during online learning?
- What challenges did you face when attending drama online lessons?
- Do you prefer physical or online drama lessons? Why?

The interview data was transcribed verbatim. The data analysis focussed on an ecological perspective, such as online learning and emotional association with the changes that were brought about by COVID-19 that might mediate the child's experiences.

#### **RESULTS**

Both the pre-test and post-test results of the SELS Pupil Checklist were tabulated and analysed to evaluate if the disruptions to classes caused by COVID-19 had an impact on SDA students. See Figure 1.

The 7 students who participated in this study are identified in the data with this label in the chart accordingly; \$1 (Student 1), \$2 (Student 2), \$3 (Student 3), \$4 (Student 4), \$5 (Student 5), \$6 (Student 6) and \$7 (Student 7). In this group, \$5 students showed a decline in their post-test scores. These results are expected, as many recent studies have reported students' social-emotional aspects deteriorated due to the pandemic and the disruptions that it brought along, for example, less social interaction, lack of support from teachers and less motivation (Soriano-Ferrer, 2021, Tay & Asmuri, 2021; Li, 2022). The 7 students who participated in this study are identified in the data with this label in the chart accordingly; \$1 (Student 1), \$2 (Student 2), \$3 (Student 3), \$4 (Student 4), \$5 (Student 5), \$6 (Student 6) and \$7 (Student 7). In this group, \$5 students showed a decline in their post-test scores. These results are expected, as many recent studies have reported students' social-emotional aspects deteriorated due to the pandemic and the disruptions that it brought along, for example, less social interaction, lack of support from teachers and less motivation (Soriano-Ferrer, 2021, Tay & Asmuri, 2021; Li, 2022).

An intriguing observation arises from the post-test results indicating improvement for Students 5 and 6. This suggests the potential for enhanced emotional literacy scores among students amidst the pandemic context, particularly in the context of participating in online drama classes. Some students thrived during the pandemic as they did not have to face peer pressure or bullying, whereas another group of students enjoyed

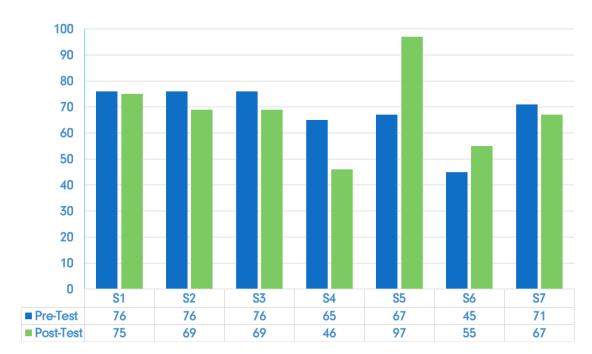


Figure 1. SELS Pupil Checklist Pre-Test and Post Test Results

spending more time with their families and bonded well, boosting their sense of security (Hamilton and Gross, 2021) and online drama lessons could increase interest and motivation ((Gürbüz, 2021).

In a similar study by Hamzah (2019) using the Southampton Emotional Literacy Scale (SELS) to explore the effectiveness of drama as a tool to build social-emotional development in children with dyslexia. It should be noted that one of the authors of the current research was involved and employed the same intervention method. In the study conducted in 2019, 6 drama students with dyslexia, between the ages of 7-11, completed the Pupil Checklist from the Southampton Emotional Literacy Scale (SELS).

The checklists were given to students at the beginning of Term 1 2016 and these scores will be recorded as pre-test scores. Then, the students had to complete the same checklist at the end of Term 4 in the same year, and this time the scores were recorded as post-test scores. The findings showed an improvement in emotional literacy scores after attending the drama programme for one year; with the difference between the pre-test and post-test average scores of 13.67 points and it is equated to a 20.45% leap in the Pupil Checklist. This result was derived in 2017, when students did not face any global circumstances, such as the pandemic that occurred in 2020. Using the same programme and the assessment methodology, the results suggest the pandemic exerted an adverse impact on the social-emotional competencies of students with dyslexia.

The quantitative findings presented are corroborated by qualitative evidence obtained from student interviews, which is imperative for examining whether the fluctuations in emotional literacy scores are associated with the online drama learning environment.

The interviews conducted with student participants yielded significant insights into their perspectives and emotions regarding the pandemic, online learning in educational settings, and SDA drama classes. Subsequent paragraphs categorise the interview responses into positive and negative perspectives for detailed examination.

## Part 1 Your experience during the lockdown

In Table 1, 6 out of 7 students remembered there was a lockdown in Singapore. Many felt comfortable and content during the lockdown as they didn't have to go to school. Only 1 student out of 7 mentioned that he felt worried and scared of the pandemic. Student 5 linked his experience to spending time with home-based learning given by school.

Table 1: Experience During Lockdown

Themes	Code	Notes and examples	
Emotions	Е	Feelings during the COVID-19 lockdown	
Positive emotions	E+	S2: Liked staying at home, S3: Felt happy as I didn't have to wake up early to go to school. S5: relaxed S7: It was okay	
Negative emotions	E-	S1: felt worried, scared	
Experience	Ex	Experiences during the COVID-19 lockdown	
Positive	Ex+	S2: I could play with my toys and play with my sister. I helped my mummy with cooking S3:as I didn't have to wake up early to go to school. S7: I didn't have to wake up to go to school and stuff.	
Negative	Ex-	S1: we couldn't buy food and see anyone. S5: sadly I had to do Home-Based Learning (HBL) at home. It was annoying me.	

## Part 2 Your experience with online learning (school work)

In Table 2, 3 out of 7 students felt positive about online learning. These 3 students mentioned that they were unable to understand the concepts taught online. However, one student out of the seven had mixed outcomes in regards to online learning, the student felt that he was able to learn online but could not follow through during some of the lessons. Whereas another 3 students had negative experiences with online learning as they felt lost and were often distracted or bored.

Table 2: Experience with online learning (school work)

Themes	Code	Notes and examples	
Lesson Content	LC	Student able to understand content taught online	
Positive Lesson Content	LC+	S1: I was able to understand what was being taught online. S2: I was able to learn online, but	
Negative Lesson Content	LC-	S3: I had no idea what was going on in Chinese (lesson). S5: Boring.	
Application	Α	Ability to follow through and apply what you have learned	
Positive Application	A+	NIL	
Negative Application  A-  S2:but I wasn't able to follow through with the lessons at time S7: you get distracted by the games that you are playing.			

## Part 3 Your experience attending drama lessons online

In terms of drama lessons conducted at the DAS, all 7 students experienced positive experiences, many mentioned that they enjoyed playing games and doing the activities online. See Table 3, below. However, 1 out of the 7 students mentioned that the home environment might have been a distraction as he couldn't follow through with writing activities and would often forget the instructions given. In terms of social connections during online drama lessons, 5 out of 7 students experienced positive feelings, many were happy to see their peers and interact with them online. On the other hand, 2 out of 7 students felt otherwise, they often felt disturbed by their friends talking and felt online learning lacked physical activities, a platform where they could connect with their peers. In terms of the technical side, 4 out of 7 students did not face any issues in regards to the platform used. On the other hand, 3 out of 7 students faced technical difficulties, such

as internet connectivity issues, space constraints and unfamiliarity on how to use the platform. In general, most of the students prefer to attend in-person drama classes.

Table 3: Experience Attending Drama Lessons Online

Themes	Codes	Notes and examples	
Experience drama online	ExD	Students' experiences	
Positive	ExD+	S1-Playing games, performing online and learning new words. S2-I remembered playing I spy with my little eye. I also remembered playing a lot of games. I remembered performing online and learning the lines online. I used my own microphone to perform. S3-Moving about. Don't have to go out. Can sleep in. S4- I saw my teacher and my friends online. I don't remember anything else. S5- It was fun. Because I was acting myself and I just stayed home. We learned our lines and said it out online. S6- There were google slides and we played games where we could play online or at home. S7- Played games.	
Negative	ExD-	S1 -Sometimes I forget the instructions. I cannot follow, especially in the writing part. Getting distracted by siblings at home.	
Social Connection	SC	Students' perspective on being connected during online drama class.	
Positive	S1-Focusing on what the teacher was saying and listening to whom my friends were saying. Sometimes Student B would help me online. I also enjoyed playing the games. I also performed onlines S2-I enjoyed talking to everybody online. I enjoyed seeing my friends and teacher. I also enjoyed playing with my friends onlines S4-I felt connected. I liked seeing my teacher.  S5-I felt connected to my friends. Student B makes me laugh. The lessons were fun.		
Negative	SC- S3- Student A kept on talking. S7-No. Because it is boring as there is a lack of physical activity.		

Table 3: Experience Attending Drama Lessons Online (Cont)

Themes	Codes	Notes and examples		
Technology	Т	Platform / Hardware		
Positive	T+	S4- I didn't face any issues. S5-No challenges. S6- No, because I fixed my wifi before going online.		
Negative	T-	S2-I accidentally clicked on the wrong buttons, like muting myself. Also, sometimes I don't know who was talking and a bit noisy with the background noises.  S3-Internet lagged. Shouting at my siblings: asking them to keep quiet. Lesser space.  S7-Trying to log in. Sometimes trying to understand as the internet is lagging.		
Drama Lesson Delivery	DD	Notes and examples		
In-Person	DDIP	S1 -Physical. I can learn more drama stuff in person, easier to learn to pronounce words and enjoy seeing my friends. S2- Physical. I can play more here. Easier for me to learn about the talking sounds, pronunciation and long words. With the paper, I can learn how to pronounce. Can try my best. Performance: easier for me to learn in person and I enjoy going on stage. S4 - Physical. I prefer to go out. S5- Physical. So that I can interact with my friends and just be cool there. S6- Physical. Because I want to see my teacher and friends. S7- Physical. Because I can move around and talk with my friends.		
Online Class	DDO	S3- Online. Don't have to go in the sun. But I couldn't benefit as compared to physical lessons, for example, grandma footsteps game. I benefited more from physical but I still preferred online class.		

#### DISCUSSION

The current study sought to evaluate the impact of social-emotional competencies on drama students with dyslexia during the pandemic. The research findings revealed that some drama students with dyslexia encountered heightened uncertainty as they grappled with challenges of online learning, compounded by external factors like the COVID-19 and the home environment. Prior studies have generally noted negative impacts of the COVID-19 on overall socio-emotional and educational well-being of students with dyslexia and also consistent with students with no learning differences (Idoiaga et al., 2020; Soriano-Ferrer et al., 2021). There were not many responses gathered from the interview with S4 that could support the significant drop in the post-test score. It was noted that S4 remembered attending online drama lessons, saw familiar faces online, felt connected and mentioned preferred to attend in-person drama classes.

Conversely, the post-test results indicated that two students flourished amidst the pandemic, effectively transitioning to remote learning settings and experiencing enhanced emotional literacy level. During the COVID-19 pandemic, numerous students globally faced perceived risks and life stressors. However, in this study, students with dyslexia who thrived amidst these challenges could have potentially demonstrated socioemotional resilience by adeptly reframing and effectively responding to adversity (Marks et al., 2022). In addition to the interview responses mentioned below, a significant post-test score for S5 could be attributed to the individual's socio-emotional resilience in dealing with the COVID-19 and learning online.

Extracts from the interview with S5:

- 1. Feelings during the COVID-19 lockdown "relaxed"
- Student's experience with drama lessons online "It was fun. Because I was acting myself and I just stayed home. We learned our lines and said it out online."
- 3. Social connection during online drama class "I felt connected with my friends. Student B makes me laugh. The lessons were fun."

During online drama classes, S5 appeared relaxed and calmed. He was determined to read his lines and participated well in all the activities. He interacted well with his classmates. This was unlike S5. In a classroom setting, he would say unkind words to his friends as he got it wrong when playing drama games. He would appear anxious and unsettled.

Many studies have shown that social-emotional competencies might mitigate the correlations between risk factors or adverse stressors and academic achievements (Mark et al., 2022). Therefore, building social-emotional skills is essential, especially so in students with dyslexia. Most students with dyslexia exhibit diminished social-emotional

development attributable to factors including personal encounters with setbacks, navigating external perceptions of their capabilities (maladaptive characteristics), and lacking adequate support from parents, educators and peers. Researchers suggest that children in this demographic stand to enhance their academic and life outcomes through a boosted self-perception (Humphrey, 2002). Consequently, it is imperative for them to receive adequate support (Eadon, 2005; Casserly, 2013).

As educators, ensuring the social-emotional needs of our students are met is crucial for their overall well-being and academic success. Apart from their parents, educators are the next group of adults that spend many hours together with the students at school. Numerous educators may overlook the significance of students' socio-emotional growth while prioritising the delivery of exam-focused content.

Educators have the capacity to impart social skills like communication, conflict resolution, empathy, and teamwork through explicit instruction. Utilising role-playing and cooperative learning methods within drama classes can prove to be efficacious in this regard. However, due to curriculum constraints, such endeavours may be deemed beyond the scope of the educators' instructional responsibilities. An alternative approach would be taking time to get to know each student individually to foster strong teacher-student relationship - pay attention to the emotional needs of students and provide them with support whenever required – validate their feelings, offer encouragement, and provide a safe space for them to express themselves. These could serve as pivotal foundations for nurturing social-emotional competencies within the classroom environment, whether it be in-person or online.

#### LIMITATIONS AND FUTURE RESEARCH

The present study is not without its limitations. The small sample size utilised in this research may limit the generalisability of the findings, as it may not accurately represent the entire population of drama students with dyslexia.

Additionally, the absence of insights gathered from parents poses a notable limitation. By neglecting to explore the parent-child relationship and parents' stress levels, crucial factors affecting students' Pupil Checklist scores may have been overlooked (Marchetti et al., 2020). Furthermore, incorporating the perspectives of parents on the impact of COVID -19 on their children's social-emotional well-being is imperative. By gaining insight into parental perspectives and home environments, researchers can develop a more comprehensive understanding of the challenges faced by students and their families during unprecedented times.

Data collection (pre-test) did not commence immediately following the onset of school closures in 2020. The late data collection may have impacted the baseline results, potentially obscuring the full extent of the benefits expected from the SEL portion of the

curriculum. Interviews were conducted several months after participants had returned to in-person classes in 2023, presenting challenges for researchers in contextualising the pandemic, school closures, and minimising potential influence on participant responses. Future research will require an effective data collection schedule to uphold the authenticity of findings.

In addition to the aforementioned points, future investigations could explore the dimensions of social-emotional resilience within the intricate dynamics involving dyslexia, social-emotional learning, and external stressors that potentially affect the social-emotional well-being of students.

## **CONCLUSION**

The present findings demonstrate that students' social-emotional competencies were impacted by the pandemic to a certain extent. It is pleasing to note from the interviews with the participants that the Speech and Drama Arts (SDA) programme was effective in bringing positive online drama learning experiences. All students enjoyed the adapted activities and some even thrived despite the challenges they faced during the period. During that time, teaching drama online required careful review of the curricula and activities to ensure suitability. The educators discussed and addressed any setbacks encountered, thereby allowing the Speech and Drama Arts (SDA) online drama classes to be implemented successfully. During times of global disruptions such as a pandemic, educators play an essential role in supporting students' social and emotional needs. Learning about the experiences and challenges faced by the students in this study confirms this. Despite the challenges posed by the pandemic, it provided us with an opportunity to learn and explore new things as students and educators.

#### **REFERENCES**

- Akyurek, G., & Bumin, G. (2019). An investigation of executive function in children with dyslexia. *Psychiatry and Behavioral Sciences, 9*(1-2), 10-17.
- Antonelli, L., Bilocca, S., Borg, D., Borg, S., Boxall, M., Briffa, L., Debono, C., Falzon, R., Farrugia, V., Gatt, L., Formosa, M., Mifsud, D., Mizzi, Scurfiled, L., Scurfield, M., & Vella, G. L. (2014)

  Drama, Performance Ethnography, and Self-esteem: Listening to Youngsters with Dyslexia and Their Parents. *Sage Open. 4*, 2, 2158244014534696.
- Aubret, A., Matignon, L., & Hassas, S. (2019). A survey on intrinsic motivation in reinforcement learning. arXiv preprint arXiv:1908.06976. https://doi.org/10.48550/arXiv.1908.06976
- Bajaj, D., & Bhatia, S. (2019). Psychosocial functioning in children with dyslexia: perspectives from parents, counsellors and teachers. *Disability, CBR & Inclusive Development, 30*(4), 49-76.
- Bandura, A. (2012). Going global with social cognitive theory: From prospect to paydirt. In *Applied psychology*, 53-79. Psychology Press.

Barnett, A. L., Connelly, V., & Miller, B. (2020). The interaction of reading, spelling, and handwriting difficulties with writing development. *Journal of learning disabilities*, *53*(2), 92-95.

- Brow, L. K. (2023). *Social and Emotional Learning Skills Following the COVID-19 Pandemic.* Johnson & Wales University.
- Caffo, E., Scandroglio, F., & Asta, L. (2020). Debate: COVID-19 and psychological well-being of children and adolescents in Italy. *Child and adolescent mental health, 25*(3), 167-168. https://doi.org/10.1111/camh.12405
- Carroll, J. M., & Iles, J. E. (2006). An assessment of anxiety levels in dyslexic students in higher education. *British journal of educational psychology*, *76*(3), 651-662.
- Casserly, A. M., (2013) The Socio-Emotional Needs of Children with Dyslexia in Different Educational Settings in Ireland. *Journal of Research in Special Educational Needs.* 13 (1), 79-91.
- Chia, S. M., Chang, S. Y. S., & Roy, C. S. (2022). Effects of nationwide lockdown and school closures during the COVID-19 pandemic on children's physical health and beyond. Singapore Medical Journal, 63(9), 548-551. https://doi.org/10.11622/smedj.2020172
- Darling-Churchill, K. E., & Lippman, L. (2016). Early childhood social and emotional development: Advancing the field of measurement. *Journal of Applied Developmental Psychology, 45*, 1-7. https://doi.org/10.1016/j.appdev.2016.02.00
- Davidson, R. J. (2012). The Emotional Life of Your Brain: How Its Unique Patterns Affect the Way You Think, Feel, and Live-and How You Can Change Them. Penguin.
- Ebert, M., Hoffmann, J. D., Ivcevic, Z., Phan, C., & Brackett, M. A. (2015). Teaching emotion and creativity skills through art: A workshop for children. *The International Journal of Creativity & Problem Solving*, 25(2), 23-35.
- Etkin, A. (2010). Functional neuroanatomy of anxiety: a neural circuit perspective. *Behavioral neurobiology of anxiety and its treatment, 25*1-277.
- Everatt, J., Weeks, S., & Brooks, P. (2008). Profiles of strengths and weaknesses in dyslexia and other learning difficulties. *Dyslexia*, *14*(1), 16-41.
- Faupel, A. (Ed.). (2003). *Emotional literacy: assessment and intervention: ages 11 to 16.* User's quide. GL Assessment.
- Gass, S. M., & Varonis, E. M. (1994). Input, interaction, and second language production. *Studies in second language acquisition*, 16(3), 283-302.
- Gibby-Leversuch, R., Hartwell, B. K., & Wright, S. (2021). Dyslexia, literacy difficulties and the self-perceptions of children and young people: A systematic review. *Current Psychology, 40*(11), 5595-5612.
- Giovagnoli, S., Mandolesi, L., Magri, S., Tossani, E., & Benassi, M. (2020). Internalizing symptoms in developmental dyslexia: A comparison between primary and secondary school. *Frontiers in psychology, 11*, 504662.
- Goleman, D. (2011). Emotional mastery. Leadership Excellence, 28(6), 12-13.
- Gürbüz, N. (2021). Teacher's and students' opinions on the use of drama method in distance education and Drama Activity proposals. *Shanlax International Journal of Education, 9*(S1-May), 126–133. https://doi.org/10.34293/education.v9is1-may.4008
- Haft, S. L., Myers, C. A., & Hoeft, F. (2016). Socio-emotional and cognitive resilience in children with reading disabilities. *Current opinion in behavioral sciences, 10,* 133-141.
- Hamilton, L., & Gross, B. (2021). How Has the Pandemic Affected Students' Social-Emotional Well-Being? A Review of the Evidence to Date. Center on Reinventing Public Education.

- Hamzah, M. (2019). An evaluation of the effectiveness of using drama as a tool to build social emotional development of children with dyslexia in Singapore. *Asia Pacific Journal of Developmental Differences, 6*(1), 127–149. https://doi.org/10.3850/s2345734119000222
- Hedeş, B. (2021). The Impact Of SARS Cov-2 Pandemic On Children's Behaviour In Society And Their Reintegration Through Drama Classes. *Colocvii teatrale*, (32), 135-148.
- Henderson, L. M., & Warmington, M. (2017). A sequence learning impairment in dyslexia? It depends on the task. *Research in Developmental Disabilities, 60,* 198-210.
- Huang, Y., He, M., Li, A., Lin, Y., Zhang, X., & Wu, K. "Personality, behavior characteristics, and life quality impact of children with dyslexia." International *Journal of Environmental Research and Public Health 17*, no. 4 (2020): 1415.
- lacobucci, G. (2022). COVID-19: Pandemic has disproportionately harmed children's mental health, report finds. *BMJ*. https://doi.org/10.1136/bmj.o430
- Idoiaga, N., Berasategi, N., Eiguren, A., & Picaza, M. (2020). Exploring children's social and emotional representations of the COVID-19 pandemic. *Frontiers in Psychology, 11*, 553612.
- International Dyslexia Association. (2023). Definition of Dyslexia. Retrieved November 28, 2023 from https://dyslexiaida.org/definition-of-dyslexia/
- Jiang, L., Alizadeh, F., & Cui, W. (2023, March). Effectiveness of drama-based intervention in improving mental health and well-being: A systematic review and meta-analysis during the COVID-19 pandemic and post-pandemic period. In *Healthcare*, 11,(6), 839. MDPI.
- Joronen, K., Hakamies, A., and Astedt-Kuki, P. (2011). Children's Experiences of a Drama Programme in a Social and Emotional Learning. *Scandinavian Journal of Caring Sciences, 25*, 671-678.
- Karaosmanoglu, G., Metinnam, İ., Özen, Z., & Adigüzel, Ö. (2022). Can Drama Lessons Be Given Online? Perspectives of Drama Teachers during the COVID-19. *International Online Journal of education and Teaching, 9*(3), 1249-1272.
- Kim, J. A., & Lorsbach, A. W. (2005). Writing self-efficacy in young children: Issues for the early grades environment. *Learning Environments Research*, *8*, 157-175.
- Kuhfeld, M., Soland, J., Tarasawa, B., Johnson, A., Ruzek, E., & Liu, J. (2020). Projecting the potential impact of COVID-19 school closures on academic achievement. *Educational Researcher*, 49(8), 549-565.
- Levenson, R. W. (2003). Blood, sweat, and fears: The autonomic architecture of emotion. *Annals of the New York academy of sciences, 1000*(1), 348-366.
- Li, D. (2022). The shift to online classes during the COVID-19 pandemic: Benefits, challenges, and required improvements from the students' perspective. *Electronic Journal of E-Learning, 20* (1). https://doi.org/10.34190/ejel.20.1.2106
- Livingston, E. M., Siegel, L. S., & Ribary, U. (2018). Developmental dyslexia: Emotional impact and consequences. *Australian Journal of Learning Difficulties, 23*(2), 107–135. https://doi.org/10.1080/19404158.2018.1479975
- Łodygowska, E., Chęć, M., & Samochowiec, A. (2017). Academic motivation in children with dyslexia. *The Journal of educational research, 110*(5), 575-580.
- Marchetti, D., Fontanesi, L., Mazza, C., Di Giandomenico, S., Roma, P., & Verrocchio, M. C. (2020). Parenting-related exhaustion during the Italian COVID-19 lockdown. *Journal of pediatric psychology, 45*(10), 1114-1123.
- Marks, R. A., Norton, R. T., Mesite, L., Fox, A. B., & Christodoulou, J. A. (2023). Risk and resilience correlates of reading among adolescents with language-based learning disabilities during COVID-19. *Reading and Writing, 36*(2), 401-428.

Marzocchi, G. M., Ornaghi, S., & Barboglio, S. (2009). What are the causes of the attention deficits observed in children with dyslexia?. *Child neuropsychology*, *15*(6), 567-581.

- Ministry of Education. (2020). Schools and Institutes of Higher Learning to Shift to Full Home-Based Learning; Preschools and Student Care Centres to Suspend General Services. (2020, April Ministry of Education. Retrieved November 27, 2023, from https://www.moe.gov.sg/news/press-releases/20200403-schools-and-institutes-of-higher-learning-to-shift-to-full-home-based-learning-preschools-and-student-care-centres-to-suspend-general-services
- Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their contributions to complex "frontal lobe" tasks: A latent variable analysis. *Cognitive psychology*, 41(1), 49-100.
- Ng, P. T. (2021). Timely change and timeless constants: COVID-19 and educational change in Singapore. *Educational Research for Policy and Practice, 20*(1), 19-27. https://doi.org/10.1007/s10671-020-09285-3
- Ogurlu, U., Garbe, A., Logan, N., & Cook, P. (2020). Parents' experiences with remote education during COVID-19 school closures. *American Journal of Qualitative Research, 4*(3). https://doi.org/10.29333/ajqr/8471
- Palser, E. R., Morris, N. A., Roy, A. R., Holley, S. R., Veziris, C. R., Watson, C., ... & Sturm, V. E. (2021). Children with developmental dyslexia show elevated parasympathetic nervous system activity at rest and greater cardiac deceleration during an empathy task. *Biological Psychology*, 166, 108203.
- Picou, J. S., & Marshall, B. K. (2007). Social impacts of Hurricane Katrina on displaced K-12 students and educational institutions in coastal Alabama counties: Some preliminary observations. *Sociological spectrum*, *27*(6), 767-780.
- Polychroni, F., Koukoura, K., & Anagnostou, I. (2006). Academic self-concept, reading attitudes and approaches to learning of children with dyslexia: Do they differ from their peers? *European Journal of Special Needs Education*, 21(4), 415-430.
- Rahmawati, A., Kaburuan, E. R., Arifianto, A., & Juniati, N. K. (2019). CISELexia: Computer-Based Method for Improving Self-Awareness in Children with Dyslexia. *Advances in Science, Technology and Engineering Systems Journal, 4*(5), 258-267.
- Ramirez, S., Aldunate, M. P., Arriagada, C., Bueno, M., Cuevas, F., González, X., ... & Gaete, J. (2021). Brief research report: The association between educational experiences and COVID -19 pandemic-related variables, and mental health among children and adolescents. Frontiers in Psychiatry, 12, 647456.
- Sako, E. (2016). The emotional and social effects of dyslexia. *European Journal of Interdisciplinary Studies, 2*(2), 175-183.
- Siddiqui, N., & Ventista, O. M. (2018). A review of school-based interventions for the improvement of social emotional skills and wider outcomes of education. *International Journal of Educational Research*, 90, 117-132.
- Smith-Spark, J. H., Henry, L. A., Messer, D. J., Edvardsdottir, E., & Zięcik, A. P. (2016). Executive functions in adults with developmental dyslexia. *Research in developmental disabilities, 53,* 323-341.
- Snowling, M. J., Hulme, C., & Nation, K. (2020). Defining and understanding dyslexia: past, present and future. *Oxford review of education, 46*(4), 501-513.
- Soon, T. C., Caleon, I. S., Shaik Kadir, M. B., Chua, J., & Ilham, N. Q. (2022). Navigating challenges during COVID-19 pandemic: Experiences and coping strategies of Singapore students. *Educational and Developmental Psychologist, 40*(1), 63–73. https://doi.org/10.1080/20590776.2022.2079405

- Soriano-Ferrer, M., Morte-Soriano, M. R., Begeny, J., & Piedra-Martínez, E. (2021).

  Psychoeducational challenges in Spanish children with dyslexia and their parents' stress during the COVID-19 pandemic. *Frontiers in Psychology, 12*, 648000.
- Sturm, V. E., Ashlin, R. K., Datta, R., S., Wang, C., Sible, I. J., Holley, S. R., Watson, C., et al. (2021). Enhanced visceromotor emotional reactivity in dyslexia and its relation to salience network connectivity. *Cortex 134* (2021): 278-295.
- Tay, H. Y., & Asmuri, S. A. (2021). Dyslexic Children's Experience of Home-Based Learning During School Closures: 4 Case Studies. *Asia Pacific Journal of Developmental Differences, 8*(2), 190-217. https://doi.org/10.3850/S2345734121000080
- The Collaborative for Academic, Social, and Emotional Learning (n.d.). Fundamentals of SEL. CASEL. Retrieved January 3, 2024, from https://casel.org/fundamentals-of-sel/
- Thomson, M. (2009) *The Psychology of Dyslexia. A Handbook for Teachers.* 2nd Ed. London: Wiley. Usakli, H. (2018). Drama based social emotional learning. *Global Research in Higher Education, 1* (1), 1. https://doi.org/10.22158/grhe.v1n1p1
- Van de Water, M. (2021). Drama in education: why drama is necessary. In *SHS Web of Conferences 98*, 02009. EDP Sciences.
- Watts, R., & Pattnaik, J. (2023). Perspectives of parents and teachers on the impact of the COVID-19 pandemic on children's socio-emotional well-being. *Early Childhood Education Journal*, 51(8), 1541-1552.
- Winston, J. (2012). Second language learning through drama. NY: Routledge.

## **MATHS PROGRAMME**





The SES Maths Programme aims to effectively support students with dyslexia who have persistent difficulties in mathematics, particularly with understanding of math concepts and word problems.

## **HOW DOES DYSLEXIA AFFECT MATHS?**



#### The Maths Programme currently offers 3 curricula:

#### **ESSENTIAL MATHS**

Developed to help students who are struggling to cope with Maths at the school level









Reading Comprehension



Proficiency



Mathematical Communication

## **PROBLEM SUMS FOR UPPER PRIMARY (STP)**

Developed to help Primary 5 / Primary 6 students who are strong in math concepts, but continue to show difficulties with understanding and solving word problems



Challenging Word Problem Types



Thinking Skills & Heuristics



Mathematical Communication



Reading Comprehension

## **SEC 1 NORMAL** TECHNICAL MATHS (STP)

Developed to help Secondary 1 students taking the Normal Technical Maths syllabus in their transition to secondary school mathematics







Procedural Proficiency



Thinking Skills Communication



Real-Life Applications



FOR MORE INFORMATION, **VISIT WWW.DAS.ORG.SG** 





(f) (a) @dyslexiasg

Asia Pacific Journal of Developmental Differences Vol. 11, No. 1, July 2024, pp. 123—180 DOI: 10.3850/S234573412400123X



# Identifying Training Needs in Using Educational Technology: a New Integrated Model

## Soofrina Mubarak<sup>1\*</sup>

Dyslexia Association of Singapore

#### Abstract

This research critically examines the imperative of systematically training Educational Therapists for optimal educational technology integration within the Dyslexia Association of Singapore's (DAS) Main Literacy Programme, accelerated by the COVID-19 pandemic's shift to remote learning. Employing a multifaceted approach, including surveys, observations, focus groups, and interviews, the study identifies seven principal performance issues among therapists, categorizing them into skills, knowledge, and attitude. Recommendations for targeted training efforts offer actionable insights for DAS management, acknowledging the intentional exclusion of student voices in this phase. Future research will address this limitation by exploring student perspectives post-implementation of interventions for teachers, aiming for a comprehensive understanding of technology's impact on the learning environment. The study's limitations encompass a specific sample (DAS Educational Therapists) and setting, potentially restricting generalisability. However, the proposed Integrated Model and solutions may prove adaptable to diverse educational contexts. The research design, employing varied data collection methods, mitigates response bias concerns, enhancing the authenticity of findings. Time constraints impact the study's depth, warranting future longitudinal investigations. The absence of student perspectives regarding technology's impact and learning goals is acknowledged, prompting future research directions. While providing valuable insights into DAS Educational Therapists' needs, this study advocates for future endeavors that include student perspectives, exploring the effectiveness of interventions post-teacher training. The Integrated Model can serve as a foundation for broader applications in diverse educational settings, contributing to industry- wide best practices. Longitudinal studies are proposed to capture evolving attitudes and practices, offering a nuanced understanding of technology integration's dynamic nature in educational settings. Future research should prioritise student engagement, ensuring a holistic exploration of technology's impact on learning outcomes across diverse educational landscapes.

Keywords: Educational technology, instructional technology, technology integration technology adoption, systematic training, performance issues, targeted training for teachers, performance analysis, training needs assessment

Soofrina Mubarak, Lead Educational Therapist, EduTech Coordinator, English Language and Literacy (ELL) Division, Dyslexia Association of Singapore. Email: soofrina@das.org.sg

<sup>\*</sup> Correspondence to:

#### 1.0 INTRODUCTION AND SUMMARY OF PART 1 OF STUDY

The coronavirus global epidemic compelled over 190 countries to cancel traditional face to-face classes and transition to remote learning - suddenly, unexpectedly, and unevenly (UNESCO, 2021). According to UNESCO (2021), at the height of the crisis, more than 85% of students around the world were absent from regular school, and by October 2020, 108 nations reported missing an average of forty-seven days of face-to-face instruction - or approximately a quarter of the academic year. Digital technologies have the potential to revolutionise education worldwide if used properly in the classroom.

The COVID-19 pandemic has had some positive effects, such as accelerating the adoption of digital technologies in schools. The extensive use of remote learning opened the door to further digitalisation, including the fusing of digital tools with conventional teaching techniques. But bringing traditional pedagogies or approaches online is only one aspect of effective digital learning. The pandemic demonstrated how digital tools were thrown into remote learning carelessly and unevenly. Digital solutions frequently rested on the creativity of a single teacher or the commitment of a single school administrator. Teachers required assistance and instruction on how to use digital technologies effectively if they are to do so. Training for an educational culture that uses digital technologies to improve its operations has become more and more crucial.

This paper looks at three prominent training needs analysis models before formulating a new integrated model in the second part. The function of analysing training needs is one that is acknowledged as being a crucial element of all effective training programs. In its simplest form, requirements assessment is the act of determining "what is" and "what should be" and proposing solutions to close the gaps between them. This method produces information that can be used to help with planning, decision-making, and problem-solving initiatives. This information can be used internationally to investigate educators' current use of technology and desired level of use of technology, and then propose training and non-training solutions to bridge the identified gaps.

#### AIM OF PART 2 OF STUDY

In this second part, a complete analysis of the use of the new integrated training needs analysis model with educational therapists will be presented. In order for Dyslexia Association of Singapore (DAS) to plan and get ready for training routes based on the determined training needs of the therapists, the findings from this research and the suggested solutions will be communicated with the organisation.

The purpose of this Training Needs Assessment (TNA) study is to determine any differences (gaps) between what the educational therapists at DAS should be knowledgeable and skilled in, versus what they currently know and can do regarding the integration and utilisation of educational technologies for dyslexic learners in the DAS Main Literacy Programme.

## **Overview of the Integrated Training Needs Analysis Model**

Human performance has a direct impact on organisational performance, and performance problems can occur when task performers lack the required capability and knowledge. To investigate the training needs for educational therapists in the DAS, an integrated model using Mager and Pipe's performance analysis model, Wile's human performance technology, and Rossett's model has been developed. Mager and Pipe's model assesses desired and actual performance states and identifies necessary interventions, while Wile's technology diagnoses root causes of performance gaps.

Rossett's holistic approach gathers information on optimal and current performance, sentiments, and solutions to problems.

In part 1 of this study (Mubarak, 2023), the article described an Integrated Training Needs Assessment (TNA) approach consisting of five major steps to identify performance deficiencies and recommend solutions. The first step involves identifying the real problem and its importance, followed by determining the gap between actual

and optimal performance levels, investigating possible causes of the gap, and determining if training is the solution. The final step involves recommending solutions based on data collected from various stakeholders, including the identification of possible causes for the performance problems, and considering the acceptance, cost effectiveness, practicality, and feasibility of proposed solutions. The article concludes by emphasising the importance of human performance to organisational performance and the need for a systematic approach to TNA.

#### **METHODOLOGY**

This section explains the background for the study as well as the methods, instruments, sources of data, and research questions that guided the investigation.

The TNA process entails identifying actual performance gaps between the therapists' current knowledge and abilities and optimal expectations for the integration of educational technologies into the Main Literacy Programme. Subsequently, recommendations are proposed to narrow the performance gaps that were identified. The outcomes and recommendations from this study will be communicated to DAS to enable the organisation to plan and implement training programs based on the identified training needs of the therapists.

## **Training Needs Assessment Plan**

To accomplish the objective of the Training Needs Assessment, the Integrated Model will be applied using the five-step approach specified in Table 1 in section 4.2. This table

outlines each step of the approach, along with corresponding guiding questions (a to i) to assist in the implementation of the model.

## **Training Needs Assessment Guiding Questions**

This study will focus on the following 9 guiding questions shown in Table 1:

Table 1. Training Needs Assessment Guiding Questions

Table 1. Training Needs Assessment Colding accitons				
TNA FOCUS	STEP IN INTEGRATED MODEL	GUIDING QUESTIONS		
Organisational Goals	Step 1	A. What is/are the goals of the organisation in terms of adopting and integrating educational technologies in the Main Literacy Programme?		
Identification of critical Performance	Step 2	B. What ar the real performance problems related to the adoption and integration of educational technologies in the Main Literacy Programme?		
Problems		C. Are the identified performance problems important to warrant a TNA study?		
Realisation of Performance Gaps  Realisation of the causes of Performance Gaps	Step 3	<ul> <li>D. What Educational Technology related skill, knowledge and attitude should DAS Therapists have in order to purposefully integrate I into the Main Literacy Programme curriculum to suit the learners with dyslexia?</li> <li>E. What Educational Technology related skill, knowledge and attitude do DAS Therapists currently have?</li> <li>F. What are the Performance Gaps?</li> <li>G. What would be the possible causes for the</li> </ul>		
		Performance Gaps?		
Nature of Solution (Training or Non-Training)	Step 4	H. Is training required to close the identified Performance Gaps?		
Suggestions	Step 5	I. What are the suggested solutions?		

#### RESEARCH DESIGN

The main approach employed in this research is qualitative, with the aim of obtaining a comprehensive understanding of the perceived training needs in DAS. To achieve this, the researcher conducted various methods such as surveys (provided in Annex 1), interviews with DAS management personnel (provided in Annex 2) and Dyslexia Association of Singapore Academy (DAC) lecturer (provided in Annex 3), focus group discussions (provided in Annex 1), observations (provided in Annex 5), and subject matter expert interviews (provided in Annex 4). These methods were used to provide an opportunity for detailed discussions of the matters raised in the survey and interviews and to corroborate self-reported data obtained in the initial stages of data collection.

#### **Procedure**

The researcher communicated the intent, objectives, and process of the TNA to the DAS research committee, who then invited participants based on the profiles described in Section 4.3.2 of this paper below and their availability. The participants were given the Study Information Sheet, which outlined the study's terms, and they consented to participate. The researcher scheduled one-to-one online meetings for interviews and conducted the focus-group discussion online due to the COVID-19 pandemic. The survey was distributed via email, and participants were notified of observation dates at least two weeks in advance, with confirmed class selection at least one week prior. The researcher provided her contact information at the end of each data collection method.

## **Participants**

This paper gathered input from 23 participants with diverse backgrounds through interviews and surveys. Diversity among the backgrounds of participants in the study significantly enriched the research by providing a holistic and comprehensive understanding of the subject matter. Involving perspectives from various roles within and outside the organisation, such as management, subject matter experts, and ground personnel like lecturers and educational therapists, ensured a well-rounded exploration of the challenges and opportunities related to the integration of educational technologies. DAS Management perspectives offered insights into overarching organisational goals and expectations, guiding the study towards aligning technological integration with broader objectives. External subject matter experts contributed specialised knowledge, shedding light on the theoretical aspects and best practices. In contrast, the input of ground personnel brought forth firsthand experiences and practical challenges faced in the classroom and during training. This diversity allowed for a triangulation of data, enhancing the reliability and validity of findings and ultimately facilitated the development of targeted and effective solutions applicable at different organisational levels.

The table presented as Table 2 displays the different groups of participants consulted in the data collection process along with their roles and backgrounds.

Table 2. Participants

Posit	tion	No.	Category		
1	Director of English Language and Literacy Division, Staff Professional Development and SpLD Assessment Services	1	Management Personnel		
2	Assistant Director, Curriculum and Resource Development	1			
3	Assistant Director, Quality Assurance and Audits	1			
4	Lead Therapists	3	Educational Therapists teaching		
5	Senior Therapists	5	the DAS Main Literacy Programme		
6	Therapists	5			
7	Curriculim and Resource Developers	1			
8	Educational Advisors		Educational Leaders in DAS		
9	Educational Technology Leaders	2			
10	Lecturer of DAS Academy	1	Lecturers in DAS		
11	Subject Matter Expert from Society for Persons with Disabilities	1	Experts for Educational Technology and Training		
12	Subject Matter Expert in Educational Technologies and Adult Training	1			

## **Management Personnel of the DAS**

The Director of the English Language and Literacy Division, Staff Professional Development and SpLD Assessment Services, was a crucial participant in this study and

was interviewed due to her position overseeing areas that are vital to this research. Having spent 16 years at DAS and worked as an educational therapist for 7 years, she was well-equipped to provide guidance on the organisation's objectives regarding the use of educational technologies in the Main Literacy Programme, as well as insights into the expected and actual performance standards of therapists. Her contributions were particularly valuable in determining the success of potential solutions.

Additionally, two Assistant Directors of the English Language and Literacy Division, who had been with DAS for 13 and 14 years, respectively, were identified as key participants for their leadership positions in critical areas such as curriculum and educational advisory. Their input through interviews on topics such as the current resources available to therapists and potential causes of performance issues played a significant role in shaping the proposed solutions in this study.

## **Educational Therapists in DAS Main Literacy Programme**

A group of 13 educational therapists with varying levels of experience, ranging from beginners to experienced leaders, was selected to take part in this study. An open call was made via email to all educational therapists. Including therapists with different levels of experience could offer valuable insights crucial for the study. These participants were asked to complete a survey and actively engage in a focused group discussion. Additionally, therapists were observed using educational technologies in their classes on two occasions. These observations were conducted live or based on recorded sessions, depending on class availability and feasibility.

#### **Educational Leaders at DAS**

Four educational administrators were recognised to furnish their perspectives and insights for this investigation. Their selection was predicated upon their specialised domains: encompassing curriculum development, educational consultancy, and the execution of pedagogical technologies. These instructional leaders allocated approximately 3-4 days weekly to supervisory responsibilities, reserving 1-2 days for direct engagement with dyslexic pupils. This configuration enabled them to retain a hands-on involvement in practical instructional matters, concurrently affording them the capacity to extend guidance and assistance to educational therapists primarily dedicated to instructional delivery.

## **Lecturer at DAS Academy**

An interview was conducted with an instructor affiliated with DAS Academy, the educational training subsidiary of DAS. This instructor's insights were garnered regarding training aspects. Notably, DAS Academy undertakes the training of all therapists upon their induction and prior to their active service. Moreover, the academy facilitates

ongoing professional development courses. This interview served as a valuable resource for comprehending the extent to which the present and prospective training trajectories incorporate the application and integration of educational technologies within instructional settings.

## **Subject Matter Experts**

The first subject matter expert is a National Institute of Education-trained teacher who currently serves as an Assistive Technology (AT) Specialist. In her role within a multidisciplinary team, she offers AT support for literacy and numeracy interventions tailored to clients with complex communication needs. Additionally, she conducts workshops on assistive and learning technologies and provides assistance to schools in integrating AT into their classroom teaching. Her primary focus lies in developing training programmes and support systems for educators and caregivers in both Mainstream and Special Education (SpEd) schools. These programmes aim to facilitate the practical implementation of technologies in both school and home settings to enhance learning outcomes. Furthermore, she provides guidance on adapting classroom assessments to accommodate diverse learning needs.

The second subject matter expert is a Chief Architect of Learning Circles and the visionary mind behind Wiztango.com. He is a prominent figure in the intersection of technology and education management. Boasting a global background, he has made significant contributions as an entrepreneur in both these domains. Throughout his illustrious career spanning three decades, he has played key roles in the digital transformation of various industries. In Singapore, he contributed to a community-led learning initiative, showcasing his commitment to lifelong learning. His current focus revolves around implementing the digitally-blended learning model through the Wiztango platform. His vision is rooted in transitioning traditional training to a digitally-facilitated learning approach, emphasising equal opportunity and knowledge sharing for all participants.

While these experts did not possess exhaustive insights into the specific training requisites of educational therapists within the DAS context, their reservoirs of experience rendered their perspectives on prospective remedies for mitigating performance gaps exceptionally valuable to this research endeavor.

#### **Data Collection Instruments**

This research employed a variety of data collection approaches, encompassing surveys, observations, focus group dialogues, and interviews. Both open-ended and closed-ended question techniques were utilised to enhance the comprehension of diverse viewpoints originating from different participant groups within DAS.

## Survey

The survey design (refer to Annex 1) has been adapted from Fan's work (2001) for its user-friendly format, simplicity, and incorporation of a 5-point self-rating scale. This scale effectively captures responses from participants across both present and anticipated scenarios for the same query. This design intends to ensure convenience for educational therapists during survey completion, minimising time consumption and survey length. The choice of survey as the data collection method for educational therapists was informed by its comprehensive reach, ensuring a more precise cross-section of participants to yield targeted data outcomes. This strategic approach enhances the accuracy of data analysis and informs significant decisions.

By maintaining survey responses in an anonymous format, DAS educational therapists can provide candid and valid input without concerns about potential identification. This accommodates those therapists who might be hesitant to express opinions due to apprehensions about recognition.

The survey enlisted the participation of a total of 10 educational therapists in this study. Among these, 5 were identified as senior educational therapists, boasting a tenure exceeding 5 years within DAS. Conversely, the remaining 5 participants did not hold senior therapist positions.

#### Interview

To amass information from 3 members of DAS management (see Annex 2), 1 representative from DAC (see Annex 3), and 2 subject matter experts (see Annex 4), interviews have been chosen as the preferred methodology. This selection is based on interviews' efficacy in extracting comprehensive insights, particularly concerning the expected utilisation of educational technologies by Educational Therapists. Interviews offer the advantage of posing detailed inquiries and facilitating real-time elucidations, utilising the respondents' own expressions to address ambiguities or incomplete replies. Given the potentially demanding schedules of these chosen participants, alternatives such as surveys or focus group discussions may not align as well with their availability.

#### Observation

In addition to the information gathered through surveys and interviews, classroom observations serve as a means to validate actual behaviors, bridging responses that may reflect participants' perceived expectations rather than their genuine classroom practices. For this study, a twenty-minute observation period has been sanctioned by the DAS research committee for specific reasons. Firstly, since literacy lessons encompass multisensory approaches with designated manipulatives like phonics card decks and finger-spelling exercises, which do not necessitate the use of educational technologies,

observations are targeted during these components. Secondly, given the numerous requests for classroom observations from various entities, DAS educational therapists were more amenable to shorter observation intervals. The decision for a twenty-minute observation was reached after consultation with the DAS Research Committee, and three classes were chosen for observation.

The observation form (refer to Annex 5) was developed with several key considerations. Firstly, it aims to document the types of devices employed in classrooms and the learning circumstances of the students. The initial section of the form presents a list of various devices for the observing researcher to indicate usage. Subsequent space is allotted to briefly note any specific learning needs of students, if applicable. This feature enables the assessment of whether educational therapists accommodated differentiated instruction based on individual student learning profiles, a detail provided by DAS educational therapists before the observation commenced.

The second page of the observation form delineates observable actions systematically compiled by the researcher, with the intention of covering a broad spectrum of aspects. For instance, it assesses whether the educational therapist is capable of independent troubleshooting and whether the activity could be carried out without the use of technology. If the activity can be performed without the selected technology, the educational therapist could be deemed to be operating at the substitution level of the SAMR model (Puentadura, 2013), which represents the initial tier of technology utilisation. Illustratively, tasks categorised under the substitution level might encompass composing a written piece on a Word document without employing autocorrect or formatting tools, given that this activity can be accomplished sans technology. The SAMR model delineates four levels of technology integration: substitution (S), augmentation (A), modification (M), and redefinition (R), each progressing in terms of the transformative impact of technology on task execution when compared to its absence.

The researcher also endeavored to make observations on student engagement during instances of technology integration. This entailed monitoring for behavioral indicators among students, encompassing disruptions, anxiety, and attentiveness within five minute intervals throughout the twenty-minute observation period.

## **Focus Group Discussion**

A focus group discussion was also undertaken, involving three educational therapists and four educational leaders. This was done to cross-reference responses obtained from other data collection methods. Furthermore, the researcher strategically scheduled the focus group discussion after the interviews and survey to ensure that certain insights, such as expectations for technology use in classrooms gleaned from interviews with DAS management personnel, and the self-reported actual technology usage from the survey by DAS educational therapists, could be raised.

This discussion was conducted within a single session. Collectively, a minimum of three distinct data collection methods were employed at each stage of the Training Needs Assessment (TNA) process within this study. This approach serves the purpose of cross-validating data from multiple sources and gaining a richer understanding through diverse perspectives. The ensuing table (Table 3) delineates the assortment of techniques and tools employed across the various stages of TNA within this study.

Table 3: Data collection techniques and tools used in this study

	Integrated TNA Processes					
Tools	STEP 1: What is the real problem?	STEP 2:  Is it important?	STEP 3:  What is the performance gap?	STEP 4: Is training required?	STEP 5: What are the possible solutions?	
Interview	✓	✓	✓	✓	✓	
Survey			✓	✓	✓	
Focus Group	✓	✓	✓	✓	✓	
Observation	✓	✓	✓			

Table 4 presents a concise overview of the strengths and limitations associated with the diverse data collection tools employed in this study. The compilation of this table drew upon insights gleaned from existing literature as well as discussions with experts in the research domain. The shortcomings identified in these instruments will be conscientiously addressed within the study, with corresponding measures taken to mitigate any potential adverse impacts. These mitigation strategies are outlined within the same table.

#### **Data Analysis**

The formulation of interview questions, survey queries, focus group discussion prompts, and observation criteria adhered to the structured guiding questions outlined in section 4.2 within this paper. The essential data hailing from individual interviews (refer to Annex 2, 3, and 4), focus group discussions (refer to Annex 1), observation of lessons (refer to Annex 5) and the survey (refer to Annex 6) were principal reservoirs of information in addressing the research questions. In terms of analytical methodology, the researcher

Table 4. An overview of the strengths and limitations associated with data collection.

Instrument	Advantages	Disadvantages	Follow- Up
Survey	<ul> <li>Relatively inexpensive Relatively time-saving</li> <li>Participants can do it at their own time</li> <li>Yields relevant, quantifiable data that can be summarised and analysed ,easily.</li> <li>Anonymity may encourage honesty</li> </ul>	<ul> <li>Low response rates or inaccurate responses No opportunity to clarify</li> <li>May restrict freedom of response</li> <li>Requires time and skill to develop targeted questions</li> </ul>	<ul> <li>Reminders will be sent to follow-up on colleagues who are yet to submit their responses</li> <li>Survey &amp; questionnaires to be kept simple lo avoid contusion or misunderstandings</li> <li>An option called "others" to be, available to relevant questions so that respondents may clarify themselves</li> </ul>
Focus Group Dimension	<ul> <li>Build involvement and support</li> <li>Provide relevant data</li> <li>Provide visibility</li> <li>May elicit key topics not expected</li> <li>On-the-spot sharing and synthesis of different views</li> </ul>	<ul> <li>Moderately time-consuming (but less so than individual interviews)</li> <li>Difficult to conduct - both logistically and in terms of conducting the session smoothly</li> <li>May be difficult to analyse and quantify data</li> </ul>	<ul> <li>Invitations will be sent early lo participants and dales will be chosen based on their availability</li> </ul>
Individual Interview	<ul> <li>Allow for clarification Provide relevant data</li> <li>Easier to conduct than group interviews</li> <li>May uncover information that would not be brought up in a group</li> </ul>	<ul> <li>Expensive in terms of time and travel costs         Requires interviewing skills</li> <li>May be difficult to analyse and quantify results</li> <li>May make interviewees self-conscious</li> </ul>	<ul> <li>Conversation will be kept casual and light-hearted</li> <li>Interviewer will ask broad questions and support with prompts where clarifications are required</li> </ul>
Observation of Work Situations	<ul> <li>Builds employee involvement</li> <li>Provides excellent information when coaching an individual</li> <li>Builds credibility</li> <li>Generates relevant quantifiable data May provide excellent real scenarios</li> </ul>	<ul> <li>Requires s a skilled observer Time-consuming</li> <li>May change performance or be perceived as spying</li> <li>May be logistically difficult</li> </ul>	<ul> <li>A detailed observation sheet will be used Recorded lessons can also be used. if available</li> <li>Observation arrangements will be made in advance to facilitate logistical concerns</li> </ul>

applied the constant comparative method (Glaser and Strauss, 1967) to examine qualitative data and descriptive statistics extracted from these sources.

In dissecting the qualitative data and descriptive statistics derived from interviews and surveys, the researcher scrutinised and interpreted the expressed viewpoints and perspectives, aiming to incorporate them into the nine guiding questions guiding this study. The constant comparative method facilitates the ongoing identification of emerging themes, supplementing the predetermined key categories deemed pertinent to this study's objectives through the nine guiding questions.

For instance, in addressing the fifth guiding question—pertaining to the current educational technology skills, knowledge, and attitudes possessed by DAS educational therapists—the researcher analysed responses from interviews and the survey. The subsequent examples illustrate how these data were dissected and categorised: Example 1, "Educational therapists have effectively employed projectors to enhance lessons with videos," and Example 2, "Based on my observations, iPads have been utilised for dictionary access and playing games." These instances were coded and classified as "current skill" since the predominant aspect highlighted was the current capability (skill) of DAS educational therapists to incorporate educational technology for enhanced student engagement. Example 3, "DAS educational therapists currently lack sufficient motivation to use educational technologies," was categorised as "current attitude" and subsumed under an emergent theme "Needs positive reinforcement," underscoring the need for more incentives in this domain.

The process of analysing theme-oriented data aggregation advanced until each emerging category reached saturation—a point where novel insights ceased to emerge within the same theme (Glaser and Strauss, 1967).

This analysis commences with an initial set of broad predefined categories, including "organisational objectives," "present skill level," "optimal skill level," "identified gaps," and "potential solutions," while also embracing an inductive approach to uncover nascent themes. Responses to the guiding questions drew substantiation from quantitative and/or qualitative data generated through analysis. Furthermore, data from observations and focus group discussions were utilised to corroborate the responses to the guiding questions.

#### **RESULTS AND FINDINGS**

## Introduction

This section delineates the process of data analysis, subsequently summarising the principal discoveries concerning the identified tangible issue's significance within the context of DAS. This pertains to the incorporation of educational technologies by

educators. The section further discloses the extant performance disparity between the anticipated expectations from educators and their current utilisation of technology. Lastly, the chapter investigates the necessity for training and explores potential remedies to bridge this performance gap. The pivotal findings have been drawn from an analysis of data culled from five distinct sources:

- Individuals in DAS Management roles,
- DAS Educational Therapists,
- DAS Educational Leaders,
- Lecturer at DAS Academy,
- Subject matter experts.

The information assimilated from these sources constitutes the basis for this discourse.

## Findings According to Integrated TNA Model

Within this segment, the researcher responds to the nine guiding questions for Training Needs Assessment (TNA) as outlined in section 4.2 of this paper. These responses adhere to the structure of the Integrated TNA model employed in this study, namely, the 5-Step Integrated Model.

## Step 1: What is the real problem?

TNA Guiding Question 1 of 9: What is/are the goals of the organisation in terms of adopting and integrating educational technologies in the Main Literacy Programme?

Upon analysing the insights extracted from the interview session involving DAS management personnel, it emerged that the roles and responsibilities of DAS Educational Therapists have undergone substantial transformation over the years. The division director noted a shifting approach, referring to it as an "evolution" and "upgrades" rather than mere changes (personal communication, March 10, 2020). The assistant directors also concurred that the core job nature—teaching dyslexic learners—has evolved to encompass greater attention to students with additional learning challenges beyond dyslexia. This includes heightened focus on accurate data collection regarding students' learning progress (personal communication, March 11, 2020).

Assistant Director (1) articulated the shift, stating that there has been a notable rise in awareness of speech-language impairment (SLI) issues, ADHD (Attention Deficit Hyperactivity Disorder), behavioral concerns, and emotional needs over the last five years. These aspects were not as pertinent or included when they initially began (personal communication, March 11, 2020).

Currently, the integration and utilisation of educational technologies are in preliminary stages, given that the adoption of such technologies is relatively nascent. DAC perceives that greater use of educational technologies can enhance the support for students with learning differences. Consequently, it has become imperative for DAS educational therapists to intentionally incorporate educational technologies into their lesson plans, adapting to diverse learning needs and the evolving demands of their role. The director emphasised the necessity for therapists to demonstrate and rationalise their selection and usage of suitable educational technologies to attain lesson objectives (personal communication, March 10, 2020).

Similar descriptions of the organisation's technological integration objectives emerged during the focus group discussion with DAS educational leaders. The group highlighted the significance of effective technology use with clear rationales for instructional enhancement, teaching, learning facilitation, and behavior management in the classroom (personal communication, May 4, 2020). Moreover, the discussion revealed that educational therapists face stress and require guidance and scaffolding for successful technology integration.

Regarding training, a DAC lecturer conveyed during the interview that the academy aims for educational therapists to proficiently design lessons with integrated technology to support students with learning differences beyond dyslexia. Therapists should understand the purpose and how technology aligns with this integration to provide access to learning for all learners (personal communication, March 3, 2020).

Upon discerning common themes and recurring patterns outlining DAS's integration goals, it was discerned that the overarching objective is for DAS Educational Therapists to deliberately incorporate educational technologies into their instruction. This integration should be developmentally and educationally suitable, aiding dyslexic learners in achieving desired learning outcomes outlined in the DAS Main Literacy Programme—both within the classroom and in independent home settings.

## Step 2: Is it important?

- ◆ TNA Guiding Question 2 of 9: What are the real performance problems related to the adoption and integration of educational technologies in the Main Literacy Programme?
- ◆ TNA Guiding Question 3 of 9: Are the identified performance problems important to warrant a TNA study?

When inquired about the perceived significance of the identified expectations for the organisation, DAS management personnel affirmed their importance. They highlighted the increasing reliance on educational technologies in the foreseeable future and

stressed the need for DAS educational therapists to meet these expectations. The Director of the Main Literacy Programme articulated intentions to enhance technology utilisation within the programme. This entails initiatives like online parent-teacher communication, progress monitoring, and remedial solutions. She emphasised the absence of a one-size-fits-all approach in the realm of special education, including educational technology usage. Her priority, shared with the DAS general management team, is that educational therapists can make well-informed choices when selecting technology for their students, thus facilitating the educational advancement of dyslexic learners (personal communication, March 10, 2020).

However, she noted that this vital objective is not currently resonating strongly among the Educational Therapists instructing the Main Literacy Programme. On the topic of technology integration's importance to DAS educators, educational leaders expressed unanimous and strong agreement. They indicated that technology integration matters to educational therapists, though at varying levels, primarily due to awareness of its benefits for students, but a perceived lack of confidence in implementation (personal communication, May 4, 2020).

Independent subject matter experts, interviewed separately, corroborated this perspective. They elucidated that considering the trajectory of education guided by the Singapore government— where students are expected to possess digital proficiency in preparation for a digital-driven economy—educators must elevate their competencies to cater to students' learning needs. In the domain of special education, one subject matter expert emphasised the heightened importance of educational technologies, as they provide an array of tools to level the educational playing field for learners with diverse learning profiles (personal communication, March 12, 2020). However, a key challenge lies in the fact that learners need time to become familiar and comfortable with these tools, a process that doesn't occur overnight.

In response to the query of whether these expectations would be met organically over time without intervention, all DAS management personnel and the DAC lecturer disagreed. They pointed out that, at present, while educational therapists recognise the importance of educational technologies, they perceive the integration as optional rather than a pressing priority. Consequently, they are not actively advancing in this realm (personal communication, March 3, 2020). This indicates that the performance issues identified carry substantial significance for DAS management personnel, underscoring the need for this Training Needs Assessment.

## Step 3: What are the identified performance gaps and their possible causes?

The gathered data indicates the presence of disparities between the current performance and the desired optimal performance of DAS Educational Therapists concerning the integration of educational technologies into their instructional approach.

Based on the accumulated data, a total of seven discrepancies emerged between the anticipated (optimal) and present (actual) practices, which will be expounded upon in this segment.

In alignment with the Integrated TNA Model adopted for this research, this section will be addressed through the utilisation of four guiding questions.

- ◆ TNA Guiding Question 4 of 9: What educational technology related skill, knowledge and attitude should DAS therapists have in order to purposefully integrate it into the Main Literacy Programme curriculum to suit the dyslexic learners?
- ◆ TNA Guiding Question 5 of 9: What educational technology related skill, knowledge and attitude do DAS therapists currently have?
- ♦ TNA Guiding Question 6 of 9: What are the performance gaps?
- ◆ TNA Guiding Question 7 of 9: What could be the possible causes for the performance gaps?

Within this segment, the outcomes will be presented following the sequence of the four guiding questions (4, 5, 6, and 7). The recognised disparities in performance will be organised into distinct categories, namely: a) skill, b) knowledge, and c) attitude, as illustrated in the following table (Table 5).

Table 5: Overview of gaps, optimals, actuals and causes

	GAP	OPTIMAL	ACTUAL	CAUSE(S)
SKILLS	Skill-Gap 1 Skill-Gap 2 Skill-Gap 3 Skill-Gap 4	Skill-Optimal 1 Skill-Optimal 2 Skill-Optimal 3 Skill-Optimal 4	Skill-Actual 1 Skill-Actual 2 Skill-Actual 3 Skill-Actual 4	Skill-Cause 1
KNOWLEDGE		Knowledge-Optimal 1 Knowledge-Optimal 2	_	_
ATTITUDE	Attitude-Gap 1	Attitude-Optimal 1	Attitude-Actual 1	Attitude-Cause 1

In Table 5, we can observe a breakdown of identified performance gaps based on skills, knowledge, and attitude. Let's delve into these performance gaps and their underlying causes as well as potential solutions. These insights will be categorised as Skills-Related

Performance Gaps and addressed according to the Integrated TNA Model's guiding questions.

## **Skills-Related Performance Gaps:**

**Skill-Gap 1: Manipulate and Integrate Educational Technologies in Teaching**DAS Educational Therapists are not incorporating educational technologies as extensively as expected. The divergence between the anticipated and actual performances is evident in their ability to effectively use and merge these technologies into their lessons.

**Skill-Optimal 1:** DAS management envisions therapists leveraging a variety of educational technologies in lessons, ideally justifying their choices and demonstrating relevance and value in their teaching methods (personal communication, Mar 10, 2020).

**Skill-Actual 1:** In both the focus group discussion and survey findings, which comprised 7 agreements and 2 strong agreements out of a total of 10 responses, educational therapists conveyed their acknowledgment that incorporating educational technologies into their lessons is vital to address the learning needs of dyslexic students. In the survey, they self-assessed their current competency levels, with most responses falling within the ratings of 1-3 (unsure, rarely, sometimes). Simultaneously, they indicated higher expected performance levels, with ratings of 4-5 (often, always) for these competencies. For more straightforward tasks involving common applications like MS Word, Google Docs, and MS PowerPoint, their self-rated competencies were generally higher, with ratings of 4-5, aligning with their perceived expectations.

However, when it came to basic functions such as connecting iPads to projectors, 6 out of 10 survey respondents expressed a lower self-assessment, selecting ratings of 1-2 (1 - unsure and 2 - rarely). Consequently, educational therapists expressed a collective sentiment that they felt inadequately prepared to meet these expectations, emphasising the need for additional support to enhance their readiness.

**Skill-Gap 2:** Plan and Develop Ability-Appropriate Lessons with Educational Technologies Discrepancies exist between the projected and actual capacities of DAS Educational Therapists to design lessons tailored to student abilities using educational technologies.

**Skill-Optimal 2:** Educational therapists should be adept at selecting age and skill-appropriate technologies, recognising the significance of accessibility features in addressing dyslexic students' learning needs (personal communication, Mar 11, 2020).

**Skill-Actual 2:** The results also revealed that DAS Educational Therapists faced challenges in both skill and confidence when it came to planning and implementing differentiated instruction using educational technologies in the classroom. A significant portion of the survey respondents (6 out of 10) expressed uncertainty and infrequent use

(rating of 1-2) regarding their knowledge of accessibility features on iPads and laptops, as well as their proficiency in utilising interactive whiteboards, specifically the Mimio Teach Interactive System. Interestingly, they acknowledged the disparity between their perceived expectations (rated at 4-5) and their actual performance in using the interactive whiteboard system.

Although these therapists were familiar with basic educational technologies such as Microsoft Word, PowerPoint, Google Slides, Google Docs, Kahoot, and Quizizz, the majority (6 out of 10) rated themselves as uncertain or rarely using (rating of 1-2) accessibility features and advanced tools like Flippity, Plickers, and Google Classroom. This aligns with the observations made during the study, where one therapist demonstrated technology integration by using a projector to display a video to students. Additionally, troubleshooting proved challenging for another therapist, who abandoned the process midway, citing time wastage, and continued the lesson without the intended technology component.

**Skill-Gap 3:** Differentiate Instruction with Educational Technologies Educational therapists struggle to adapt instruction using technology. The capability to deliver tailored instruction, particularly for dyslexic learners with diverse comorbidities and distinct learning needs, is a crucial requirement for all DAS Educational Therapists (Skill-Optimal 3). Despite the emphasis on integrating educational technologies to facilitate differentiated instruction, the observed performance of DAS Educational Therapists falls short of meeting the outlined expectations for differentiated instruction, as indicated in Skill-Actual 3.

**Skill-Optimal 3:** DAS management personnel emphasised the importance of DAS Educational Therapists conducting lessons with differentiated instructions, involving modifications to lesson objectives and instructions for specific students in the class due to comorbidities, as highlighted by the divisional director during a personal communication on March 10, 2020. The divisional director stressed that the ability of educational therapists to "differentiate instruction using technology" is crucial, given the highly individualised nature of their programme tailored to each learner. Additionally, Assistant Director (1) underscored the necessity for differentiation in the classroom, pointing out that student profiles are becoming increasingly diverse with various co-morbidities. They highlighted the importance of addressing differences in processing speeds and learning abilities among students, including their capacity to retain previously learned concepts.

**Skill-Actual 3:** The DAS Academy lecturer shared insights into the training provided for Educational Therapists, highlighting the current structure involving two three-hour sessions. The first session focuses on the Student Management System for attendance and administrative tasks, while the second covers the basics of an iPad, conducting digitised assessments, and general classroom applications like Kahoot and Quizizz. These sessions are part of the initial training, but they lack pedagogical training on

utilising educational technologies for differentiated instruction and advanced tools. The survey data, specifically question 4 on ranking training priorities, indicated that DAS educational therapists consider differentiation in the integration of EduTech resources as a top priority. This aligns with the confirmation from the DAS Academy lecturer that differentiation has not been explicitly taught in training sessions for educational therapists. Observations revealed that some therapists attempted instructional differentiation using technology, but these attempts were often simplistic and may not represent the most effective use of technology for differentiation. For example, one therapist had a dyslexic student type a paragraph on an iPad, while others wrote on paper. Although the therapist recognised the need for an alternative platform, more suitable functions, such as speech-to-text, could have better catered to the student's learning needs.

**Skill-Gap 4: Assess and Evaluate Students' Learning Progress:** DAS Educational Therapists exhibit limited proficiency in assessing and evaluating students' progress using educational technologies, despite self-reported awareness of these tools.

**Skill-Optimal 4:** DAS Educational Therapists are anticipated to assess and evaluate their students' learning at the conclusion of each lesson while preparing for the next one. According to both assistant directors in the interview, educational technologies are expected to serve a purpose and offer feedback to therapists on students' work. This feedback, as emphasised in a personal communication on March 11, 2020, is considered essential, and it is exemplified in applications like Quizizz, where educators can view students' results, including time taken and whether they reviewed incorrectly answered questions, on their dashboard.

**Skill-Actual 4:** DAS Educational Therapists displayed varied responses regarding evaluating students' learning progress through educational technologies, with no instances observed during observations. In the focus group discussion, educational leaders noted therapists' awareness of available tools and their timing for assessing and evaluating students' learning. Despite being aware of various tools, therapists tended to stick to their preferred ones, often chosen for their ease of use. However, the selected platform might not offer the necessary information for assessing students' understanding effectively. Consequently, therapists resort to traditional methods, such as paper-based activities, for assessment. Contrarily, in observations, students demonstrated engagement without disruptive behaviors when therapists either utilised or attempted to use technology.

## Cause of Skills-Related Performance Gaps:

### **Skill-Cause 1: Lack of Training**

Both the survey and focus group discussions highlighted the deficiency in training for DAS Educational Therapists. Participants emphasised that they lacked the necessary skills and

knowledge to effectively employ educational technologies for differentiated instruction. They expressed a need for more practical examples and demonstrations illustrating how these technologies can facilitate differentiated instruction and how to implement it effectively. A conversation with the DAC lecturer further revealed that training efforts were primarily focused on basics, leaving a gap in equipping therapists with comprehensive technology integration skills. The current training programme involves two three-hour sessions, covering foundational iPad usage and digital assessment administration (personal communication, Mar 3, 2020). 9 out of 10 Educational Therapists indicated in their survey forms that they were keen for training and preferred to attend small-group training sessions with hands-on experience.

## **Causes of Knowledge-Related Performance Gaps:**

## **Knowledge-Cause 1: Lack of Time**

DAS Educational Therapists encounter difficulties in allocating sufficient time for thorough exploration, planning, and selection of educational technologies for their lessons. While recognising the value of technology for dyslexic learners, therapists reported time constraints preventing them from adequately integrating technology into lesson plans. Survey responses indicated unanimous agreement among respondents that they lacked time for both lesson planning and evaluating the appropriateness of educational technologies for their students. Focus group discussions echoed these challenges, attributing the time crunch to a growing administrative workload that curtailed opportunities for comprehensive lesson planning with integrated technology.

# Knowledge-Cause 2: Lack of Direct Access to Hardware and Software

The lack of access to requisite hardware (e.g., iPads, Interactive Systems) and software emerged as an additional obstacle for DAS Educational Therapists. Survey responses revealed concerns about limited device availability, with therapists sometimes forced to share or borrow devices due to inadequate supply. Focus group participants shared instances where a class had more students than available devices, leading to cumbersome device-sharing arrangements. Challenges also arose from inconsistent software availability across different devices, impeding seamless application access.

### **Cause of Attitude-Related Performance Gaps:**

### Attitude-Cause 1: Lack of Incentive and Recognition

While recognising the significance of educational technologies, DAS Educational Therapists reported a lack of motivation stemming from inadequate incentives, recognition, and support. Survey results demonstrated that 90% of respondents identified these factors as barriers to technology adoption. Focus group discussions emphasised that therapists felt overwhelmed by administrative demands and technology-related information, hindering their capacity to effectively integrate technology into their teaching. Annual audits evaluating lesson completion and quality further dissuaded

therapists from investing significant effort into technology adoption. As a result, many therapists leaned towards traditional teaching methods, using technology only when less stressed.

## **Step 4: Nature of solutions**

In this segment, we will assess whether the determined performance gaps and their underlying causes necessitate instructional or non-instructional remedies. Guided by the Integrated TNA Model employed in this study, this section will be explored through the lens of the following research inquiry:

Guiding Question 8 out of the 9 TNA Queries: Is there a need for training to address the recognised performance gaps?

In alignment with Wile's Comprehensive Human Performance Technology (HPT) Model, the performance challenges linked to DAS Educational Therapists' integration of educational technologies encompass both internal and external factors influencing the therapists. The ensuing table (Table 6) classifies the various performance issues based on the required solution type and whether training is deemed necessary or not.

Training is required to tackle the performance challenge arising from insufficient knowledge and skills in incorporating educational technologies into lessons. Moreover, as indicated in the aforementioned Table 6, there are additional remedies available to tackle the various performance issues encountered by DAS Educational Therapists. These solutions will be thoroughly examined in the subsequent phase.

### **Step 5: Suggested solutions**

In this section, proposed remedies for the identified performance challenges and their underlying causes will be outlined. The purpose of these suggested solutions is to bridge the performance gaps and enable DAS Educational Therapists to meet the expectations set by the management. As guided by the Integrated TNA Model employed in this study, this section will be addressed through the following research question:

Research Question 9 of 9: What are the suggested remedies for the identified performance gaps? Proposed solutions for the first of seven performance gaps: Integrating and Using Educational Technologies in Teaching

All survey participants pointed to a lack of time as a hindrance to their incorporation of educational technologies into lessons. This issue was further deliberated upon during the focus group discussion, where participants explained that Educational Therapists are burdened with considerable administrative tasks that often come with tight timelines. Activities such as parent communication, email responses, meetings, attendance tracking,

Performance Gap	Cause(s)		ble solutions: or non-instructional?	
Skills Related				
Manipulate and integrate educational technologies in teaching	Lack of Time	Non- instructional	<ul> <li>Provision of editable templates</li> <li>Repository for educators</li> </ul>	
Plan and develop ability- appropriate lessons with educational technologies	Lack of Access to Technology	Non- instructional	<ul> <li>Redistribute devices         Create channels for         soft/hardware         request</li> </ul>	
Differentiate instruction with the aid of educational technologies	Lack of Training	Instructional	Training Small Group Practical! Sessions	
Assess and evaluate students' learning progress		Instructional	Mentoring	
	Knowle	dge Related		
Possess basic troubleshooting knowledge	Lack of Training	Instructional	<ul><li>Instructional Videos on troubleshooting</li><li>Job aids</li></ul>	
Make appropriate recommendations to parents	Lack of Awareness	Non-Instructional	Promote a supportive and sharing culture	
Attitude Related				
Embrace educational technologies with positivity	Lack of incentive and recognition	Non-instructional	<ul> <li>Recognise and reward exemplary performance</li> <li>Include educational technologies in Observational Reports</li> <li>Peer Coaching</li> <li>Include the 'whys' when promoting technology</li> </ul>	

and manual attendance calculations contribute to their non-teaching workload. To encourage Educational Therapists to integrate educational technologies while managing administrative duties, more support can be provided.

# **Supply of Editable Templates**

A viable approach is to offer Educational Therapists templates for games and activities that can be incorporated into their lessons. These templates, which are adaptable, can be modified and reused as lessons are structured within the DAS Main Literacy Programme.

## **E-Resources Repository**

Creating a repository of digital resources would prove advantageous as it serves as a valuable resource hub for ideas and materials. These resources could also include examples and guidance for differentiated instruction.

These suggestions are supported by the research by Cohen, Kalimi and Nachmias (2013). In Cohen et el, 2013, the study delved into the adoption of local learning material repositories by teachers, investigating attitudes, training, and patterns of use. The research involved 103 teachers from four schools, each representing a distinct approach to repository development and integration. 96% of teachers across all four schools were found to actively utilise various repositories. Despite variations in usage patterns, local repositories played a crucial role, supporting a range of activities, including exams, worksheets, presentations, videos, and interactive online resources.

In the study, an in-depth analysis of teachers' use of their schools' repositories revealed varied yet consistent usage across schools. The spectrum of usage ranged from background utilisation (averaging 4.25 on a scale where 1 signifies slight extent and 5 denotes great extent) to offline use for printing worksheets and tests (averaging 4.29). Additionally, teachers employed online materials from the repositories during class lessons for presentations (averaging 4.12), videos and music files (averaging 3.86), and interactive resources like animations and applets (averaging 3.22). Teachers also employed the resources as a foundation for constructing new, adapted lessons (averaging 3.95) or created a blended assortment of various teaching resources (averaging 3.72).

The examination extended to the types of materials contributed to the local repositories. Predominantly, the contributed resources comprised office files of working pages, lesson plans, learning units, tests, and exams (averaging 3.03), along with administration files like calendars of events and holidays, board exams, weekly programs, and timetables (averaging 2.96). Approximately 40% of contributors significantly contributed these resources. Additionally, contributors uploaded links to selected websites and repositories

(averaging 2.79), online assignments (averaging 2.63), links to online tools and applets (averaging 2.31), detailed descriptions of curriculum and special programs (averaging 2.38), and students' works and outcomes (averaging 2.5).

The findings of the study underscored that teachers primarily uploaded resources derived from the general curriculum. However, unique resources related to special programs offered at the school, as well as resources on Google Docs, videos, educational tasks, documentation of processes through images, presentations, and forms, were also contributed to the repositories.

The extensive utilisation of local repositories by teachers can be attributed to the distinctiveness of the materials uploaded and tailored to their specific needs. These materials hold significant relevance and meaning for surveyed school teachers as they are specifically adapted and controllable to align with the curriculum. Teachers highly valued these repositories for their time efficiency and contributions to school knowledge management, ensuring the retention of valuable insights within the organisation.

The study showed that local repositories emerge as integral components of teaching and learning processes, addressing both administrative and pedagogical needs within the school. They facilitate effective use of the organisation's information resources, creating a shared pool of experiences characterised by a common language. Local repositories offer timely responses when searching for information, establish internal standards through a control process, foster the professional development of teaching staff, and preserve organisational knowledge. Recognising the strategic significance of implementing a local repository in an educational institution, it necessitates time for teaching staff to acculturate to the transformative process. Consistent and systematic guidance and training for teachers are vital to managing knowledge effectively and acquiring new skills for the successful implementation of this process (Ayalon et al., 2007).

# Solutions for the second of seven performance gaps:

### **Developing and Planning Apt Lessons with Educational Technologies**

To address the challenge of limited access to hardware and software, DAS could a) share devices and b) establish avenues for software requests.

#### **Device Sharing**

It is important for Educational Therapists to have easy access to Educational Technologies. Ideally, when an Educational Therapist requires additional iPads beyond their allocated quantity, accessing these extra devices should be feasible. Easy access promotes extensive use, while complicated access discourages integration. It would

therefore be good for Educational Therapists to pre-arrange a buddy system so that they can approach the identified colleagues to loan additional devices if necessary.

# **Create Software Request Channels**

During the focus group discussion, it was mentioned that Educational Therapists lacked access to the iTunes account for downloading iPad applications for lessons. By establishing channels for Educational Therapists to request specific software, both parties benefit. For instance, Google Forms could be implemented within digital repositories for this purpose.

## Solutions for the third, fourth, and fifth performance gaps:

**Gap 3:** Differentiating Instruction with Educational Technologies Gap 4: Assessing and Evaluating Students' Learning Progress Gap 5: Acquiring Basic Troubleshooting Knowledge

DAS could address the proficiency gaps in integrating educational technologies within the Main Literacy Programme by employing a combination of instructional strategies: a) small group practical sessions, b) one-on-one mentoring or buddy systems, and c) the provision of job aids. Survey responses and focus group discussions demonstrated that DAS Educational Therapists favored options a and b.

### **Structured Training**

It is advisable to supplement the rollout of new technologies with formal training sessions, such as webinars or pre-recorded sessions. These sessions provide insight into Educational Therapists' confidence levels in executing tasks as anticipated, indicating the necessity for clarification or improved resources.

Small Group Practical Training Given the dispersion of Educational Therapists across 14 learning centers in Singapore, conducting face-to-face training for all is challenging. Instead, small group practical sessions are more appropriate. These sessions can focus on different lesson components and various student levels. One-on-One Pairing (Mentoring)

In addition to small group sessions, a buddy system or mentorship can be valuable for Educational Therapists who lack confidence in independently creating and implementing the solutions demonstrated. Peer collaboration ensures that Educational Therapists have a support system for sharing ideas and building confidence in integrating educational technologies. Accomplished Educational Therapists can mentor their colleagues, positively influencing their readiness to embrace technology.

#### Instructional Videos

Instructional videos provide a reference point for less experienced Educational Therapists. These videos showcase step-by-step troubleshooting processes for new technologies.

## **Supplying Job Aids**

DAS could consider providing job aids as resources to assist Educational Therapists. These aids might encompass operational and troubleshooting guidelines for projectors, iPads, Mimio Teach Interactive Systems, and other upcoming equipment.

It will also be important to bear in mind that aside from supplying training, mentoring, videos and job-aids, teachers' beliefs about the use of technology as a teaching and learning tool needs to be factored in as well.

Kim et al. (2013) showed that when teachers had access to technologies, workshops, and help with technical and teaching methods, the levels of technology use varied. It wasn't just about having technology; what mattered more was the teachers' beliefs about teaching. Teachers who believed in student-centered teaching were better at using technology in their classes. On the other hand, those who believed in teacher-directed teaching were more likely to see technology as an extra, not a central part of their lessons (Kim et al., 2013).

Moreover, if teachers don't know how to use technology, their efforts to use it effectively are often limited (Koehler et al., 2014). This idea builds on the earlier work of Vannatta and Fordham (2004), who found three things that best predicted how a teacher used technology: how much time they invested, their willingness to change, and the amount of training they had in technology.

In the context of science, Guzey and Roehrig (2009) found similar results to Kim et al. (2013). They studied four new secondary science teachers after they attended a summer program on technology integration in science. Two teachers, who were already familiar with technology, felt comfortable using it and actively looked for ways to incorporate it into their science teaching. They also had a teaching style that focused more on students. The other two teachers struggled with integrating technology and had a less student-centered teaching approach.

Besides, instead of only focusing on skills, the suggestions above should include content and pedagogy to have a greater impact on teachers. Putting together content-specific training, videos, and learning groups may offer more value to teachers, which is in line with the TPACK framework. Jimoyiannis (2010), Niess (2005), and Guzey and Roehrig (2009) discovered that teachers became more confident in integrating technology with

science content when they gained experience using technology in subject-specific ways. Also, through observing classrooms at Caldwell, it became evident that teachers in the school had varying levels of technology knowledge, indicating the need for different types of professional development tailored to their specific requirements. The structure that solely emphasises one skill while neglecting pedagogy and content is problematic.

## Solutions for the sixth of seven performance gaps:

## **Making Appropriate Recommendations to Parents**

Educational Therapists sometimes lack the confidence to recommend software and applications to parents of DAS students due to their limited knowledge of targeted solutions for dyslexic students with specific learning differences. So having bi-annual handouts with a variety of tools or applications categorised for young and older learners; learners with specific learning differences and ability levels can help. Over time, the therapists would have the confidence to even add their own recommendation in their sharing with parents.

## **Promotion of a Supportive and Collaborative Culture**

To address the rapid pace of updates and new applications in the tech landscape, a supportive work culture that encourages sharing and mutual assistance can prove invaluable. Peer sharing can keep Educational Therapists informed about the latest developments, facilitating their adoption of new technologies.

### Solutions for the seventh of seven performance gaps:

# **Embracing Educational Technologies with Enthusiasm**

To encourage technology integration, DAS can acknowledge those who excel in using educational technologies and highlight their achievements in newsletters or emails. Demonstrating the achievements of peers can instill a sense of perseverance and a "cando" attitude. According to Wyatt (2013), the school environment and climate, and consequently, teachers' sense of relatedness, are influenced by the relationships among colleagues. Carson & Chase (2009) discovered that praise from colleagues can boost teachers' perceived competence and sense of relatedness. Support and assistance in learning from peers can fulfill the needs outlined in Self-Determination Theory (SDT), particularly by improving competence and relatedness. Therefore, the integration of technology practices in schools can be encouraged through the provision of learning support and recognition of efforts in terms of praise or other forms of recognition within the school context (Wyatt, 2013).

# **Inclusion of Educational Technologies in Evaluation Reports**

Educational Therapists mentioned during the focus group discussion that they are assessed during audits based on lesson quality and accurate execution of structured instruction. Including educational technology components in evaluations could motivate Educational Therapists to explore and integrate them into lessons, ultimately fostering familiarity and comfort with such tools.

According to research, high-quality teacher evaluation systems can provide important information about education, work to ensure teacher quality, create a common language around quality instruction, and provide a structure for accountability (Danielson, 2010). To ensure the effectiveness of teacher evaluation, it is crucial that the methods employed and the purpose behind the evaluation are clearly defined (Darling-Hammond, Wise, & Pease, 1983). The process of establishing an effective evaluation system necessitates discussions and agreements on what constitutes excellent teaching and the anticipated outcomes for students (Danielson, 2010). These conversations and the subsequent alignment can guide a teacher evaluation system toward best practices and a comprehensive understanding of quality education.

Once the teacher evaluation system is established, the outcomes derived from evaluations influence decisions ranging from teacher retention and bonuses to professional development opportunities (McDougald, Griffith, Pennington, & Mead, 2016).

### **Peer Coaching**

For Educational Therapists who lack confidence or ability, informal coaching arrangements can be helpful. Coaching ensures deeper, more consistent application of learning compared to independent efforts. This method supports self-reflective practices and rapid integration of learning into lessons.

# Stress the "Why" in Technology Promotion

Educational Therapists are primarily motivated by their students' improvement and well-being. Therefore, highlighting the rationale behind adopting educational technology and how it benefits students can increase their motivation to embrace it. This can be tied to the discussion portion of the teacher evaluation - so that it is clear to the teacher how technology can elevate student achievement and lesson objectives.

In summary, a comprehensive range of fourteen potential solutions has been presented in this section to address the three skills-related, two knowledge-related, and one attitude-related performance challenges.

# **DISCUSSION AND CONCLUSION**

Recognising the pivotal role that educational technologies play in equalising opportunities for students with dyslexia, DAC instructors are keen on enhancing educational therapists' utilisation of technology and elevating the depth of meaningful tech integration within the Main Literacy Programme sessions. Therefore, the primary objective of this research was to pinpoint disparities between the expected knowledge and actions of educational therapists regarding the incorporation and utilisation of educational technologies within the DAS Main Literacy Programme, in contrast to their current proficiency and capabilities.

To achieve this, the researcher employed a variety of data collection methods, including surveys, observations, focus groups, and interviews, to gather pertinent information from designated groups within DAS and external subject matter experts. Upon analysing the amassed data, it became evident that seven principal performance issues were contributing to these performance shortcomings. Among these seven issues, four were identified as pertaining to skills, two to knowledge, and one to attitude. Furthermore, the researcher provided recommendations for bridging these performance gaps, along with addressing other challenges faced by DAS educational therapists while integrating educational technologies in line with DAS management's expectations.

With the insights garnered from this Training Needs Analysis (TNA), DAS can allocate resources such as time and personnel for targeted training efforts. This approach aims to create a supportive pathway for DAS Educational Therapists, fostering a heightened and more focused incorporation of educational technologies into the Main Literacy Programme. To fully harness the transformative potential of educational technologies within DAS, a greater emphasis must be placed on evaluating the effectiveness of their integration into the Main Literacy Programme. The intentional integration of educational technologies is not solely driven by the availability of devices and resources; rather, it hinges on how these technologies enhance the learning process. This encompasses a thorough understanding of why Educational Therapists opt for technology integration, how such integration can yield effective outcomes, and how they can be better assisted in embracing and seamlessly integrating educational technologies into their instructional practices.

### LIMITATIONS OF STUDY

### Sample Size and Generalisation:

One notable limitation of this study is the reliance on a specific sample, namely the teacher population within DAS. The study's outcomes may be constrained by the size of this sample and its specific characteristics. It is essential to acknowledge that the student population was not directly consulted in this research. The decision stems from the study's primary focus on identifying training or non-training-related needs to gauge the current

level of technology usage and its potential among teachers.

The exclusion of student voices is intentional, aligning with the study's objectives. Subsequent research endeavors will address this gap by examining the effectiveness and preferences of learning and teaching materials post-implementation of training or non-training interventions for teachers. Including student perspectives will provide a comprehensive view of the impact of technology on the learning environment.

## **Contextual Specificity:**

Another limitation arises from the study's focus on a specific educational setting, DAS. Consequently, not all of the findings may be directly transferable to other educational institutions with distinct structures, resources, or student populations. However, it is anticipated that the training needs evaluation model (The Integrated Model) and the proposed solutions for addressing identified gaps could prove beneficial for organisations outside the DAS structure but within the broader education industry. These entities may find the model adaptable to their unique contexts.

## **Self-Report Bias:**

The study employed surveys and self-reports for data collection, a method susceptible to response bias, where participants may offer socially acceptable answers. To mitigate this concern, the research design incorporated multiple data collection instruments and employed varied question phrasing. This approach, aimed at eliciting consistent sentiments, provided a degree of triangulation in the gathered data. Additionally, observations were included in the study to enhance the authenticity of reported responses and ensure a more comprehensive understanding of the participants' perspectives.

### **Time Constraints:**

Conducting the study within a specific timeframe introduces limitations regarding the depth and breadth of the investigation. Long-term effects and evolving perspectives over time might not be fully captured. Moreover, the study did not encompass the student perspective concerning meeting learning goals and preferences through technology. The subsequent section will delve into potential future projects that aim to address these aspects and extend the scope of this research.

### **DIRECTIONS FOR FUTURE RESEARCH**

While this study has provided valuable insights into the training and non-training needs of educators in integrating technology within the specific context of DAS, future research endeavors could extend the scope to encompass a more comprehensive understanding of the impact of technology on student learning outcomes. Given the lack of engagement with the student population in this study, it is imperative to include their perspectives in subsequent research. Exploring the effectiveness and preferences of learning and

teaching materials implemented by educators after their training needs are addressed could offer a holistic view. Additionally, future studies might benefit from investigating technology integration in various educational settings beyond DAS. The training needs evaluation model (The Integrated Model) developed in this study could serve as a foundation for assessing and enhancing technology integration practices in diverse educational institutions, contributing to a broader understanding of best practices across the education industry.

Furthermore, longitudinal studies could be employed to track the long-term effects of technology integration and changes in attitudes and practices over an extended period, providing a more nuanced perspective on the dynamic nature of technology use in educational settings.

#### REFERENCES

- Ayalon, B., Shertz, Z., & Carmeli, M. (2007). *Coefficients excellence in education. Research and development of a model for training and operation.* Weizmann Institute of Science, Davidson Institute and Israel Center for Excellence through Education.
- Burner, K. J. (2010). From performance analysis to training needs assessment. In K. H. Silber & W. R. Foshay (Eds.), *Handbook of improving performance in the workplace: Instructional design and training delivery* (Vol. 1, pp. 144–183). San Francisco, CA: Pfeiffer.
- Carson, R. L., Chase, M. A., (2009). An examination of physical education teacher motivation from a self-determination theoretical framework. *Physical Education and Sport Pedagogy, 14* (4):335–353. doi: 10.1080/17408980802301866.
- Casey, E. (1997). *The fate of place: A philosophical history*. Berkeley: University of California Press. Cohen, A., Kalimi, S., & Nachmias, R. (2013). The use of digital repositories for enhancing teacher pedagogical performance. Interdisciplinary *Journal of E-Learning and Learning Objects, 9*, 201-218. Retrieved from http://www.ijello.org/Volume9/IJELLOv9p201-218Cohen0861.pdf
- Danielson, C. (2010). Evaluations that help teachers learn. *Educational Leadership, 68*(4), 35–39.
- Darling-Hammond, L., Wise, A. E., & Pease, S. R. (1983). Teacher evaluation in the organizational context: A review of the literature. *Review of Educational Research, 53*(3),285–328. doi: 10.3102/00346543053003285
- Dyslexia Association of Singapore. (2016, April 4). *Vision and Mission*. Retrieved January 10, 2019, from: https://www.das.org.sq/about-das/about-us/vision-mission.html
- Fan, C. Y. F. (2001). *IT Training Needs Assessment for Teachers in a Pre-School.* (Masters Dissertation). Available from National Institute of Education, Singapore. (http://hdl.handle.net/10356/14022)
- Gilmore, E. (2009). An evaluation of the efficacy of Wile's taxonomy of human performance factors. Bloomington: Indiana University.
- Glaser, B. G., & Strauss, A. L. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research.* New York: Aldine De Gruyter.
- Gupta, K. (1999). A Practical Guide to Needs Assessment. San Francisco: Jossey Bass, Pfeiffer.
- Guzey, S. S., & Roehrig, G. H. (2009). Teaching science with technology: Case studies of science teachers' development of technology, pedagogy, and content knowledge. *Contemporary Issues in Technology and Teacher Education, 9*(1), 25-45. Retrieved from https://

- citejournal.org/vol9/iss1/science/article1.cfm
- International Dyslexia Association (2008, September). *Definition of Dyslexia*. Retrieved January 17, 2019, from: https://dyslexiaida.org/definition-of-dyslexia/
- Jimoyiannis, A. (2010). Designing and implementing an integrated technological pedagogical science knowledge framework for science teachers professional development. *Computers and Education*, *55*, 1259-1269. doi: 10.1016/j.compedu.2010.05.022
- Karande, S., Sawant, S., Kulkarni, M., Galvankar, P., & Sholapurwala, R. (2005). Comparison of cognition abilities between groups of children with specific learning disability having average, bright normal and superior nonverbal intelligence. *Indian journal of medical sciences*. 59. 95-103. 10.4103/0019-5359.15085.
- Kim, C., Kim, M. K., Lee, C., Spector, J. M., & DeMeester, K. (2013). Teacher beliefs and technology integration. *Teaching and Teacher Education*, *29*, 76-85. doi: 10.1016/j.tate.2012.08.005
- Koehler, M., Mishra, P., Kereluik, K., Shin, T., & Graham, C. (2014). The technological pedagogical content knowledge framework. In J. M. Spector, M. D. Merrill, J. Elen & M. J. Bishop (Eds.), Handbook of research on educational communications and technology (pp. 101-111). New York, NY: Springer. doi: 10.1007/978-1-4614-3185-5\_9
- Mager, R. F., & Pipe. P. (1984). *Analyzing Performance Problems.* (2 ed.) Belmont, CA: Lake Publishing Company.
- Mager, R. F., & Pipe, P. (1997). *Analyzing Performance Problems: Or, You Really Oughta Wanna* (3 ed. pp. 32): Center for Effective Performance.
- McArdle, & Geri E. H. (1998). Conducting A Needs Analysis. Menlo Park, CA: Crisp.
- McDougald, V., Griffith, D., Pennington, K., & Mead, S. (2016). What is the purpose of teacher evaluation today? A conversation between Bellwether and Fordham. Retrieved from: https://edexcellence.net/articles/what-is-the-purpose-of-teacher-evaluation-today-a-conversation-between-bellwether-and
- Mubarak. S. (2023). Identifying Training Needs in Using Educational Technology: a New Integrated Model. *Asia Pacific Journal of Developmental Differences*. 10, (1)119-136 Retrieved June 30, 2023, from https://das.org.sg/research\_journal/apjdd-vol-10-no-1-jan-2023/
- Niess, M. L. (2005). Preparing teachers to teach science and mathematics with technology: Developing a technology pedagogical content knowledge. *Teaching and Teacher Education*. 21, 509-523. doi: 10.1016/j.tate.2005.03.006
- Puentedura, R. (2013, May 29). SAMR: Moving from enhancement to transformation. Retrieved March 3rd 2019 from http://www.hippasus.com/rrpweblog/ archives/ 000095.html
- Rosenberg, M., Coscarelli, W., & Hutchinson, C. (1999). *Handbook of human performance technology: Improving individual and organizational performance worldwide* (2nd ed., pp. 24-46). San Francisco, CA: Jossey-Bass.
- Rossett, A. (1987). Training Needs Assessment: Techniques in Training and Performance Development Series, *Educational Technology*. ISBN: 0877781958, 9780877781950 p6.
- Rossett, A. (1999). First Things Fast: A Handbook for Performance Analysis. San Francisco: Jossey-Bass Publishers.
- Rummler, G. A. (2006). The anatomy of performance: A framework for consultants. In J.A. Pershing (Ed.), *Handbook of human performance technology.* (3rd ed., pp. 986-1007). San Francisco, CA: Pfeiffer.
- Selfe, L. (1985). Anomalous drawing development: Some clinical studies. In N.H. Freeman and M.V. Cox (eds) Visual Order: *The Nature and Development of Pictorial Representation*. Cambridge: Cambridge University Press.
- Sorensen, J. B. (2002). The Strength of Corporate Culture and the Reliability of Firm Performance.

- Administrative Science Quarterly. 47(1):70-91. doi:10.2307/3094891
- Teo, Y. H., & Ting, B. H. (2010). Singapore Education ICT Masterplans. ICT for self-directed and collaborative learning (p. 2-14). Singapore: Pearson.
- Vannatta, R. A., & Fordham, N. (2004). Teacher dispositions as predictors of classroom technology use. *Journal of Research on Technology in Education, 36*(3), 253-271. doi: 10.1080/15391523.2004.10782415
- Wile, D. (1996). Why doers do: *Performance Instruction. 35*(2), 30-35. https://doi.org/10.1002/pfi.21273
- Wilmoth, F., Prigmore, C., & Bray, M. (2002). HPT models: An overview of the major models in the field. *Performance Improvement.* 41(8), 16-24 doi: https://10.1002/pfi.4140410806
- Wyatt M. (2013). Motivating teachers in the developing world: Insights from research with English language teachers in Oman. *International Review of Education.* 59(2):217–242. doi: 10.1007/s11159-013-9358-0

### **ANNEX 1 - FOCUS GROUP DISCUSSION QUESTIONS**

### FOR EDUCATIONAL THERAPISTS & LEADERS

# Focus Group for Educational Therapists and Educational Leaders.

Name of Participant:	(optional)
Learning Centre:	(optional)
Dear Educational Therapists / Educational Leaders,	

Thank you for participating in this focus group and your responses are very valuable to this study. The information you provide will be kept strictly confidential. You may choose to withdraw from this research participation at any point of time. Please feel free to contact me at soofrina@das.org.sq should you have further questions about this survey or the research.

#### **Expected Involvement:**

This focus group discussion will focus your training and support needs in incorporating educational technologies (Educational technologies) into your lesson designs. The session will be approximately 90-minutes long.

# **Background of Research:**

This research is conducted by Soofrina, the Educational technologies Coordinator of Dyslexia Association of Singapore, for the purpose of the dissertation for Master of Arts (instructional Design and Technology). The information you provide will be used for analysing the training needs among DAS Educational Therapists in their efforts to integrate Educational technologies resources into the MLP programme.

Thank you for putting aside some time to complete this focus group. Your responses are very valuable to this research and will help to shape the Educational technologies initiatives in the near future.

### Focus Group with Educational Therapists (EdTs) and Educational Leaders

I thank you for taking time off your busy schedule to provide some valuable insights about the perceptions and actual integration of Educational technologies resources in the MLP Programme.

Rest assured that your responses to me will be kept strictly confidential and anonymous. Your individual names nor any identifiers will not be captured in the report. These questions will take us about forty-five minutes.

\*Educational technologies = Educational Technologies

Research Focus	TNA Integrated Model Step
Organisational Goals	Step 1: Determination of real performance problem

## Understanding of Organisation's goals for Educational technologies Integration:

- 1. What does the term Educational technologies (Educational Technologies) mean to you?
  - a. (PROBE) How would you define Educational technologies? (if answer to (1) is no1 clear)
  - b. (PROBE) Can you comment on the organisation's vision for the use of educational technologies in the MLP classroom?
- 2. Could you please describe to me briefly how you envision the use of Educational technologies in DAS classrooms to be in the next 3-5 years?

  (if participant is not clear of organisation's goals in(|))
- Does integrating Educational technologies in MLP lessons really matter to EdTs? PROBES:
  - a. Is there a favorable outcome for integrating Educational technologies tools?
  - b. Is there an undesirable outcome of not integrating Educational technologies tools?
  - c. Is there a source of satisfaction or pride in conducting a MLP lesson by integrating Educational technologies tools?

Research Focus	TNA Integrated Model Step
Identification of real and critical performance problems	Step 2: Determination of the importance of the problem

- 4. Is there a difference between what is being done and how you have envisioned it (what is supposed to be done)?
- 5. How beneficial or important is the integration of Educational technologies in MLP lessons for dyslexic students?
- 6. How important then, is the therapists' readiness to embrace and adopt these educational technologies?
- 7. If the current usage of Educational technologies tools are left status quo, would it affect the goal of the DAS in integrating Educational technologies into the MLP lesson?

Research Focus	TNA Integrated Model Step
Realisation of performance deficiencies (gap)	Step 3: Realising the gap between the optimal and actual performances and possible causes

### **Optimals:**

- How might the integration of Educational technologies tools and devices elevate learning for dyslexic learners?
   (PROBE)
  - What possible pedagogical or practical benefits to learning and teaching can educational technologies bring?
- 9. What educational technologies related skills and knowledge do you think a therapists teaching the MLP lesson needs to have in order to achieve the benefits in (1)?
- 10. I am sure we can agree that we will never be able to catch up with technology due to its constant evolvement. How can this relate to the attitudes of the therapists in embracing and integrating educational technologies in the MLP classes?

#### **Actuals:**

- 11. What resources (educational technology devices and softwares) are currently available to therapists teaching the MLP classes?
- 12. Would you be able to share on the take-up rate of these hardware and software?
- 13. How would you describe the typical integration of Educational technologies in the DAS MLP classroom?
  - a. In your experience or observations, how are the Educational technologies tools integrated in the classrooms? (if answer to (2) is not clear)

#### Causes:

- 14. What are some of the reac;;ons (barriers) you can identify for low motivation in integrating educational technologies in MLP classes?
- 15. How incentivised are the therapists to use educational technologies in the MLP classroom?

Research Focus	TNA Integrated Model Step
Nature of solution (training or non-training)	Step 4: Deciding if bridging the gap requires training

### Is the problem internal or external to the therapists?

- 16. Could therapists integrate educational technologies at the desired level if they were really required to do it?
- 17. Are the therapists' present skills adequate for the desired performance (level of techintegration)?
- 18. Are there obstacles to integrating Educational technologies tools in the MLP classroom PROBES:
  - a. What prevents/ acts as barriers for EdT to integrate Educational technologies tools in the MLP classroom?
  - b. Do EdTs know what is expected in terms of Educational technologies integration in the class?
  - c. Are there conflicting demands on EdTs' time?
  - d. Do EdTs lack time or tools?
  - e. Are there restrictive policies or practices? (eg a "right way of doing it"?)
- 19. Are information pertaining to integration of educational technologies sufficiently and readily available to the therapists?

#### If external, is it a tangible or intangible factor to the therapists?

Identify which 3 of the following 10 attributes would be of importance to enable therapists to integrate educational technologies at the ideal standards: (Researcher to take a vote)

Provision of clear goals on the use of educational technologies
Availability of educational technology related policies
Appropriate workload for therapists
Provision of timely feedback on therapists' use of educational technologies
Provision of positive reinforcements for therapists' use of educational technologies
Availability of instructional manuals to operate educational technologies
Provision of sufficient tools (iPads, Mimio Teach Interactive Systems etc)
Proper classroom layouts (wall PowerPoints) for the integration of educational technologies
Sufficient on the job training to integrate educational technologies
Structured training on the integration of educational technologies

Research Focus	TNA Integrated Model Step
Suggestions	Step 5: Providing possible solutions

#### **Possible Solutions:**

- 20. Given the tight schedules of the therapists, what mode of training do you think would best suit the therapists? Some examples include face to face training, e-learning
- 21. How well do you think EdTs would respond to such training approaches?
- 22. Is there a down-time for therapists (a period where they are usually more available) to attend training sessions?
- 23. How can EdTs be evaluated in their use of Educational technologies resources.

# **ANNEX 2 - INTERVIEW QUESTIONS**

### FOR MANAGEMENT PERSONNEL

merview with management reform	
Name of Management Personnel:	 (Optional)
Position	 (Optional)
Dear	

Thank you for participating in this interview. Your responses are very valuable to this study. The information you provide will be kep strictly confidential. You may choose to withdraw from this research participation at any point of time. Please feel free to contact me at soofrina@das.org.sg should you hae further questions about his survey or the research.

#### **Expected Involvement**

Interview with Management Personnel

This interview will focus on your thoughts and beliefs with regards to EdTs' training support needs in incorporating Educational Technologies into lesson designs as well as what is expected of them in this aspect. The session will be approximately 45 minutes long.

#### **Background of Research:**

This research is conducted by Soofrina, the Educational Technologies Coordinator of the Dyslexia Association of Singapore, for the purpose of the dissertation for Master of Arts (Instructional Design and Technology). The information you provide will be used for analysing the training needs among DAS EdTs in their efforts to integrate Educational Technologies resources into the Main Literacy Programme.

Thank you for putting aside some time to do this interview with Soofrina. Your sharing is very valuable to this research and will help to shape the Educational Technologies initiatives in the near future.

#### **Interview with Management Personnel**

I thank you for taking time off your busy schedule to provide some valuable insights about the perceptions and actual integration of educational technologies at the DAS. The following questions will help me to understand the current and optimal Educational technologies integration. This interview will take approximately forty-five minutes. Please feel free to let me know if you need a break or of you want to end this interview.

#### Introduction:

- 1. Could you please share how long you have been with the DAS?
- 2. Of these number of years, how many years were you directly teaching dyslexic learners?
- 3. Do you think the approach to teaching dyslexic learners has evolved over the years? If yes, how so?

Thank you for the introduction and for sharing your overall views. I will now ask you some questions pertaining to your perception of Educational technologies - the abbreviation for educational technologies.

Research Focus	TNA Integrated Model Step
Organisational Goals	Step 1: Determination of real performance problem

## **Understanding organisational goals:**

- 4. What does the term Educational technologies (Educational Technologies) mean to you?
- 5. How would you define Educational technologies? (if answer to (I) is not clear)
- 6. How would you describe the ideal integration of Educational technologies in the classroom?
- 7. In your opinion, what is a right mix of Educational technologies tools in the lesson design? (if answer to (3) is not clear)
- 8. Could you please describe to me briefly how you envision the use of Educational technologies in DAS classrooms in the next 3-5 years?

### Understanding the performance problem:

- 9. Do you think training is required for the successful integration of Educational technologies in MLP classrooms?
  PROBES:
  - a. Why do you think there is a training need?

b. What is the difference between what is being done and what is supposed to be done (discrepancy)?

- c. What will happen if the discrepancy is left alone?
- d. Do you suppose there's dissatisfaction about the current performance (of integrating Educational technologies in MLP lessons?)
- 10. Is the inability/not integrating Educational technologies related to skill deficiency? PROBES:
  - a. Could EdTs do it if it was made mandatory/ really required to do it?
  - b. Arc EdT's present skills adequate for the desired level of Educational technologies usage?

If participants agree that it is a skill deficiency, use the following questions and prompts:

- 10.1. Could the EdTs demonstrate a good level of use of Educational technologies tools in the classroom in the past?
- 10.2. How often is the skill of integrating Educational technologies tools in the MLP lesson used?
- 10.3. How do EdTs find out if about how well they are integrating Educational technologies in the classroom?
- 10.4. Is there regular feedback on the integration?
- 10.5. Could there be a simpler solution ie: provision of job aids, storing of information somewhere more accessible, demonstrations instead of trainings, informal coaching sessions?
- 11. Is the inability/not integrating Educational technologies related to knowledge deficiency?

(f participants agree that it is a knowledge deficiency, use the following questions and prompts):

- 11.1. Did EdTs know how to integrate Educational technologies tools in the past?
- 11.2. How has the knowledge been lost/ misplaced?

If participants disagree that it is a skill nor knowledge deficiency, use the following questions and prompts:

11.3. Is the desired performance punishing? What is the consequence of performing as desired?

Research Focus	TNA Integrated Model Step
Identification of real and critical performance problems	Step 2: Determination of the importance of the problem

- 12. How important then, is the therapists' readiness to embrace and adopt these educational technologies?
- 13. If the current usage of Educational technologies tools are left status quo, would it affect the goal of the DAS in integrating Educational technologies into the MLP lesson?

Research Focus	TNA Integrated Model Step				
Realisation of performance deficiencies (gap)	Step 3: Realising the gap between the optimal and actual performances and possible causes				

#### **Optimals:**

- 14. Could you identify some pros and cons relating to the integration of Educational technologies inthe classroom?
- 15. How might the integration of Educational technologies tools and devices elevate learning for dyslexic learners?
- 16. At your level, you would have seen and evaluated your therapists' lessons. What would you like to see more of with the use of Educational technologies in the classrooms?
- 17. If we were to establish a base-level standard for the integration of Educational technologies tools, how would you describe that?
- 18. Tn order to achieve that (3), what skills, knowledge and attitude do therapists need to be equipped with?
- 19. I am sure that you will agree with me that not all therapists would have the same baseline knowledge and skills in using and integrating Educational technologies tools. What support would therapists need to integrate Educational technologies appropriately?
- 20. If Educational technologies training is provided at the DAS for therapists, what skills and knowledge should therapists have gained after the training?

#### Actuals:

21. What Educational technologies resources are available to therapists and students at the DAS?

- 22. How is the distribution of these resources like? (iPads and Interactive Smart Boards)
- 23. What percentage of the time are these resources used in teaching the dyslexic learners?
- 24. What Educational technologies skills and knowledge do your therapists have currently?
- 25. How are these therapists currently supported?
- 26. Can you describe a typical classroom scenario where the therapists has appropriately used the Educational technologies resources?
- 27. How competent are the therapists in integrating Educational technologies resources into the lesson plan?
- 28. Are therapists incentivized to use Educational technologies resources in the classroom?
- 29. What type of support are available to therapists to integrate Educational technologies resources appropriately?
- 30. Are there upcoming plans to expand the use of Educational technologies at DAS?

Research Focus	TNA Integrated Model Step				
Nature of solution (training or non-training)	Step 4: Deciding if bridging the gap requires training				

### Is the problem internal or external to the therapists?

- 31. Could therapists integrate educational technologies at the desired level if they were really required to do it?
- 32. Are the therapists' present skills adequate for the desired performance (level of tech-integration)?
- 33. Are there obstacles to integrating Educational technologies tools in the MLP classroom? PROBES:
  - a. What prevents / acts as barriers for EdT to integrate Educational technologies tools in the MLP classroom?
  - B. Do EdTs know what is expected in terms of Educational technologies integration in the class?
  - c. Are there conflicting demands on EdTs' time?
  - d. Do EdTs lack time or tools?

- e. Are there restrictive policies or practices? (eg a "right way of doing it"?)
- 34. Are information pertaining to integration of educational technologies sufficiently and readily available to the therapists?

Research Focus	TNA Integrated Model Step				
Suggestions	Step 5: Providing possible solutions				

35. What mode of training do you think will suit the therapists the best given their current work load? e-learning, face to face 3 hour training sessions, a mixture of both (blended learning)

### Others:

36. Do you have any other comments?

# **ANNEX 3 - INTERVIEW QUESTIONS**

### FOR DAS ACADEMY LECTURERS

## For subject matter experts in the field of Special Educational Needs:

# **DAS Academy Lecturer**

Interview with DAS Academy Lecturer			
Name of Lecturer:	(Optional)		
Position	(Optional)		
Dear			

Thank you for participating in this interview. Your responses are very valuable to this study. The information you provide will be kep strictly confidential. You may choose to withdraw from this research participation at any point of time. Please feel free to contact me at soofrina@das.org.sg should you hae further questions about his survey or the research.

#### **Expected Involvement**

This interview will focus on your thoughts and beliefs with regards to EdTs' training support needs in incorporating Educational Technologies into lesson designs as well as what is expected of them in this aspect. The session will be approximately 45 minutes long.

#### **Background of Research:**

This research is conducted by Soofrina, the Educational Technologies Coordinator of the Dyslexia Association of Singapore, for the purpose of the dissertation for Master of Arts (Instructional Design and Technology). The information you provide will be used for analysing the training needs among DAS EdTs in their efforts to integrate Educational Technologies resources into the Main Literacy Programme.

Thank you for putting aside some time to do this interview with Soofrina. Your sharing is very valuable to this research and will help to shape the Educational Technologies initiatives in the near future.

#### **Interview with DAS Academy Lecturer**

I thank you for taking time off your busy schedule to provide some valuable insights about the perceptions and actual integration of educational technologies at the DAS. The following questions will help me to understand the current and optimal Educational technologies integration by the MLP EdTs in their interventions for dyslexic students. This interview will take approximately forty-five minutes. Please feel free to let me know if you need a break or of you want to end this interview.

#### Introduction:

- 1. Could you please share how long you have been with the DAS?
- 2. Of these number of years, how many years were you directly teaching dyslexic learners?
- 3. Do you think the approach to teaching dyslexic learners has evolved over the years? If yes, how so?

Thank you for the introduction and for sharing your overall views. I will now ask you some questions pertaining to your perception of Educational technologies - the abbreviation for educational technologies.

Research Focus	TNA Integrated Model Step			
Identification of real and critical performance problems	Step 2: Determination of the importance of the problem			

#### Importance of Educational technologies in the MLP Classroom:

- 4. What is/are the goals of the organisation in terms of adopting and integrating educational technologies in the Main Literacy Programme?
- 5. On a scale of 1-5, how would you rate the importance of Educational technologies integration in the MLP classroom? (1= not important at all, 5 = very important)

If participant selects options 1-2, use the following prompts:

- 5.1. Why do you think that the integration of Educational technologies tools are not important in the MLP classroom?
- 5.2. If you feel that the integration of Educational technologies in MLP classrooms is not important, how do you think the needs of today's dyslexic student (who are infamously known to be more tech savvy than adults) can be met without the Educational technologies tools?

5.3. Would you then agree that a lesson without Educational technologies tools can be as equally engaging for the dyslexic student as compared to a lesson with the integration of Educational technologies tools?

If participant selects options 4-5, use the following prompts:

- 5.4. Why do you think that the integration of Educational technologies tools are important in the MLP classroom?
- 5.5. How do you think Educational technologies tools support and/or enhance the dyslexic learner's learning experience?
- 5.6. If things remain the way they are, do you think
- 4. Therapists' readiness in integrating Educational technologies tools in MLP classroom
- 6. Could you tell me about the coverage of educational technologies in the initial training?
- 7. Do you think EdTs understand the benefits of integrating Educational technologies tools in the classroom?
- 8. How soon do you think an EdT is ready to integrate Educational technologies tools in the classroom, upon the initial EdT training (DELA)?

Research Focus	TNA Integrated Model Step			
Suggestions	Step 5: Providing possible solutions			

#### EdTs' training needs

- 9. How are trainings usually planned for therapists? (what is a good time period)
- 10. What motivates a therapist to attend training?

# ANNEX 4 - INTERVIEW QUESTIONS (S.M.Es)

# For subject matter experts in the field of Educational Technologies

Interview with Subject Ma	itter Experts		
Name of Expert:	(Optional)		
Position (Optional)			
Dear	_		
information you provide wiresearch participation at a	g in this interview. Your responses are very valuable to this study. The ill be kep strictly confidential. You may choose to withdraw from this any point of time. Please feel free to contact me at soofrina@das.org.sg estions abou this survey or the research.		
Expected Involvement			
in incorporating Education	your thoughts and beliefs with regards to EdTs' training support needs al Technologies into lesson designs as well as what is expected of them will be approximately 45 minutes long.		
Background of Research:			

This research is conducted by Soofrina, the Educational Technologies Coordinator of the Dyslexia Association of Singapore, for the purpose of the dissertation for Master of Arts (Instructional Design and Technology). The information you provide will be used for analysing the training needs among DAS EdTs in their efforts to integrate Educational Technologies resources into the Main Literacy Programme.

Thank you for putting aside some time to do this interview with Soofrina. Your sharing is very valuable to this research and will help to shape the Educational Technologies initiatives in the near future.

# Interview with Subject Matter of Educational Technologies

I thank you for taking time off your busy schedule to provide some valuable insights about the perceptions and actual integration of educational technologies at the DAS. The following questions will help me to understand the cunent and optin1al standards of Educational technologies integration by educators in their interventions for dyslexic students. This interview will take approximately forty-five minutes. Please feel free to let me know if you need a break or of you want to end this interview.

#### Introduction:

- 1. Could you please share how long you've been an advocate for the integration of Educational technologies tools for learners with special needs?
- 2. What keeps you motivated or makes you passionate about the advocacy?
- 3. Could you share with me a success story of how Educational technologies helped a learner (dyslexic if possible) when Educational technologies tools were introduced in the classroom?

# Skills and knowledge:

- 4. In your Line of work, you would have managed and helped to estabUsh training standards for the integration of Educational technologies tools. What skills and knowledge should educators have in order to integrate Educational technologies into the lesson?
- 5. Could you provide some examples from the people you have worked with?

### Support:

- 6. What forms of support do educators need in order to integrate Educational technologies tools in the lessons?
- 7. What about training how rigorously or frequently should trainings take place?
- 8. In what other forms can support come in?
- 9. Could you share with me a success story of how educators embraced Educational technologies tools after some training or non-trining initiatives were put in place?

# **ANNEX 5 - OBSERVATION SHEET**

Name of Observer:	С	Date:	Class Code:				
<ul> <li>1 Observation sheet per Observation</li> <li>Other details about the class:</li> </ul>							
Lesson Description:  ◆ Software used  ◆ Materials used  ◆ Hardware used  ◆ Objective / Approach	Observation and Notes on Perceived Student Engagement	SAMR  ◆ Substitution  ◆ - Augmentation  ◆ - Modification  ◆ Redefinition	Duration and other remarks  (EdT's competence in utilising hard/software/ Appropriateness of hard/ software for activities etc)				

	Remarks	Not Observed	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The Educational technologies tool(s) used meets the need of the learner.							
The Educational technologies tool/ material is a replication of existing activity that can be carried out without technology							
The students prepared/ briefed on how to use the Educational technologies tool appropriately.							
The students are aware of how to manipulate the technology to suit their learning needs on their own.							
The EdT is able to manipulate the technology to suit the learning need of the students.							
The EdT is able to deliver differentiated instruction to the students using Educational technologies tool(s).							
The Educational technologies tool meet the students at their current skill levels.							
The EdT is able to perform troubleshooting on the spot.							
The EdT spent minimum/ acceptable time in preparing the Educational technologies tools/ materials during class time.							

#### **ANNEX 6 - SURVEY FOR EDUCATIONAL THERAPISTS**

nterview with Educational Therapists							
Name of Therapist:	(Optional)						
Learning Centre:	(Optional)						
Dear							
TI 1 (	V						

Thank you for participating in this interview. Your responses are very valuable to this study. The information you provide will be kep strictly confidential. You may choose to withdraw from this research participation at any point of time. Please feel free to contact me at soofrina@das.org.sg should you hae further questions about his survey or the research.

#### **Expected Involvement:**

This survey consists of 3 parts (Section A, B and C). All 3 parts will require approximately 10 minutes for completion altogether. Please provide your honest feedback.

#### **Background of Research:**

This research is conducted by Soofrina, the Educational Technologies Coordinator of the Dyslexia Association of Singapore, for the purpose of the dissertation for Master of Arts (Instructional Design and Technology). The information you provide will be used for analysing the training needs among DAS EdTs in their efforts to integrate Educational Technologies resources into the Main Literacy Programme.

Thank you for putting aside some time to do this interview with Soofrina. Your sharing is very valuable to this research and will help to shape the Educational Technologies initiatives in the near future.

5. Murbarak

#### SECTION A: Understanding therapists' current task-related performances

Please read the task-related questions below and tick the box that which best represents you.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	I can use most of the Educational technologies resources fairly well to integrate them into my lessons.					
2	I generally learn new technologies fairly easily.					
3	I have the technical skills I need to operate most of the educational technologies.					
4	I know how to solve my own technical issues (basic troubleshooting for Wi-Fi connectivity, printing etc).					
5	I am able to use web-based collaboration tools in my lesson plans.					
6	I am able to use a wide range of online tools in my classroom (Kahoot, Padlet, Google Docs etc)					
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
7	I am able to use Educational technologies to stimulate my students' critical thinking about real world problems.					
8	I am able to use Educational technologies to guide my students to manage their own learning.					
9	I am able to use Educational technologies to help my students reflect on their own learning.					
10	I am able to facilitate students to engage in collaborative knowledge construction with Educational technologies resources.					
11	I am able to guide my students to construct representations of learning using Educational technologies.					
12	I can use appropriate technologies for the content I have developed for my teaching (eg: multimedia, interactive activities)					
13	I can teach lessons that appropriately combine the subject matter, Educational technologies resource and teaching approach/pedagogy.					
14	I can use strategies that combine content, Educational technologies resources, and teaching approaches that I learnt about in my trainings.					
15	I can select Educational technologies resources to use in my classroom that can enhance what I teach, how I teach and what my students learn.					
16	I can provide leadership in helping other EdTs coordinate the use of Educational technologies resources, content and teaching approaches at the DAS.					

#### SECTION B: Therapists' Current and Expected Educational Technologies related performances

Please read the questions below and circle the number that which best represents you. On the left side, indicate what your current levels are. On the right side, indicate which level is expected of you. Please provide two (2) responses for each item.

Circle the number that represents your current level of competency.		our of	(I) Unsure (2) Rarely (3) Sometimes (4) Often (5) Always	re exp	num pres	ent ed l	the that s yo evel	ur of		
ı	2	3	4	5	Apply basic skills on iPad (save/print/share a working document, etc)	1	2	3	4	5
1	2	3	4	5	Connect the iPad to the laptop to transfer files	1	2	3	4	5
ı	2	3	4	5	Connect the iPad to the projector	1	2	3	4	5
1	2	3	4	5	Set up and operate the Mimio Teah Interactive System	1	2	3	4	5
1	2	3	4	5	Teach and deliver activities through the Mimio Teach Interactive System	1	2	3	4	5
1	2	3	4	5	Connect the iPads to the Munio Teach Interactive System	1	2	3	4	5
1	2	3	4	5	Apply basic skills on the Minuo Teach Interactive System (save/print/modify a working document, etc)		2	3	4	5
1	2	3	4	5	I can perform simple troubleshooting on the iPad				4	5
1	2	3	4	5	T can perform simple troubleshooting on the Mimio Teach Interactive System				4	5
1	2	3	4	5	Perform simple troubleshooting on the projector		2	3	4	5
1	2	3	4	5	Evaluate the appropriateness of an Educational technologies tool for dyslexic learners.	1	2	3	4	5
1	2	3	4	5	Use a simple software to create worksheets (MS Word / Google Doc etc)		2	3	4	5
1	2	3	4	5	Use advanced software to create lesson materials (Powtoons / Plickers etc)	1	2	3	4	5
1	2	3	4	5	Enhance lesson materials with appropriate predesigned multi-media (images, videos etc)	1	2	3	4	5
1	2	3	4	5	Enhance lesson materials with self-designed multi- media (images, videos etc)	1	2	3	4	5
1	2	3	4	5	Present information to students via simple software (MS PowerPoint, Google Slides etc)	1	2	3	4	5
I	2	3	4	5	Present information to students via advanced software (Trello, Google Site etc)	ı	2	3	4	5
١	2	3	4	5	Draw a picture/diagram using Google Drawing, MS Paint	1	2	3	4	5
1	2	3	4	5	Use Educational technologies to improve students' work (spell-check, text-to-speech, etc)	ı	2	3	4	5
1	2	3	4	5	Match Educational technologies resources to students' learning needs	1	2	3	4	5
1	2	3	4	5	Share with parents appropriate Educational technologies resources	1	2	3	4	5

178 S. Murbarak

#### SECTION C: Therapists' Attitudes About Educational Technologies and Refated Training

Please tick the appropriate response and write your response in the spaces provided.

"Educational Technologies (Educational technologies) should be purposefully integrated into the curriculum so that its integration is developmentally and educationally appropriate; and provides opportunities for dyslexic learners to achieve the desired learning outcomes of the DAS Main Literacy Programme."

Which of the following responses best describes your attitude towards the statement above?						
	Strongly Agree Agree Unsure / Neutral Disagree Strongly Disagree					
What c	loes the term "Educational technologies should be purposefully integrated" mean to					
	of the following best describes your feelings about attending training on the use of ional technologies for teaching and learning?					
	Keen Neutral Not keen					
techno would should	e that training on the purposeful integration of educational technologies (Educational logies) for teaching and learning is conducted at the DAS for MLP Programme. What be your training priorities? Rank the following topics according to what you feel you get trained in. Please use number 1 to represent your top priority, number 2 to ent your second priority, up to 3					

	Торіс	Area of Application
1	Introduction to different Educational Technology Resources - General overview of hardware, software and online resources	What are the Educational Technology Resources available to me? (general)
2	Lesson planning with the integration of Educational technologies	How can I plan my lessons with Educational technologies Resources? Why is the Educational technologies resource appropriate?
3	Preparing a variety of lesson materials with Educational technologies	Where can I access various Educational technologies resources?  How can I put together lesson materials using Educational technologies?
4	Educational technologies for student's learning Independent learning Collaborative work As an assistive tool	<b>How</b> can I differentiate the types of purposes in the integration of Educational technologies resources?
5	Assessing my integration of Educational technologies for teaching	<b>How</b> can I assess my integration level as a reflective practitioner?
6	Setup and Troubleshooting of Educational technologies hardware	<b>How</b> can I set up and troubleshoot the various hardware?
7	Other	

1. What types of educational technology (Educational technologies) related training do you prefer? Rank the top 3 topics according to your preferences. Please write the letter (A - F) according to the rank.

# Training Approach A. Attend formal 'workshop conducted by DAS Educational technologies representatives or external professionals (2-3 hours) B. Attend small group training session by DAS Educational technologies representatives with hands-on sharing C. Have sharing online (Educational technologies website/ emails/ e-newsletters) D. Learn from video tutorials only E. Have peer mentoring / coaching F. Others:

RANK 1	RANK2	RANK3

180 S. Murbarak

#### **SECTION D: Factor that affect performance**

The following table lists possible barriers to the efficient usage of educational technologies. Which of the following do you think will affect the use of educational technologies in DAS? Tick (against the box that correspond with your response (major factor/ factor I not a factor)

Possible causes of performance deficiencies	Factor	Not a factor
Difficulty accessing the Educational technologies software		
Difficulty accessing the Educational technologies hardware		
Lack of technical support		
Lack of Educational technologies training/ sharing		
Educational therapists are not motivated to try new Educational technologies resources / hardware		
Educational therapists lack technical skills and knowledge in using Educational technologies resources/ hardware		
Educationa.l therapists fear losing control over the lesson if Educational technologies is integrated in the lesson		
Educational therapists not having enough time for lesson planning with Educational technologies		
Educational therapists having little time to evaluate Educational technologies resources' appropriateness for specific lesson components		
Educational therapists feel that Educational technologies will be a source of distraction for dyslexic learners		_
Others: (Please state)		

#### **SECTION E: EDT's Background**

Please tick the responses that best describe you.

I	What is your gender?	Male			Female		
2	What is your age group?	21 to 30	31 to 40	o 40 41 to 50		60+	
3	What is your highest academic qualification?	Diploma	Degree	Post- Graduate	Master Degree	Doctorate	
4	Years in teaching dyslexic students?	1-5 yrs	6-10 yrs	11-15 yrs	16-20 yrs	21-25 yrs	>25 yrs

Asia Pacific Journal of Developmental Differences Vol. 11, No. 1, July 2024, pp. 181—194 DOI: 10.3850/S2345734124001811



### Designing for Dyslexic Individuals in the digital environment

Wu Junyi<sup>1\*</sup>

Alumni Student of National University of Singapore

#### Abstract

This paper delves into the multifaceted landscape of dyslexia within the context of digital environments, aiming to explore the nuanced challenges faced by dyslexic individuals and propose design interventions to cater to their diverse needs. Dyslexia, recognised as a neurobiological learning disability characterised by difficulties in language processing and reading comprehension, continues to pose unique challenges despite advancements in its understanding and diagnosis. The study draws from interviews conducted with dyslexic individuals, highlighting the spectrum of challenges encountered. It reveals the varied nature of dyslexia experiences, spanning struggles in languagespecific domains, reading difficulties, and individualised approaches to coping with the disability. Furthermore, it critically examines existing digital assistive technologies, emphasising their limitations in meeting the tailored requirements of dyslexic learners, often failing to align with individual learning approaches and impeding effective learning experiences. Acknowledging the dichotomy between the aid provided by assistive tools and the need to cultivate personal skills, this paper advocates for a balanced approach. It explores a range of tools and educational tactics employed by dyslexic individuals, emphasising the importance of personalised, adaptable solutions to accommodate diverse experiences and preferences. The study progresses to present low-fidelity design probes as potential interventions in the digital sphere, focusing on tools that allow gradual skill development and customisation. These prototypes aim to provide tailored support while fostering the growth of personal tactics and skills, aiming to strike a harmonious balance between assistance and skill enhancement. Despite these contributions, this study faces limitations, including a restricted sample size and a lack of longitudinal data. The research methodology could benefit from a more comprehensive approach, integrating quantitative measures and expanding participant diversity to enhance generalisability. Furthermore, a deeper synthesis of existing literature and a more explicit theoretical framework could strengthen the theoretical underpinnings of this study.

#### Keywords:

<sup>\*</sup> Correspondence to: Wu Junyi, Email: wujunyi@u.nus.edu

#### INTRODUCTION

The International Dyslexia Association (IDA) delineates dyslexia as a neurobiologically rooted specific learning disability, typified by impediments in accurate word recognition, deficient spelling, and decoding capabilities (Lyon et al., 2003). These challenges predominantly emanate from underlying phonological deficiencies within language processing, concurrently manifesting in difficulties encompassing reading comprehension, writing, and spelling. The consequential arduous reading experiences often obstruct the expansion of vocabulary and knowledge acquisition among affected individuals.

The etymology of the term 'dyslexia' traces back 130 years to its origination by Rudolf Berlin. Despite its historical legacy, dyslexia persists as a contentious descriptor within the realm of educational policy-making. Its initial inception was fraught with skepticism, as critics dismissed dyslexia as a contrived concept utilised by apprehensive middle-class parents to rationalise their children's underperformance (Kirby, 2020a). Contemporary discourse continues to grapple with the term's pervasive and arguably imprecise application, critiqued for its expansive usage (Elliott & Grigorenko, 2014). Nonetheless, the diagnostic identification of dyslexia in the contemporary milieu has substantially facilitated the advancement of numerous dyslexic individuals, aiding their educational progress and subsequent integration into the workforce, contributing to successful life trajectories (Kirby, 2020b).

The institutional acknowledgment of dyslexia as a disability under The Equality Act of 2010 in the UK further validates its recognition as a lifelong impediment impacting reading, spelling, and directional orientation. This statutory recognition underscores the imperative for comprehensive design interventions aimed at enhancing the quality of life for dyslexic individuals within our societal framework.

Over the past decade, a discernible escalation in projects dedicated to raising awareness of dyslexia has been evident. Simultaneously, numerous educational initiatives have endeavored to empower dyslexic individuals. The current article endeavors to examine the exigencies and prospects inherent in designing solutions tailored for dyslexic individuals, with a particular emphasis on the digital milieu. This exploration seeks to address the distinctive needs of this demographic and unearth opportunities for enhancing their experiences through targeted design interventions.

#### The Dyslexia Experience

The heterogeneous nature of dyslexia is evident in its multifaceted manifestation across individuals, wherein no singular symptom or panacea exists to encapsulate the spectrum of experiences encountered. Broadly classified into phonological and surface dyslexia, these categorisations delineate distinct challenges in language processing. Phonological dyslexia manifests as challenges in phonological processing, divergent from

orthographic competencies, while surface dyslexia denotes pronounced orthographic hurdles relative to phonological skills (Wolff, 2009). However, despite these general classifications, my empirical inquiry involving interviews with three dyslexic individuals in their early twenties revealed diverse and idiosyncratic experiences within this cohort. For instance, while Interviewee A grappled predominantly with Chinese language challenges and obtained an exemption from Chinese language studies, Interviewees B and C encountered obstacles primarily in English spelling and reading. The individualised nature of their experiences with dyslexia spans a spectrum: from perceiving words or letters as 'jumping around' to occasional letter confusion, such as conflating 'd' and 'b'. Notably, this diversity defies clear-cut demarcation between dyslexia categories, underscoring the unique and intricate struggles encountered by each individual in varying degrees of complexity. Ergo, a one-size-fits-all solution is untenable. Addressing these challenges necessitates the intervention of educational therapists adept at assessing individual abilities and tailoring personalised teaching methodologies commensurate with their distinctive diagnoses. This underscores the imperative for bespoke approaches catering to the unique needs of dyslexic individuals.

#### Assisting the Dyslexic in a Digital Environment

Despite a growing shift towards digital educational platforms, a considerable gap exists in the integration of digital assistive technologies tailored for dyslexic learners. Present digital tools, while attempting to aid dyslexic students, often fail to accommodate their individualised learning approaches and needs (Beachman & Alty, 2006). This mismatch results in inadequate accessibility and convenience, hindering rather than enriching the learning experiences of dyslexic students (Roberts, 2019). Unlike the adaptability of teachers in physical classrooms, current e-learning tools struggle to cater to diverse learning styles and individual abilities.

Throughout the interview sessions, participants emphasised the imperative need for self-training in refining their reading and writing abilities subsequent to their diagnosis at the Dyslexic Association of Singapore (DAS). The diagnostic reports issued by DAS delineate areas of strength and weakness in various cognitive components like verbal and non-verbal reasoning, pattern construction, and sequential reasoning, among others. Subsequent to this assessment, individuals enroll in DAS for structured instructional sessions, encompassing a generalised curriculum spanning Mathematics, Science, or English. Notably, the educational therapists at DAS employ adaptive pedagogical methodologies tailored to each participant's needs within the group setting.

These strategies include elucidating patterns in word sequences, facilitating left-to-right eye movement through systematic exercises, recognising common letter clusters, and imparting linguistic conventions. However, a critical distinction arises between interventions fostering personal skill development and a distinct category of tools solely designed for assistance without concurrently fostering skill acquisition. While immediate

assistive tools offer aid, overreliance on them might impede the cultivation of personal skills among dyslexic individuals. Nonetheless, recognising the diverse capacities of individuals, the availability of these assistive tools remains indispensable.

#### Assistance or Over-reliance?

Throughout the interview sessions, participants disclosed the imperative need for self-training in refining their reading and writing abilities subsequent to their diagnosis at the Dyslexic Association of Singapore (DAS). The diagnostic report issued by DAS delineates areas of strength and weakness in various cognitive components like verbal and non-verbal reasoning, pattern construction, and sequential reasoning, among others. Subsequent to this assessment, individuals are enrolled in DAS for structured instructional sessions, encompassing a generalised curriculum spanning Mathematics, Science, or English. Notably, the educational therapists at DAS employ adaptive pedagogical methodologies tailored to each participant's needs within the group setting. These strategies include elucidating patterns in word sequences, facilitating left-to-right eye movement through systematic exercises like orderly alphabet tracing or recognising common letter clusters such as "ing," "that," and imparting linguistic conventions like the impact of silent 'E' in elongating vowels within English words.

The pedagogical approaches implemented at DAS aim to cultivate individualised competencies and compensatory mechanisms tailored to address the challenges inherent in dyslexia.

Remarkably, these tactics often camouflage the inherent difficulties, enabling individuals to function conventionally within educational settings. Dyslexic individuals may also harness compensatory strengths, fostering opportunities for enhanced learning and development (Tunmer & Greaney, 2010). However, an important distinction arises between interventions fostering personal skill development and a distinct category of tools solely designed for assistance without concurrently fostering skill acquisition. For instance, the Open Dyslexic font, purportedly optimised for readability and text-to-speech applications, exemplifies this category. While such tools provide immediate assistance, an overreliance on them might impede the cultivation of personal skills and tactics among dyslexic individuals. Nonetheless, recognising that not all individuals possess the capacity to acquire such skills, the availability of these assistive tools remains indispensable. The ideal scenario remains rooted in fostering individualised tactics and skills while judiciously incorporating assistive tools on a supplementary basis.

#### **Observed Tools & Tactics from Research Participants**

Through in-depth interviews and extensive dialogues, a comprehensive inventory of tools and prototypes commonly utilised by dyslexic individuals has been curated, albeit acknowledging the non-exhaustive nature of this compilation. These tools delineate into

two principal categories: assistive and educational, encapsulating a spectrum of resources that have been historically employed or continue to be actively utilised within the dyslexic community. This systematic categorisation serves to elucidate the multifaceted strategies and aids adopted by dyslexic individuals, encompassing a diverse array of solutions tailored to address distinct facets of their challenges.

Table 1. List of Dyslexic Individuals that were interviewed

Interviewees	Age	Gender	Occupation
А	20	Female	Student
В	22	Male	Student
С	25	Male	Student

#### **Assistive Tools:**

- 1. Relating words and letterforms to visuals /shapes.
- 2. Using a grid to write properly.
- 3. Using a finger guide to help them focus on the words they are reading.
- 4. Using highlighters to differentiate between similar letter forms.
- 5. Decluttering of content so it is not so overwhelming.

#### **Educational Tools:**

- 1. Breaking up words into syllables so that it becomes more manageable to read and teaching the right way of breaking word syllables.
- 2. Learning trends and patterns in the language.

The utilisation of tools among dyslexic individuals exhibits a marked divergence attributable to the heterogeneous nature of their dyslexia experiences. Individualised requirements manifest distinctly; while one individual may find benefit in utilising a guiding tool to streamline and enhance focus during reading, another might necessitate the employment of the Open Dyslexia font type to facilitate ease in comprehension.

Despite the efficacy of these tools, a prevailingobservation emerges wherein many dyslexic children persistently exhibit slower reading rates, a trend that often persists into adulthood. Furthermore, dyslexic individuals commonly encounter the need for repeated readings to achieve comprehensive understanding of textual content.

Notwithstanding these challenges, the prospect of substantial progress remains feasible given the provision of suitable pedagogy, training, support, and ample time for skill development. It is acknowledged that while some dyslexic individuals may primarily engage in reading out of necessity, others might cultivate an interest in reading, thereby underscoring the significance of tailored assistance. Hence, ensuring the provision of appropriate support delineates a rewarding trajectory, accommodating diverse needs and fostering progress across individual journeys within the dyslexic community.

#### **Design Research with Low-Fidelity Probes:**

Drawing from the elucidated tactics, a strategic decision was undertaken to construct low fidelity probes encompassing design parameters aimed at facilitating dyslexic individuals' progressive engagement, thereby transitioning from a reliance on purely assistive tools towards skill development. This methodological approach sought to investigate the transformative capacity of digital tools in fostering the cultivation and refinement of personal skills and tactics while dynamically evolving in tandem with users' evolving competencies. The rationale underlying the formulation of these low-fidelity probes aimed to delve deeper into the prospective skills and tactics that could be nurtured and honed within dyslexic individuals, engendering a comprehensive exploration of their developmental trajectories within a digitally mediated context.

The devised low-fidelity probes encompass a series of digitally deployable tools expressly tailored for dyslexic individuals, facilitating their discretionary engagement by allowing for on-demand utilisation and concealment based on situational needs. Among these tools, the initial iteration introduced a word picker feature designed to offer pictorial associations in tandem with selected words. For instance, upon selecting the word "Hot," an accompanying image depicting fire would overlay the chosen term. This strategic incorporation of visual cues aimed to enhance word identification by establishing associative links between words and corresponding visuals. However, concerns were raised regarding potential implications on reading consistency arising from the sustained presence of pictorial references. Consequently, a subsequent refinement involved the development of a revised iteration featuring a floating pictorial reference, addressing apprehensions regarding its sustained impact on reading coherence.

The subsequent tool within the suite of innovations pertains to a decluttering mechanism, meticulously crafted to selectively obscure extraneous information displayed on-screen, with the blurred segment dynamically adjusting in correspondence to the user's individual reading pace. This strategic feature was conceived to mitigate cognitive overload, fostering enhanced concentration on the core content being perused. However, apprehensions emerged regarding the potential imposition of undue cognitive strain, particularly concerning users who prefer a comprehensive view before decluttering. In response to this concern, an iterative enhancement was devised,

emulating a real-life paradigm where users are empowered to utilise a virtual ruler to selectively mask portions of text while preserving unblurred sections yet to be read. This revised mechanism seeks to accommodate diverse user preferences by offering a flexible decluttering interface akin to a personalised reading aid, ensuring an unobtrusive reading experience aligned with individual comfort levels.

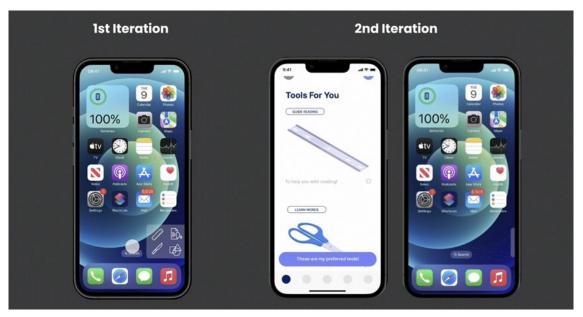


Figure 1. First Design

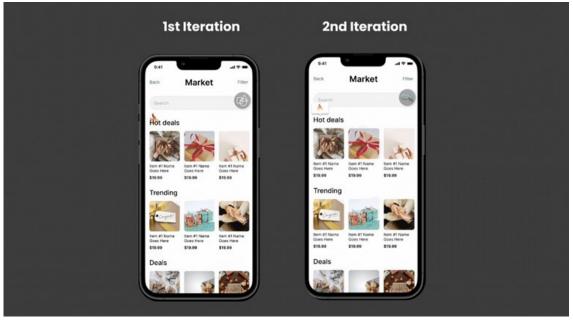


Figure 2. Second Design



Figure 3. Third Design

The third implemented tool embodies a highlighting functionality conceived to dynamically track users' ocular movements and correspondingly emphasise the specific word within their line of sight. This feature operates in tandem with the user's scanning patterns, facilitating an interactive alignment where the highlighting mechanism synchronously moves along with the user's gaze as they peruse the text. Intended to optimise user focus by directing attention to the currently-read word, this tool aims to augment reading comprehension. However, insights gleaned from feedback underscored potential drawbacks, with concerns raised regarding the likelihood of this feature inducing distraction rather than aiding concentration. Such feedback posits a critical perspective, prompting reevaluation and refinement to ascertain its efficacy as an effective aid rather than an inadvertent disruption within the dyslexic user experience.

The final tool introduced is a scissors tool, conceived to segment longer words into constituent syllables, offering users struggling with longer words a systematic approach to decoding. This functionality aligns with the pedagogical strategy of deconstructing complex words into more manageable and comprehensible components, thus facilitating enhanced reading fluency. Feedback received underscored the necessity for an augmented feature encompassing educational dimensions, elucidating the rationale behind the segmentation process and imparting insights into the methodologies employed for word segmentation. Consequently, an educational component was incorporated, designed to equip users with an understanding of the underlying principles

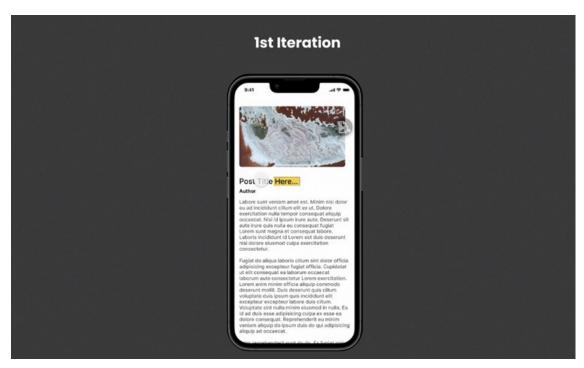


Figure 4. Fourth Design



Figure 5. Fifth Design

governing word segmentation, aiming to empower dyslexic individuals with the knowledge and skills requisite for effective word deconstruction.

Upon soliciting feedback from dyslexic individuals regarding the prototype, several crucial insights emerged. Primarily, the envisioned prototype necessitates a customisable toolkit catering to individual preferences, acknowledging the inherent diversity among dyslexic individuals in their responses to various aids. This bespoke toolkit envisages an array of tools that individuals can selectively adopt based on their idiosyncratic preferences and experiences, recognising their nuanced requirements. For instance, preferences may vary widely in terms of optimal contrast ratios between text and background colors; some individuals may find dark blue text against a cream background more conducive to readability, while others may prefer grey text on a white background. Secondly, the imperative integration of pedagogy within these tools emerges as pivotal. Overcoming the challenges posed by dyslexia inherently entails an understanding of the rationale behind specific skills and tactics. Educating users about the underlying principles and methodologies is paramount, as it empowers them to comprehend and effectively apply these strategies. Consequently, incorporating educational components within the toolkit is deemed essential to foster comprehension and utilisation of these tools.

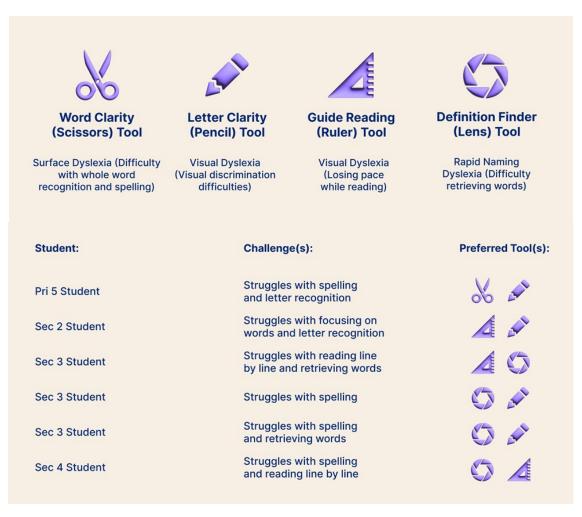
Lastly, addressing the needs of both dyslexic children and adults presents a significant challenge. While younger individuals may be in the process of developing personal tactics, older dyslexic individuals have often established coping mechanisms. Designing a progressive toolkit that accommodates the varying needs and proficiencies of diverse age groups within the dyslexic community becomes imperative. Therefore, an overarching concern pertains to crafting tools that facilitate continual learning and aid, ensuring applicability across diverse age demographics, from children navigating initial challenges to adults seeking supplemental support.

#### **Findings**

In a later version of these digital tools, I presented 6 students from the Dyslexia Association of Singapore (DAS) with a set of 4 tools, namely the scissors tool, pencil tool, ruler tool and lens tool and conducted interviews.

The empirical exploration conducted with six dyslexic individuals revealed distinct preferences and resonances with specific digital tools aimed at addressing their diverse learning challenges. These individuals, aged 11 to 16 and engaged with the Dyslexic Association of Singapore (DAS), articulated unique preferences linked to their learning difficulties. Notably, the scissors tool garnered positive resonance among individuals grappling with whole word recognition and spelling challenges. The segmentation of longer words into manageable syllables using this tool emerged as a favored method among participants, aligning with established pedagogical strategies. Additionally, the

pencil tool, designed to address visual discrimination difficulties, showcased adaptive features such as contrast reduction over successive readings, indicating promising progress towards self-reliance. The ruler tool, targeting pace retention while reading, demonstrated potential enhancements in increasing the number of words displayed per line, aligning with participants' adaptive reading patterns. Lastly, the lens tool, formulated to aid word retrieval difficulties, received commendation for its support in easing word recall.



Participants' feedback emphasised the pivotal role of gradual tool adaptability in fostering independence from reliance on these aids. Notably, the incremental decrease in tool reliance with successive usage sessions emerged as a notable marker of tool effectiveness. Moreover, the incorporation of user analytics within the digital tools showcased promise in fostering sustained user engagement. Extrinsic motivators, such as

experience levels and badges, elicited positive responses, complemented by intrinsic motivators like progress reminders, bolstering continued tool utilisation.

The interviews underscored the heterogeneity of dyslexia experiences, reframing the importance of bespoke interventions catering to individual needs. Participants' preferences for specific tools highlighted the necessity for adaptable digital solutions aligning with their diverse learning difficulties. The insights gleaned from these interviews underscored the significance of personalised approaches in designing digital tools aimed at empowering dyslexic individuals by fostering autonomy and skill development.

#### Literature Review on Self-Esteem and Dyslexia:

Self-esteem plays a pivotal role in the psychological and educational experiences of individuals, particularly those with dyslexia. Numerous studies have underscored the significant correlation between dyslexia and diminished self-esteem (Alexander-Passe, 2006; Humphrey & Mullins, 2002). The persistent struggles faced by dyslexic individuals, such as difficulties in reading, writing, and comprehension, often lead to feelings of inadequacy, frustration, and lowered self-worth (Riddick, 1996).

Research has consistently demonstrated the detrimental effects of dyslexia on self-esteem, especially during formative years in educational settings (Humphrey, 2010; Riddick et al., 1999). The constant exposure to academic challenges coupled with societal misconceptions and stigmatisation exacerbates feelings of incompetence and lowers confidence levels among dyslexic individuals (Humphrey & Mullins, 2002; Riddick, 1996). These negative perceptions about their abilities and performance contribute significantly to the erosion of self-esteem in dyslexic individuals.

However, it's important to note that while dyslexia may pose challenges to self-esteem, individual differences in coping strategies and support systems can mediate its impact (Humphrey, 2010). Research by McArthur and Lewis (1997) highlights the role of supportive environments, effective teaching methods, and positive reinforcement in mitigating the adverse effects of dyslexia on self-esteem. Encouragement and recognition of strengths, as well as efforts aimed at developing coping mechanisms and adaptive strategies, have shown promise in bolstering self-esteem among dyslexic individuals (Humphrey, 2010; Riddick et al., 1999).

Additionally, interventions targeting skill development, individualised learning approaches, and assistive technologies, as discussed in this paper, offer opportunities to enhance self-esteem among dyslexic individuals. By providing tools that accommodate diverse learning styles and acknowledging individual preferences, these interventions aim to empower dyslexic individuals, potentially fostering a sense of competence and efficacy, consequently positively impacting their self-esteem (Humphrey, 2010; Riddick et al., 1999).

In conclusion, the literature strongly emphasises the intricate relationship between dyslexia and self-esteem, highlighting the need for holistic approaches that address educational, psychological, and social aspects to support and uplift dyslexic individuals, ultimately fostering a positive self-concept and confidence.

Limitations:

While this study provided valuable insights into the preferences and effectiveness of specific digital tools among dyslexic individuals, its limitations warrant consideration. The sample size, comprising six participants from a specific age group and within the confines of a particular association, may limit the generalisability of the findings. A broader and more diverse participant pool across various demographics and geographical locations would enhance the study's external validity. Moreover, the qualitative nature of the interviews, while rich in subjective experiences, might introduce interpretative biases. Incorporating quantitative measures or longitudinal studies could bolster the robustness of the findings and offer a more comprehensive understanding of the evolving needs and experiences of dyslexic individuals over time.

#### Conclusion

The pursuit of this project is underpinned by extensive research that underscores the critical role of intervention and support for dyslexic individuals. Studies, such as those by Lyon et al. (2003), Elliott & Grigorenko (2014), and Kirby (2020b), have highlighted the detrimental impact of dyslexia on self-esteem and psychological well-being, emphasising the pressing need for tailored interventions. Research by Tunmer & Greaney (2010) also stresses the importance of personalised teaching methodologies and compensatory strategies in aiding dyslexic individuals to navigate their challenges effectively. Furthermore, studies by Beacham & Alty (2006) have underscored the limitations of existing digital tools in addressing the diverse needs of dyslexic learners, emphasising the necessity for innovative, personalised solutions. Integrating these research insights, the project aims to bridge the gap between research findings and practical implementations by developing adaptable digital tools, honed through co-design workshops, to positively impact the learning experiences of dyslexic individuals, potentially enriching educational curricula at institutions like DAS.

The research in question is distinguished by its targeted focus on addressing the multifaceted challenges faced by dyslexic individuals through innovative digital interventions. This study uniquely combines insights gleaned from existing literature on dyslexia's impact on self-esteem, the necessity for personalised teaching methodologies, and the limitations of current digital tools. Moreover, this research seeks to transcend theoretical frameworks by directly engaging with dyslexic individuals through co-design workshops, ensuring their active involvement in shaping the development of digital tools tailored to their specific needs. By aligning theoretical underpinnings with practical implementation strategies, this research endeavors to foster a transformative impact on

educational practices, potentially influencing the integration of adaptive digital tools within institutional curricula, thereby offering tangible solutions to empower dyslexic learners.

#### REFERENCES:

- Alexander-Passe, N. (2006). How dyslexic teenagers cope: An investigation of self-esteem, coping, and depression. *Dyslexia*, 12(4), 256-275.
- Beacham, N. A., & Alty, J. L. (2006). An investigation into the effects that digital media can have on the learning outcomes of individuals who have dyslexia. *Computers & Education, 47*(1), 74–93. https://doi.org/10.1016/j.compedu.2004.10.006
- Brian, M. (2012). *Apple: 1.5m iPads in Education, Over 20,000 Apps.* TNW | Apple. https://thenextweb.com/news/apple-1-5-million-ipads-in-use-in-educational-programs-offering-over-20000-education-apps
- Elliott, J., & Grigorenko, E. L. (2014). The dyslexia debate. Cambridge University Press. Humphrey, N., & Mullins, P. M. (2002). Self-concept and self-esteem in developmental dyslexia. *Journal of Research in Reading*, 25(2), 102-109.
- Humphrey, N. (2010). Self-esteem and its relationship to mental health and competence in young people with specific learning difficulties. *British Journal of Special Education, 37*(3), 114-121.
- Kirby, P. (2020a). Dyslexia debated, then and now: A historical perspective on the dyslexia debate. *Oxford Review of Education, 46*(4), 472–486. https://doi.org/10.1080/03054985.2020.1747418
- Kirby, P. (2020b). Literacy, advocacy and agency: The campaign for political recognition of dyslexia in britain(1962–1997). *Social History of Medicine, 33*(4), 1306–1326. https://doi.org/10.1093/shm/hkz030
- Lyon, G. R., Shaywitz, S. E., & Shaywitz, B. A. (2003). A definition of dyslexia. *Annals of Dyslexia*, *53* (1), 1–14. https://doi.org/10.1007/s11881-003-0001-9
- McArthur, G. M., & Lewis, V. (1997). *Treating the child with specific phonological difficulties*. European Dyslexia Association, Brussels.
- Ouf, S., Abd Ellatif, M., Salama, S. E., & Helmy, Y. (2017). A proposed paradigm for smart learning environment based on semantic web. *Computers in Human Behavior, 72*, 796–818. https://doi.org/10.1016/j.chb.2016.08.030
- Riddick, B., Sterling, C., & Farmer, M. (1999). Dyslexia and inclusion: Time for a social model of disability perspective? *International Studies in Sociology of Education, 9*(3), 227-251.
- Riddick, B. (1996). Living with dyslexia: The social and emotional consequences of specific learning difficulties/disabilities. Routledge.
- Roberts, D. (2019). Higher education lectures: From passive to active learning via imagery? *Active Learning in Higher Education*, 20(1), 63–77. https://doi.org/10.1177/1469787417731198
- Tunmer, W., & Greaney, K. (2010). Defining dyslexia. *Journal of Learning Disabilities, 43*(3), 229–243. https://doi.org/10.1177/0022219409345009
- Wolff, U. (2009). Phonological and surface subtypes among university students with dyslexia. *International Journal of Disability, Development and Education, 56*(1), 73–91. https://doi.org/10.1080/10349120802682083

Asia Pacific Journal of Developmental Differences Vol. 11, No. 1, July 2024 pp. 195—223 DOI: 10.3850/S2345734124001952



## Evaluating a Reading Comprehension Curriculum and Factors Predicting Reading Comprehension Performance

Fong Pei Yi 1\* and Lay See Yeo2

- 1 Dyslexia Association of Singapore (Formerly)
- 2 National Institute of Education, Nanyang Technological University

#### Abstract

This study comprised two parts. The first was part of a study at the Dyslexia Association of Singapore to monitor the progress of students undergoing literacy intervention with an enhanced reading comprehension curriculum. The reading comprehension performance of primary school students with dyslexia (n = 42) was monitored at three time-points (Time 1: baseline, Time 2: pre-enhanced curriculum and Time 3: post-enhanced curriculum) over the course of two years. Analysis of variance revealed significant improvement in reading comprehension performance from Time 1 to Time 2 and Time 1 to Time 3, but no significant difference between Time 2 and Time 3. Significant improvements were observed only in students with weaker verbal ability from Time 1 to Time 2 whereas students with stronger verbal ability showed no significant changes in reading comprehension performance over time. The second part of the study explored the ability of cognitive factors, namely verbal ability, non-verbal ability, phonological awareness, working memory and rapid naming ability, to predict concurrent (n = 31) and future reading comprehension performance at the end of one (n = 48) and two years (n = 44). There were neither significant correlations between rapid naming ability and reading comprehension performance at any of the time-points, nor between phonological awareness and future reading comprehension performance after one and two years. Verbal ability was a consistent and significant predictor of reading comprehension at the three time-points. Phonological awareness significantly correlated with concurrent reading comprehension performance but did not significantly predict it. Non-verbal ability and working memory significantly correlated with reading comprehension at all time-points but were not significant predictors of reading comprehension across time. Implications and future considerations for reading comprehension intervention were discussed, and theoretical implications with regard to the Simple View of Reading were considered as well.

Keywords: Dyslexia, reading comprehension, curriculum evaluation, reading comprehension predictors

<sup>\*</sup> Correspondence to: Fong Pei Yi, Educational Psychologist Email: pyfong1911@gmail.com

#### INTRODUCTION

According to Lyon, Shaywitz and Shaywitz (2003), dyslexia is a neurobiologically-based specific learning disability that is characterised by difficulties with accurate and fluent word reading, as well as weaknesses in spelling and decoding. In Singapore, the prevalence of dyslexia among school-going children is 2.5 to 5 percent (Ng, 2012), and students with dyslexia form the largest group of those with mild special educational needs in mainstream schools (Lim, 2016). As such, there is a need to help students with dyslexia in their learning.

The Main Literacy Programme (MLP), provided by the Dyslexia Association of Singapore (DAS), is a literacy intervention programme that aims to support dyslexic students. Students of the MLP typically receive two hours of literacy intervention per week, over a term of 10 weeks, for a total of four terms in a year. The MLP targets the following areas for intervention: phonemic awareness and phonics, reading fluency, reading comprehension, vocabulary and writing. This study will explore the reading comprehension aspect of literacy intervention for students with dyslexia.

#### **Enhanced Reading Comprehension Curriculum**

The earlier iteration of the reading comprehension component of the MLP curriculum was somewhat unstructured and had not been developed with as much depth as the phonics, reading and spelling components. It encompassed utilising Bloom's Taxonomy (Krathwohl, 2002) as a guide for developing reading comprehension skills. In addition, reading comprehension strategies such as charts for students to write what they know, what they want to know and what they learned from a passage (KWL; Ogle, 1986), as well as the Survey-Question-Read-Write (SQRW; Strichart & Mangrum, 2002) method were used to help students process passages before, during and after reading. Bloom's taxonomy provided a conceptual framework in which to approach teaching reading comprehension, and the strategies used guided educational therapists in the implementation of intervention.

While these strategies were useful, they were generic in nature, and there was still a need for educational therapists at the DAS to better understand reading comprehension tasks that their students typically encounter in school. In Singapore mainstream schools, reading comprehension assessment is done through tests or examinations that require students to read a short text and answer accompanying open-ended questions in writing (Singapore Examinations and Assessment Board, 2015). Hence, in addition to helping students understand written text, educational therapists also need to be equipped with strategies to help students: (1) understand the reading comprehension questions that accompany text, and (2) draw links between the questions and parts of the text in order to answer the questions.

Given that students with dyslexia already encounter difficulties with decoding and reading, it is important to develop teaching strategies to support them in understanding and answering questions in reading comprehension tasks. In light of this, the DAS sought to introduce more structure and specificity to the existing reading comprehension curriculum. Benjamin (2015) explained that certain text features within a passage, such as "critical vocabulary or conjunctive expressions", are important for the accurate interpretation of text. A taxonomy of textual features was therefore developed based on analyses of past Cambridge University 'O' Levels English reading comprehension questions that secondary school students in Singapore had encountered. Benjamin (2015) explained that this taxonomy could be used by educators to develop reading comprehension activities that are aligned with what students are likely to encounter in their examinations.

Some of the textual features identified in Benjamin's (2015) study were adapted for use in the DAS enhanced reading comprehension curriculum. The adaptations were made to ensure that the curriculum included text types that primary school level students encounter, and also to cater to the varying language abilities of the students at the DAS. Educational therapists at the DAS were then trained to use these specific text features to teach students reading comprehension skills. An example of a text feature that was included in the enhanced curriculum is "referring expressions", which are noun phrases that function to identify a person or an object mentioned in another part of the text. Students can be taught to identify referring expressions in reading comprehension texts, as well as questions that are relevant to this particular text feature. For instance, a passage may contain the phrase, "it was a large spider," where the word "it" is a referring expression. Students may then be taught to answer the question, "What does 'it' refer to?" by highlighting the referring expression and identifying what it refers to (i.e., "a large spider").

Within the enhanced curriculum, the earlier-mentioned textual features are taught as skills to students using the Presentation-Practice-Production (PPP) method (Harmer, 2007). Through this method, students are first shown examples of the textual features that are present in passages and questions (Presentation). They are then guided by educational therapists in practicing the identification of these textual features in the reading comprehension context (Practice). Finally, students are provided opportunities to apply these skills independently (Production). The implementation of the enhanced reading comprehension curriculum at the DAS is currently in its early stages. As such, investigating its effectiveness is required to inform decisions for improvement. The DAS is conducting an on-going study to evaluate students' progress and teachers' attitudes in teaching reading comprehension following the implementation of the enhanced curriculum. The focus of this study is on monitoring students' progress in reading comprehension before and after the implementation of the enhanced reading comprehension curriculum.

#### **Predictors of Reading Comprehension Performance**

Apart from evaluating the progress of students at the DAS, this study also aims to explore the cognitive predictors of reading comprehension. According to the Simple View of Reading (SVR) (Gough & Tunmer, 1986; Hoover & Gough, 1990), reading comprehension is the product of linguistic comprehension and decoding abilities. Support has been found for this framework (Catts, Adlof, & Weismer, 2006; Kendeou, Savage, & van den Broek, 2009), and it has been suggested that the SVR can be used in the context of structuring classroom level reading instruction (Savage, Burgos, Wood, & Piquette, 2015). In view of the consistent support for the SVR, it is expected that verbal cognitive skills and phonological awareness abilities can predict reading comprehension skills. However, researchers have entertained the possibility that other factors can contribute to reading comprehension. Adlof, Catts and Lee (2010) found that in addition to phonological awareness and alphabet knowledge, factors such as naming speed and non-verbal cognitive ability can also predict reading comprehension. Other researchers have also noted that working memory can play a role in reading comprehension as well (Cain, Oakhill, & Bryant, 2004; Georgiou, Das, & Hayward, 2008). Given that working memory deficits have long been associated with dyslexia (Gathercole, Alloway, Willis, & Adams, 2006), it is important to consider its role in reading comprehension performance in students with dyslexia.

#### **Study Objectives**

The objectives of this study are twofold. Firstly, the study aims to examine the changes in reading comprehension skills in students with dyslexia, before and after the implementation of the enhanced curriculum. This part of the study is a component of the ongoing research at the DAS to evaluate the enhanced reading comprehension curriculum. Secondly, the study aims to investigate the ability of the identified cognitive factors to predict reading comprehension performance in students with dyslexia. That is, in addition to linguistic comprehension and decoding skills (i.e., oral language comprehension and ability to decode unfamiliar nonsense words) as outlined in the SVR, can non-verbal cognitive ability, working memory, and rapid naming ability also predict reading comprehension in students with dyslexia?

#### **Research Questions and Hypotheses**

In accordance with the two main objectives of this study, investigation is conducted in two parts.

#### Part one

The first part of the study explores the progress of reading comprehension performance of dyslexic students over the course of two years. The research question and hypothesis for part one of the study are as follows:

#### Research question one

Did the reading comprehension performance of dyslexic students improve following the implementation of the enhanced reading comprehension curriculum?

#### Hypothesis one

It is hypothesised that following the implementation of the enhanced reading comprehension curriculum, students' reading comprehension performance will change significantly.

#### Part two

The second part of the study seeks to explore the ability of the following cognitive factors - verbal ability, non-verbal ability, working memory, phonological awareness, rapid naming ability - in predicting reading comprehension performance in students with dyslexia. The research question and hypothesis of the second part of the study are as follows:

#### Research question two

Can verbal ability, non-verbal ability, rapid naming ability, phonological awareness and working memory predict reading comprehension performance in students with dyslexia?

#### Hypothesis two

It is hypothesised that the identified cognitive factors can significantly predict reading comprehension performance in students with dyslexia.

#### Significance of Study

With the enhancements made to the DAS MLP reading comprehension curriculum, it is important that students' reading comprehension performances are examined. Monitoring the progress of students can provide an indication of the utility of the curriculum. In addition, findings from this study can inform curriculum developers and educational therapists at the DAS about possible changes or improvements that can be made.

With reference to the second research question, it appears that there are factors that can predict reading comprehension performance in children beyond the SVR, and it would be useful to explore these in this study. Further understanding of the predictors of reading comprehension performance in students with dyslexia could add to the existing literature about dyslexia in Singapore. It could also provide parents and educators with information regarding the identification and remediation of reading comprehension difficulties in students with dyslexia. For instance, educators could possibly identify, at the point of assessment, which students are likely to struggle with reading comprehension based on their performance on cognitive factors that are identified in this study. This would then inform the focus of remediation for these students.

#### **Operational Definition of Terms**

The frequently-used terms in this study are defined as follows:

#### Dyslexia

Dyslexia is a specific learning disability that has a neurobiological origin. Individuals with dyslexia typically experience difficulties with accurate and fluent word reading, as well as weaknesses in spelling and decoding. Secondary issues associated with dyslexia include limited reading experience that affects the development of reading comprehension skills and the accumulation of vocabulary knowledge (Lyon et al., 2003).

#### Reading comprehension

Reading comprehension is the ability to understand written discourse. According to the SVR, reading comprehension is a product of linguistic comprehension, which refers to the interpretation of words, sentences or discourse; and decoding, which is the recognition of words without attaching context (Gough & Tunmer, 1986).

#### **Verbal ability**

Verbal ability refers to a component of an individual's cognitive ability that involves linguistic comprehension skills. It includes vocabulary knowledge and the ability to identify concepts that underlie words.

#### Non-verbal ability

Non-verbal ability is a component of an individual's cognitive ability that involves analysis and reasoning with non-verbal concepts such as abstract visual patterns and sequences or quantity comparisons.

#### Working memory

Working memory refers to an individual's abilities in recalling and mentally manipulating information. A three-component model of working memory was proposed by Baddeley and Hitch (1974), which comprises a central executive component, a visuospatial sketchpad, and phonological loop. Deficits in working memory have been associated with dyslexia (Gathercole et al., 2006).

#### Phonological awareness

Phonological awareness refers to the ability to perceive and mentally manipulate word sounds. This includes the abilities to segment or break down words into their component sounds, blend sounds to form words, or to isolate sounds within words. Phonological awareness plays a significant role in the development of decoding skills, and the reading difficulties that people with dyslexia experience are usually associated with weaknesses in the area (Lyon et al., 2003).

#### Rapid naming ability

Rapid naming ability, or rapid automatised naming, refers to the ability to quickly name a series of visually-presented familiar objects or symbols. Deficits in rapid naming ability are associated with difficulties in reading fluently and it is commonly observed in individuals with dyslexia (Norton & Wolf, 2012).

#### **METHODOLOGY**

This paper is based on the first author's dissertation submitted in fulfilment of the requirements for the degree of Master of Arts (Applied Psychology) at the National Institute of Education (NIE), Nanyang Technological University, under the same title (Fong, 2018).

#### **Participants**

Existing students at the Dyslexia Association of Singapore (DAS) who underwent psychological assessments in 2015 were identified through enrolment records. Participants were recruited through information sheets disseminated to their parents. A total of 55 students, who were previously diagnosed with dyslexia following a psychological assessment, were recruited for this study (41 male, 14 female). At the point of recruitment in June 2016, participants' ages ranged from seven to 12 years ( $M_{oge}$  = 10.69;  $SD_{oge}$  = 1.26), and their grade levels ranged from Primary Two to Primary Five.

Over the course of the study, 13 participants withdrew from the study. No formal tracking was done to identify the reasons for withdrawal. However, anecdotally, some reasons cited include scheduling conflicts that made it difficult to attend data collection sessions, and graduation from the literacy intervention programme. It was therefore unlikely that the participants withdrew due to negative perceptions about the programme. The final number of participants was 42 (32 male, 10 female). As such, the statistical comparisons of reading comprehension performance were conducted based on this sample of 42 participants. Their ages ranged from seven to 12 years at the point of recruitment ( $M_{oge}$  = 10.70;  $SD_{oge}$  = 1.24).

For the statistical analyses that determined the predictors of reading comprehension performance, it was noted that not all of the participants had available scores for the Working Memory and Phonological Processing factors from their assessments in 2015. As such, those with missing values in the dataset for these factors, as well as those with missing reading comprehension scores due to attrition, were excluded from the analyses. This resulted in a sample sizes of n = 31 (21 male, 10 female;  $M_{oge} = 10.45$ ,  $SD_{oge} = 1.37$ ), n = 48 (35 male, 13 female;  $M_{oge} = 10.75$ ,  $SD_{oge} = 1.22$ ), and n = 44 (34 male, 10 female;  $M_{oge} = 10.78$ ,  $SD_{oge} = 1.21$ ), for the analyses of 2015, 2016 and 2017 reading comprehension performance, respectively.

#### Measures

#### Reading comprehension

Measures of reading comprehension were obtained using the Reading Comprehension subtest of the Wechsler Individual Achievement Scale, 3rd Edition (WIAT-III; PsychCorp, 2009a). The WIAT-III is an individually administered test battery commonly used to assess the achievement of children aged four to 19 years of age. Normed in the United States (US), the WIAT-III Reading Comprehension subtest has an established average internal reliability of .88 across age-groups (PsychCorp, 2009b). On the WIAT-III Reading Comprehension subtest, participants were required to read passages and verbally answer questions based on what they had read. Subtest standard scores were used in this study.

#### Verbal ability

Measures of participants' verbal ability were obtained from their archived assessment data obtained in 2015. Depending on the tests used in their respective assessments, participants' scores were obtained from the either the Verbal cluster of the Differential Ability Scales, 2nd Edition (DAS-II; Elliot, 2007a) or the Verbal Comprehension Index from the Wechsler Intelligence Scale for Children, 4th (WISC-IV; Wechsler, 2003a) and 5th Editions (WISC-V; Wechsler, 2014a).

The DAS-II Verbal cluster comprised subtests that required participants to identify similarities between words and explain the definitions of words. Normed in the US, the DAS-II has established evidence for validity, and the Verbal cluster has an average internal reliability coefficient of .89 (Elliot, 2007b). The WISC-V Verbal Comprehension Index (VCI) subtests also assessed participants on their ability to identify similarities among words and to explain the meanings of words. The WISC-V was normed in the US and evidence was found for its validity (Wechsler, 2014b). The WISC-V VCI has established internal reliability with an average coefficient of .92 (Wechsler, 2014b). The WISC-IV comprised subtests similar to that of WISC-V, with an additional one that assessed participants on their knowledge of general principles and social situations. The WISC-IV has evidence of validity and the WISC-IV VCI has established internal reliability, with an average coefficient of .94 (Wechsler, 2003b).

There is some evidence of the comparability between the composites measuring verbal ability. The correlation between DAS-II Verbal cluster and the WISC-IV VCI had a coefficient of .73 (Elliot, 2007b), whereas the correlation coefficient for the relationship between the WISC-IV VCI and WISC-V VCI was found to be .85 (Wechsler, 2014b). No correlation studies were available that examined the relationship between the DAS-II Verbal cluster and the WISC-V VCI.

#### Non-verbal ability

Measures of participants' non-verbal ability were obtained from their archived assessment data obtained in 2015. These comprised composite standard scores from the DAS-II, WISC-IV and WISC-V. The DAS-II Non-verbal cluster comprised subtests that required participants to identify the missing figure within a grid pattern and to identify figures or numbers that fit into a sequential pattern. It has established internal reliability with an average coefficient of .92 across age-groups (Elliot, 2007b). The WISC-V Fluid Reasoning Index (FRI) involved subtests where participants had to identify missing figures within grid or sequential patterns, as well as make quantitative comparisons. It has established internal reliability with an average reliability coefficient of .93 (Wechsler, 2003b). The WISC-IV Perceptual Reasoning Index (PRI) included subtests that required participants to use blocks to construct given patterns, to identify commonalities between pictures, and to identify missing figures within grid patterns. It has an average internal reliability coefficient of .92 (Wechsler, 2003b).

Some evidence of the comparability between the composites measuring non-verbal ability was found. The correlation between DAS-II Non-verbal Reasoning cluster and the WISC-IV PRI had a coefficient of .71 (Elliot, 2007b), whereas the correlation coefficient for the relationship between the WISC-IV PRI and WISC-V FRI was found to be .63 (Wechsler, 2014b). No correlation studies were found that examined the relationship between the DAS-II Non-verbal Reasoning cluster and the WISC-V FRI.

#### **Working memory**

Measures of participants' working memory were obtained from their archived assessment data obtained in 2015. These comprised composite standard scores from the DAS-II, WISC-IV and WISC-V. The DAS-II Working Memory cluster is made up of subtests that required participants to recall auditory information verbatim or in a specified sequence. It has an established average internal reliability coefficient of .95 (Elliot, 2007b). The WISC-IV Working Memory Index (WMI) comprises subtests that also required participants to recall and mentally manipulate auditory information. It has an average internal reliability coefficient of .92 (Wechsler, 2003b). The WISC-V WMI is made up of subtests that required participants to recall sequences of both auditory and visual information, and it has an internal reliability of .92 (Wechsler, 2014b).

There is some evidence of the comparability between the composites measuring working memory. The correlation between DAS-II Working Memory cluster and the WISC-IV WMI had a coefficient of .74 (Elliot, 2007b), whereas the correlation coefficient for the relationship between the WISC-IV WMI and WISC-V WMI was found to be .65 (Wechsler, 2014b). There were no studies available that examined the relationship between the DAS-II Working Memory cluster and the WISC-V WMI.

#### Phonological awareness

Participants' phonological awareness was measured using the DAS-II Phonological Processing subtest and the Phonological Awareness composite of the Comprehensive Test of Phonological Processing, 2nd Edition (CTOPP-2; Wagner, Torgesen, Rashotte & Pearson, 2012). The DAS-II Phonological Processing subtest assessed participants on their abilities in rhyming, as well as blending, segmenting and isolating phonemes within words. It has an average internal reliability coefficient of .89 (Elliot, 2007b). The CTOPP-2 Phonological Awareness composite comprised subtests that tested participants on their abilities to delete, blend, and isolate phonemes within words. Evidence had been found to support the validity of the CTOPP-2, and the Phonological Awareness composite has an average internal reliability coefficient of .92 (Wagner et al., 2012). Participants' phonological awareness scores were obtained from their archived assessment data obtained in 2015. Comparability between the DAS-II Phonological Processing subtest and the CTOPP-2 Phonological Awareness composite was not established as there were no studies available that examined the relationship between these two measures.

#### Rapid naming

Participants' rapid naming skills were measured using the DAS-II Rapid Naming subtest and the Rapid Symbolic Naming composite of the CTOPP-2. The DAS-II Rapid Naming subtest assessed participants on their abilities in naming objects and colours quickly. It has an average internal reliability coefficient of .81 (Elliot, 2007b). The CTOPP-2 Rapid Symbolic Naming composite comprised subtests that tested participants on their abilities to quickly name letters and digits. It has an average internal reliability coefficient of .92 (Wagner et al., 2012). Participants' phonological processing scores were obtained from their archived assessment data obtained in 2015. Comparability between the DAS-II Rapid Naming subtest and the CTOPP-2 Rapid Symbolic Naming composite was not established as there were no studies available that examined the relationship between the two measures.

#### **Reading Comprehension Curriculum**

At DAS, reading comprehension is taught as part of the Main Literacy Programme (MLP). The MLP is a literacy intervention programme designed to provide support for students with dyslexia in the areas of reading, spelling and writing. Students of the MLP receive two one-hour sessions of literacy intervention per week, over a term of 10 weeks, and they attend four terms of intervention over the course of a year. This frequency translates to 80 hours of literacy intervention a year. Educational therapists at the DAS are required to include reading comprehension activities for a minimum of five out of the 10 weeks of a term.

It should further be noted that the participants' attendance at the intervention sessions was not formally tracked over the course of this study. However, for students to continue receiving literacy intervention at the DAS, they are required to attend at least 85% of the

sessions in a term. Hence, it is likely that the participants of this study received 68 to 80 hours of intervention with the previous reading comprehension curriculum, as well as with the enhanced curriculum.

The enhanced reading comprehension curriculum comprised a series of skills that enable students to identify various text features in passages and questions, which they could use to aid their comprehension of text. The skills are separated into three categories: Basic, which includes skills such as learning how to identify literal questions and referring expressions; Intermediate, which involves learning about types of vocabulary such as synonyms, metaphors, as well as identifying contextual clues; and Advanced, which involves learning about more complex language features such as irony or connotative phrases.

In addition to the reading comprehension skills described, educational therapists also focus on building listening comprehension skills in students with weaker verbal ability. This is done through strategies such as teaching students how to listen for and identify the main idea in a passage that they hear, such as an audio recording of an advertisement; listening for details, such as having students follow detailed verbal instructions for classroom activities, e.g., colouring pictures in a particular way; and sequencing of events, where students may do activities such as sequencing picture cards according to chronological order.

#### **PROCEDURE**

This study was part of a project to evaluate the outcomes of an enhanced reading comprehension curriculum at the DAS, and it is focused on monitoring the progress of reading comprehension performance in students with dyslexia. As such, permission was obtained from the DAS research committee to use the data collected. Approval was also sought and obtained from the Institutional Review Board of the Nanyang Technological University to carry out the study.

It was explained to the participants' parents that data from participants' 2015 assessment would be retrieved, and that the participants would be tested on their reading comprehension skills on two occasions, once in 2016 and another in 2017. It was also indicated that participation in the research study was voluntary and could be withdrawn at any point, and that data would remain confidential and presented at a group level. For joining the study, parents were given the option to attend a complimentary reading comprehension workshop at the DAS Academy. Parents indicated their consent to allow their children to participate in the study by returning the signed consent form to the DAS researchers.

Participants' 2015 assessment scores in reading comprehension, verbal ability, non-verbal ability, phonological processing, working memory and rapid naming ability were

obtained through the DAS online database. Scaled scores from the DAS-II phonological processing and rapid naming subtests were converted to standard scores with means and standard deviations that were comparable to scores from the CTOPP-2 Phonological Awareness and Rapid Symbolic Naming composites, respectively.

Reading comprehension measures were obtained by testing the participants individually on the WIAT-III Reading Comprehension subtest, once over the period of June to September 2016, at the end of receiving a year of literacy intervention that incorporated the previous reading comprehension curriculum. From July to August 2017, participants were tested again on the WIAT-III Reading Comprehension subtest, after receiving a year of literacy intervention that incorporated the enhanced reading comprehension curriculum. Testing sessions were conducted at DAS learning centres by psychologists from the DAS and research assistants who were trained in the administration of the WIAT-III Reading Comprehension subtest. The purposes of the study were explained to the participants, and they were informed about the types of data that would be collected for the study. They then indicated their assent to participate in the study by filling out their names in a form. Participants were administered item sets of the WIAT-III Reading Comprehension subtest that corresponded to their grade level at each time of testing. Raw scores were then converted to standard scores for analysis.

It was anticipated that the participants of this study may be taught by different educational therapists over the years, and it is likely for educational therapists to have individual differences in the teaching of the enhanced reading comprehension curriculum. As such, information from the evaluation of the participants' educational therapists was obtained to determine if educational therapists had implemented the reading comprehension curriculum as per their training. During these evaluations, videos and lesson plans that were submitted by educational therapists were reviewed by the DAS quality assurance team.

#### Research Design and Data Analytic Plan

The present study adopted a within-subject, action research design for the analysis of participants' progress in reading comprehension before and after the implementation of the enhanced reading comprehension curriculum. An observational research design involving standard multiple regression was used to determine whether reading comprehension performance was predictable by cognitive factors (i.e. verbal ability, nonverbal ability, working memory, phonological awareness and rapid naming ability).

To compare participants' reading comprehension performances over the three years, a one-way repeated measures analysis of variance (ANOVA) was done to compare the participants' reading comprehension performance at three time points over three years. The independent variable was the time of testing (i.e. 2015, 2016 and 2017), and the dependent variable was the participants' WIAT-III Reading Comprehension subtest

scores. To get a further understanding of how verbal ability may impact reading comprehension progress, the data obtained was split according to "High" and "Low" verbal ability and analysed again using a one-way repeated measures ANOVA. The "High" group comprises those who obtained verbal ability standard scores of 90 and above in 2015, and the "Low" group was made up of those who obtained standard scores of below 90. The standard score of 90 was used in accordance to the DAS guidelines for determining the placement of students with weaker verbal ability in classes that place a stronger emphasis on language development.

Multiple regression analyses were used to determine if the five cognitive factors (i.e. verbal ability, non-verbal ability, working memory, phonological processing and rapid naming ability) were significant predictors of concurrent and future reading comprehension performance. Participants' scores on these five factors during their 2015 assessments were identified as potential predictors for reading comprehension performance in 2015, 2016 and 2017, as measured on the WIAT-III Reading Comprehension subtest.

All analyses were conducted using the IBM SPSS statistics software, version 20. An alpha value of .05 was used for all statistical tests.

#### **RESULTS**

#### **Progress in Reading Comprehension**

To answer the first research question of whether the reading comprehension performance of students with dyslexia improved following the implementation of the enhanced reading comprehension curriculum, a one-way repeated measures ANOVA was conducted to compare participants' (n = 42) performance at three time points over two years: Time 1, which refers to a baseline measure of reading comprehension; Time 2, when reading comprehension performance was measured pre-enhanced curriculum; and

Table 1. Descriptive Statistics for Reading Comprehension Performance at Three Timepoints

Time of testing	n	М	SD
Time 1 (Baseline)	42	91.19	9.67
Time 2 (Pre-enhanced curriculum)	42	94.90	8.84
Time 3 (Post-enhanced curriculum)	42	95.31	11.56

Time 3, when reading comprehension was measured a year after the enhanced

curriculum was implemented. There was a significant effect for time of testing, Wilk's Lambda = .82, F(2, 40) = 4.38, p = .02, multivariate partial eta squared = .18. Pairwise comparisons, using the Least Significant Difference t-test, revealed that there was significant increase in mean reading comprehension performance from Time 1 to Time 2 (p = .01), and from Time 1 to Time 3 (p = .03). There was no significant difference in reading comprehension scores from Time 2 to Time 3. Descriptive statistics from this analysis are summarised in Table 1.

To provide further insight into how verbal ability may impact participants' progress in learning reading comprehension, two separate ANOVA analyses were done to compare the reading comprehension scores over three years, of participants with "Low" verbal ability (i.e. those who obtained a verbal ability score below 90; n = 13), and with "High" verbal ability (i.e. those who obtained a verbal ability score of 90 and above; n = 29). For participants with "Low" verbal ability, significant effect of time was found, Wilk's Lambda = .28, R(2, 11) = 14.10, p = .001. Pairwise comparisons, using the Least Significant Difference t-test, showed significant increase in reading comprehension scores from Time 1 to Time 2 (p < .001). No significant differences in scores were found from Time 1 to Time 3 and Time 2 to Time 3. For participants with "High" verbal ability, no significant effects of time were found. A summary of the group means is provided in Table 2.

Table 2: Descriptive Statistics for Reading Comprehension Performance

	Low	verbal a	bility	High verbal ability			
Time of testing	n	М	SD	n	М	SD	
Time 1 (Baseline)	13	85.54	8.84	29	93.72	9.05	
Time 2 (Pre-enhanced curriculum)	13	93.15	9.97	29	95.69	8.35	
Time 3 (Post-enhanced curriculum)	13	88.92	9.07	29	98.17	11.54	

#### **Predictors of Reading Comprehension**

The second research question of this study was whether cognitive factors such as verbal ability, non-verbal ability, working memory, phonological awareness and rapid naming ability could predict reading comprehension performance. To establish if there were linear relationships between the measures of the five cognitive factors taken in 2015, with participants' reading comprehension performances in 2015, 2016 and 2017, correlation analyses were done using Pearson product-movement correlation coefficient. Correlation

coefficients are summarised in Table 3. Reading comprehension performance in 2015 showed significant, positive correlation with participants' verbal ability, non-verbal ability, working memory and phonological awareness at the p < .01 level, with r ranging from .46 to .63. There was no significant correlation between participants' 2015 reading comprehension and rapid naming scores.

Table 3. Correlations of Measures of Cognitive Factors with Reading Comprehension Performance

Measures	1	2	3	4	5	6	7	8
Verbal ability (2015)	-	.51**	.46**	.34*	.14	.63**	.56**	.67**
n		55	52	34	37	53	50	46
Non-verbal ability (2015)		-	.48**	.17	.14	.52**	.47**	.46**
n			52	34	37	53	50	46
Working memory (2015)			-	.32	.44**	.46**	.43**	.45**
n				31	34	51	48	44
Phonological awareness (2015)				-	14	.49**	.31	.28
п					30	33	32	27
Rapid Naming (2015)					-	.09	.28	.15
n						35	34	31
Reading Comprehension (2015)						-	.63**	.45**
n							49	46
Reading Comprehension (2016)							-	.49**
n								42
Reading Comprehension (2017)								-
* p < .05: ** p < .01								

<sup>\*</sup> p < .05; \*\* p < .01

<sup>© 2024</sup> Dyslexia Association of Singapore Limited www.das.org.sg

Participants' reading comprehension performances in 2016 and 2017 showed significant, positive correlations with their 2015 measures of verbal ability, non-verbal ability and working memory, at the p < .01 level. Pearson r values ranged from .43 to .56 for correlations between measures of cognitive factors with 2016 reading comprehension scores, and from .45 to .67 for correlations with 2017 reading comprehension scores. Cognitive factors that did not show significant linear relationships with reading comprehension scores were omitted from the multiple regression analyses. As such, rapid naming ability was excluded from the analysis using 2015 reading comprehension scores as a dependent variable. In addition, rapid naming ability and phonological awareness were excluded from analyses using 2016 and 2017 reading comprehension performance.

Multiple regression was used to investigate the ability of four measures of cognitive factors taken in 2015 (i.e., verbal ability, non-verbal ability, working memory, and phonological awareness) to predict reading comprehension performance in the same year. In addition to the assumption of linearity, preliminary analyses were conducted to ensure no violation of assumptions of normality, multicollinearity and homoscedaticity. This procedure was also applied to all subsequent regression analyses. Given that phonological awareness is often associated with dyslexia, predictors were entered into the regression model in a hierarchical fashion. Phonological awareness was entered in the first step of the regression model to control for its influence. Verbal ability, non-verbal ability and working memory were entered at the second step. A summary of the regression statistics is provided in Table 4.

Table 4. Predictors of 2015 Reading Comprehension Performance

Predictors	N	В	SE B	β	t	p
Step 1						
Phonological awareness	31	.52	0.17	.49	3.06	.005
Step 2						
Phonological awareness	31	0.29	0.16	.27	1.78	.09
Verbal ability	31	0.29	0.14	.33	2.12	.04
Non-verbal ability	31	0.06	0.12	.08	0.45	.66
Working memory	31	0.33	0.20	.29	1.60	.12

After entry of phonological awareness at Step 1, phonological awareness contributed significantly to the regression model, F(1, 29) = 9.38, p = .005, and explained 24.4% of the variance in reading comprehension performance. After entry of verbal ability, non-verbal ability and working memory at Step 2, the total variance in reading comprehension performance explained by the model as a whole was 50%, F(4, 26) = 6.49, p = .001. Verbal ability, non-verbal and working memory explained an additional 26% of variance in reading comprehension after controlling for phonological awareness, R2 change = .26, F(4, 26) = 4.43, F(4

To investigate whether 2015 measures of cognitive factors (i.e., verbal ability, non-verbal ability and working memory) could significantly predict reading comprehension performance in 2016, standard multiple regression was used. The total variance in reading comprehension performance explained by the model as a whole was 40.1%, F(3, 44) = 9.82, p < .001. In this regression model, only verbal ability was found to be a statistically significant predictor ( $\beta = .40$ ), p = .004. A summary of the regression statistics is provided in Table 5.

Table 5. Predictors of 2016 Reading Comprehension Performance

Predictors	N	В	SE B	β	t	p
Verbal ability	48	0.31	0.10	.40	3.02	.004
Non-verbal ability	48	0.13	0.08	.22	1.59	.12
Working memory	48	0.13	0.10	.17	1.24	.22

For reading comprehension scores obtained in 2017, participants' 2015 scores in verbal ability, non-verbal ability and working memory were entered as predictors in a standard multiple regression analysis.. The total variance in reading comprehension performance explained by the model as a whole was 49.1%, F(3, 40) = 12.87, p < .001. In this regression model, only verbal ability was found to be a statistically significant predictor  $(\beta = .54)$ , p < .001. A summary of the regression statistics is provided in Table 6.

Table 6. Predictors of 2017 Reading Comprehension Performance

Predictors	N	В	SE B	β	t	p
Verbal ability	44	0.47	0.12	.54	4.10	<.001
Non-verbal ability	44	0.07	0.09	.10	0.75	.46
Working memory	44	0.19	0.11	.21	1.63	.11

#### DISCUSSION

This study was carried out to evaluate an enhanced reading comprehension curriculum following its implementation at the DAS, and to find out if specific cognitive factors could predict reading comprehension performance in students with dyslexia.

#### **Progress in Reading Comprehension**

#### **Findings**

Participants showed significant progress in reading comprehension performance following a year of intervention with the original curriculum, but did not show significant improvement after receiving a year of intervention with the enhanced reading comprehension curriculum. In addition, further analysis showed that significant improvement between Time 1 and Time 2 was only evident in students with lower verbal ability. Based on the findings from this part of the study, the first hypothesis that students' reading comprehension performance would improve following the implementation of the enhanced reading comprehension curriculum was rejected.

#### **Implications**

The lack of improvement in reading comprehension performance between the time-points before and after the enhanced reading comprehension curriculum was implemented seems to suggest that the enhanced curriculum may not be effective in improving reading comprehension. This outcome is also not in line with research studies showing the utility of reading comprehension strategies such as question asking (NRP, 2000) and reciprocal teaching (Duke & Pearson, 2009; Pilonieta & Medina, 2009), which have elements similar to strategies used in the enhanced reading comprehension curriculum. Nonetheless, it should be noted that, given that age-based standard scores were used in the analysis, having no significant differences in mean performance

suggests that participants did not lag further behind their age-matched peers in reading comprehension skills despite having reading difficulties associated with dyslexia, and in some cases weaker verbal ability as well.

There are some possible explanations for the lack of improvement in students' reading comprehension performance following the implementation of the enhanced curriculum, and three in particular are discussed. Firstly, give that this was the first year of implementation, educational therapists may not have achieved familiarity with using the reading comprehension curriculum. Findings from the NRP (2000) report suggested that improvements in teacher knowledge and practice conferred benefits to student achievement. It is also unclear whether the educational therapists implemented the new curriculum as planned. As the current study did not look into educational therapists' knowledge and familiarity with the curriculum, and that information on instruction fidelity was unavailable, it would be useful for future studies evaluating the curriculum to take teacher knowledge and understanding of the material into consideration.

Secondly, the intensity of reading comprehension intervention could affect reading comprehension outcomes as well. In their meta-analysis of one-to-one teaching programmes for elementary school students at-risk for reading failure, Elbaum, Vaughn, Hughes and Moody (2000) found evidence to suggest that instructional time for intervention was more effective when delivered more intensely than when spread out. In addition, Rose (2009) suggested that once-weekly sessions of reading intervention may not be enough to ensure progress, and recommended daily sessions instead. At the DAS, literacy intervention is taught at a frequency of twice a week over a term of 10 weeks, and reading comprehension is only taught for not more than 50% of the lessons in a term. The intensity at which reading comprehension intervention is delivered may therefore be insufficient for students to show improvement in their performance.

Thirdly, the use of the WIAT-III as an assessment tool of reading comprehension skills in this study may not have been in line with what was taught through the enhanced reading comprehension curriculum. It is unclear whether the passages and questions in the WIAT-III Reading Comprehension subtest contained the specific textual features that were taught to students through the enhanced reading comprehension curriculum. While the use of the WIAT-III was useful in providing information about participants' reading comprehension skills in general, it would be useful for future studies to include curriculum-based measures, developed based on specific elements of the enhanced reading comprehension curriculum, to find out if students had understood what was taught and were able to apply the skills that they had learnt. Findings from curriculum-based measures can also be compared with that from standardised tests of reading comprehension to provide a fuller picture about the utility of the enhanced curriculum.

Another interesting finding is that while students showed improvement in their reading comprehension performance between Time 1 and Time 2 (i.e. before and after a year of

intervention with the previous reading comprehension curriculum), the improvement was found only in students with lower verbal ability. A possible explanation for this is the use of the WIAT-III Reading Comprehension subtest as the measure for reading comprehension performance. Keenan, Betjemann and Olson (2008) found that listening comprehension explained more variance than decoding skills for reading comprehension performance on tests that required reading of medium to long passages and for students to provide responses to answers in a multiple-choice format, giving short answers to questions or using retell. Conversely, decoding skills explained more variance than listening comprehension for reading comprehension performance on tests that required students to read single sentences or short passages, and for them to respond by selecting pictures, or completing cloze sentences. As the WIAT-III requires passage reading and the provision of short-answer questions, it appears similar to the former type of assessment, which seems to be more sensitive to students' listening comprehension skills. At the DAS, educational therapists focus on building listening comprehension skills in students with weaker verbal ability. As such, the changes in reading comprehension performance could reflect students being more sensitive to an increased focus on developing language skills rather than decoding skills.

#### **Predictors of Reading Comprehension**

With regard to second part of this study, findings only partially supported the hypothesis that all five factors would significantly predict reading comprehension performance.

#### **Findings**

In the regression analyses for this study, verbal ability was found to consistently predict concurrent and future reading comprehension performance in the participants of this study, and the regression models in this study predicted 40.1 to 50% of variance in reading comprehension performance. The significance of verbal ability as a predictor is in line with previous studies showing the association between verbal ability and reading comprehension performance (Cain & Oakhill, 2006; Cain, Oakhill, & Bryant, 2004; Oullette, 2006; Ricketts et al., 2007). In comparison, although non-verbal ability and working memory showed significant correlations with the measures of reading comprehension at all three time-points, they did not significantly predict reading comprehension at any of the time-points. These findings are consistent with some studies that did not support the abilities of non-verbal ability in predicting reading comprehension (Cutting & Scarborough, 2006; Oakhill & Cain, 2012; Tighe & Schatschneider, 2014). However, they are in contrast to the findings in other studies that showed non-verbal ability (Pammer & Kevan, 2007) and working memory (Cain et al., 2004; Seigneuric et al., 2000) to be significant predictors of reading comprehension.

Phonological awareness taken at the first time-point (i.e. 2015) was only found to be significantly correlated with reading comprehension performance measured in the same

year. It was also found to be a significant predictor of reading comprehension performance when entered as a sole predictor in the first step of the hierarchical regression model. However, the ability of phonological awareness to predict concurrent reading comprehension became insignificant when verbal ability, non-verbal ability and working memory were included in the second step of the regression model; suggesting that, like non-verbal ability and working memory, its contribution to the variance in reading comprehension performance may be subsumed under the contribution of verbal ability. Correlation-wise, the relationships between phonological awareness taken at Time 1 and future reading comprehension performances (taken at Time 2 and Time 3) were no longer significant. This suggests that phonological awareness does not co-vary with future reading comprehension.

It was noted that rapid naming ability only showed significant correlation with working memory, and not with any of the other predictors, nor with participants' reading comprehension scores at the three time-points. Rapid naming ability was therefore excluded from the regression analyses. This is inconsistent with findings from previous studies that demonstrated the role of rapid naming in reading comprehension (Cutting & Scarborough, 2006; Georgiou et al., 2009; Johnston and Kirby, 2006; Manis et al., 1999).

Implications. In this study, verbal ability was shown to predict concurrent and future reading comprehension performance in student with dyslexia. This highlights the importance of verbal ability in the identification of students who may have difficulty with reading comprehension. Once identified, children with weaker verbal ability can be supported in the development of reading comprehension skills through intervention. Specifically, intervention strategies to increase students' vocabulary knowledge and verbal language skills could encourage the development of their reading comprehension skills. Teaching new vocabulary has long been noted to improve reading comprehension performance in students (Beck, Perfetti, & Mckeown, 1982; Bos & Anders, 1990). In addition, a randomised controlled trial conducted by Clarke, Snowling, Truelove and Hulme (2010) revealed that oral language intervention, which included elements of vocabulary training and verbal reasoning activities, improved reading comprehension performance in eight- and nine-year-old children. It was further noted that students who received oral language training performed better than those who underwent textcomprehension training or a combination of text-comprehension and oral language training at the end of intervention and at follow-up testing after 11 months.

Apart from the role of verbal ability in predicting reading comprehension, the finding that non-verbal ability and working memory are significantly correlated with concurrent and future reading comprehension performance but are insignificant predictors supports the idea proposed by Cutting and Scarborough (2006) that non-verbal ability and working memory do not make unique contributions to reading comprehension performance over and above oral language abilities and decoding skills. With this in mind, it appears that the reasoning skills needed in reading comprehension are verbal in nature, rather than

attributed to general non-verbal reasoning abilities. In addition, while the contribution of working memory was insignificant, it may be related to the type of reading comprehension task used in this study. In the WIAT-III Reading Comprehension subtest, students can refer to the passages while answering the questions. Hence, load on working memory is reduced as well. It may be interesting to explore the impact of working memory on other types of reading comprehension tasks in future studies.

The finding that phonological awareness was significantly correlated with concurrent reading comprehension performance but not future reading comprehension skills is consistent with Scarborough's (1998) finding that phonemic awareness does not seem to be a good indicator of the prognosis of reading comprehension ability in children with reading disabilities. Scarborough (1998) further suggested that phonemic awareness was only important to reading development in children up until the second grade. This has implications for the Simple View of Reading (SVR) in that its ability to explain reading comprehension performance may be affected by age. Indeed, Martin, Claydon, Morton, Binns and Pratt (2003) found that younger students relied more on phonological strategies to read, while older readers relied more on orthographic strategies (i.e. visual processing of words). As such, there might be more to reading comprehension than the SVR suggests. In addition, even though phonological awareness was significantly correlated with concurrent reading comprehension performance, it was not a significant predictor of reading comprehension in the regression model when entered with verbal ability. This suggests that the variance in reading comprehension explained by phonological awareness may be subsumed under that explained by verbal ability. This is in line with the findings of a study done by Näslund and Schneider (1991), who used structural equation modeling to demonstrate how the inter-relationships between verbal ability, memory capacity, phonological awareness and decoding speed could predict reading comprehension in German children. It was shown that verbal ability significantly predicted reading comprehension performance, and its influence was exerted both directly as well as indirectly through phonological awareness.

It should further be noted that in this study, regression models only explained a portion of the variance of reading comprehension. Hence, the predictors included in this study did not fully explain reading comprehension in students with dyslexia. In terms of the SVR, it further suggests that listening comprehension and decoding skills may not fully explain reading comprehension as well. Gersten et al. (2001), as well as Quinn (2016), highlighted the importance of background or domain-specific knowledge in contributing to reading comprehension. It has also been demonstrated that prior knowledge has direct and indirect influence (through mediation of inference) on reading comprehension performance in seventh graders (Tarchi, 2010). It may therefore be useful for future studies to further explore the role of background knowledge.

Rapid naming ability was excluded from the regression analysis due to the lack of significant correlations between rapid naming and reading comprehension. This outcome

suggests that rapid naming, or the ability to quickly identify names associated with symbols, is not related to reading comprehension performance, or that the relationship is negligible. It is also possible that the lack of significant relationship was due to the type of stimulus used to measure rapid naming. Majority of the participants' rapid naming scores were derived from the DAS-II Rapid Naming subtest, which assessed purely nonalphanumeric rapid naming ability, where participants named colors and pictures. Although Johnston and Kirby (2006) used a non-alphanumeric rapid naming task and found significant relationship between rapid naming and reading comprehension, other studies reviewed used rapid naming tasks that involved naming letters and digits (Cutting & Scarborough, 2006; Georgiou et al., 2009; Manis et al., 1999). Georgiou et al. (2009) further noted that alphanumeric rapid naming correlated significantly with reading comprehension, while non-alphanumeric rapid naming did not. The ability to make associations between non-meaningful symbols and their names, as is needed in alphanumeric naming, may be more relevant to reading comprehension than nonalphanumeric rapid naming, where associations are made between meaningful colors and pictures to their names. It would therefore be important to consider the nature of the rapid naming task in future studies of reading comprehension.

#### LIMITATIONS OF STUDY

The findings from this study have provided some insight into the area of reading comprehension. However, there were some limitations that impacted the interpretation of the results. For the first part of the study, where students' progress in reading comprehension was measured, there was no control group available for comparison. As such, a definitive conclusion about the effects of the previous and enhanced reading comprehension curriculum could not be made, and possible explanations for the outcome were generally speculative in nature. Secondly, there was a lack of information about the fidelity with which educational therapists utilised the enhanced reading comprehension curriculum over the period of the study. Additionally, due to operational factors, several participants in this study experienced a change in educational therapists who might have had different teaching styles or rapport with students. Students' attendance at the intervention sessions was also not formally tracked. As a result of these, participants may not have received a consistent delivery of intervention using the enhanced reading comprehension curriculum across and within individuals. Finally, the possibility that participants in this study may have received prior or concurrent reading support was not accounted for, and was a possible confound of this study as well.

Some factors that possibly limited the findings of the second part of the study were also identified. Firstly, archived assessment data are vulnerable to the impact of consolidating scores from different test batteries. Although the scores were matched in terms of the similarities of the skills measured and method of administration, comparability between the DAS-II and WISC-V measures of verbal ability, non-verbal ability and working memory, as well as between DAS-II and CTOPP-2 measures of phonological awareness and rapid

naming were not established as no correlation studies on these relationships were available. Hence, differences across batteries may still exist. For instance, scores were derived from rapid naming tests that utilised alphanumeric stimuli, non-alphanumeric stimuli, or a mix of both. This could have diluted the relationships between variables and impact the outcome of the study. Secondly, the sample size obtained for the regression analyses was small due to missing data and attrition. The sample size for the regression analysis with reading comprehension performance at Time 2 (i.e. 2016) as the dependent variable barely met the minimum suggested requirement (Pallant, 2010) for three predictors, while the other regression analyses did not meet the recommended minimum sample sizes. This reduced the power of statistical analysis. According to Pallant (2010), this could affect how generalisable the findings from the study were to the target population of children who have dyslexia.

#### AREAS FOR FUTURE RESEARCH

The outcome of the current study provided some basis for further exploration in the area of reading comprehension. First of all, it would be useful for future studies to consider the limitations of this study in the design of future research. Comparing students who receive intervention with the enhanced curriculum with either a control group from a waitlist or a separate group receiving a different form of intervention with established empirical support can help to elicit more concrete outcomes about the effectiveness of the enhanced curriculum. Additionally, including fidelity checks and controlling for student factors such as the presence of concurrent or prior intervention can help to strengthen the validity of the study. It would be useful to replicate the regression analyses with a larger sample size to establish if consistent results can be obtained, and to improve the generalisability of the outcome to what is observed in the population.

Apart from addressing the limitations of this study in future research in the area of reading comprehension, it would be interesting to explore other factors that relate to reading comprehension going forward. In the evaluation of enhancements to reading comprehension curriculum and intervention, it would firstly be important to look into teacher factors, such as teachers' knowledge of the curriculum and their beliefs about how the changes in curriculum may impact the efficacy of the reading comprehension intervention. Next, factors relating to the curriculum itself should be further explored and analyzed for their impact on the efficacy of the intervention. For instance, specific components of the enhanced reading comprehension curriculum should be identified (e.g. skills taught, delivery method or intensity) and investigated in order to ascertain the utility of each component. Thirdly, the current study showed that differences in verbal ability can translate to differences in how students' respond to reading comprehension intervention. It would therefore be useful to see if this finding can be replicated in future studies, and other student factors could be explored as well. For example, given that Singapore is a multi-racial society, students come from different language backgrounds and may not always be most comfortable with communicating in the English language.

Hence, it may be helpful to see if students' home language can impact their reading comprehension performance and affect how they respond to intervention.

In terms of the factors that predict reading comprehension performance, consideration of the outcomes of the current study suggest that it may be useful to ascertain if different methods of measuring skills can produce different results. For instance, if reading comprehension is measured using retell fluency of passages read (Roberts, Good, & Corcoran, 2005), the contribution of working memory and rapid naming may be found to be more salient. In addition, further studies can also investigate whether there are differences between the influence of alphanumeric and non-alphanumeric rapid naming abilities on reading comprehension performance.

Apart from exploring the use of different tools to measure cognitive factors, it would be important to explore the contribution of other factors to reading comprehension. Factors such as age, orthographic/visual processing abilities, as well as prior knowledge appear to be likely candidates that may impact reading comprehension performance. Additionally, environmental factors such as the home literacy environment have been found to be associated with reading competencies, including reading comprehension, in Singaporean preschoolers (Yeo, Ong & Ng, 2014), and print exposure has been found to predict future reading comprehension performance in French children (Sénéchal, 2006). Such factors can be included in future analyses of the predictors of reading comprehension. With thorough exploration, a deeper understanding of what contributes to reading comprehension can be developed. Consequently, educational professionals can be better informed in their decisions for the identification of and intervention provided for students who have difficulties in this area.

#### **REFERENCES**

- Adlof, S. M., Catts, H. W., & Lee, J. (2010). Kindergarten predictors of second versus eighth grade reading comprehension impairments. *Journal of Learning Disabilities, 43*(4), 332-345. doi: 10.1177/0022219410369067
- Baddeley, A. D., & Hitch, G. (1974). Working memory. *Psychology of learning and motivation, 8*, 47-89. doi:10.1016/S0079-7421(08)60452-1
- Beck, I. L., Perfetti, C. A., & McKeown, M. G. (1982). Effects of long-term vocabulary instruction on lexical access and reading comprehension. *Journal of educational psychology, 74*(4), 506-521. doi: 10.1037/0022-0663.74.4.506
- Benjamin, S. I. (2015). The target of the question: A taxonomy of textual features for Cambridge University "O" levels English. *Education Research and Perspectives, 42*, 91-133. Retrieved from http://www.erpjournal.net/wp-content/uploads/2015/12/4\_ERPV42\_Benjamin\_2015\_The-target-of-the-guestion.pdf
- Bos, C. S., & Anders, P. L. (1990). Effects of interactive vocabulary instruction on the vocabulary learning and reading comprehension of junior-high learning disabled students. *Learning Disability Quarterly*, 13(1), 31-42. doi: 10.2307/1510390

Cain, K., & Oakhill, J. (2006). Profiles of children with specific reading comprehension difficulties. *British Journal of Educational Psychology, 76*(4), 683-696. doi: 10.1348/000709905X67610

- Cain, K., Oakhill, J., & Bryant, P. (2004). Children's reading comprehension ability: Concurrent prediction by working memory, verbal ability, and component skills. *Journal of Educational Psychology*, *96*(1), 31-42. doi: 10.1037/0022-0663.96.1.31
- Catts, H. W., Adlof, S. M., & Weismer, S. E. (2006). Language deficits in poor comprehenders: A case for the simple view of reading. *Journal of Speech, Language, and Hearing Research,* 49(2), 278-293. doi:10.1044/1092-4388(2006/023)
- Clarke, P. J., Snowling, M. J., Truelove, E., & Hulme, C. (2010). Ameliorating children's reading-comprehension difficulties: A randomized controlled trial. *Psychological Science*, *21*(8), 1106-1116. doi: 10.1177/0956797610375449
- Cutting, L. E., & Scarborough, H. S. (2006). Prediction of reading comprehension: Relative contributions of word recognition, language proficiency, and other cognitive skills can depend on how comprehension is measured. *Scientific Studies of Reading, 10*(3), 277-299. doi: 10.1207/s1532799xssr1003 5
- Duke, N. K., & Pearson, P. D. (2009). Effective practices for developing reading comprehension. *Journal of Education, 189*(1-2), 107-122. doi: 10.1177/0022057409189001-208
- Elbaum, B., Vaughn, S., Tejero Hughes, M., & Watson Moody, S. (2000). How effective are one-to-one tutoring programs in reading for elementary students at risk for reading failure? A meta-analysis of the intervention research. *Journal of Educational Psychology, 92*(4), 605-619. doi: 10.1037/0022-0663.92.4.605
- Elliot, C. (2007a). *Differential Ability Scales 2nd Edition administration and scoring manual.* San Antonio, TX: Harcourt Assessment, Inc.
- Elliot, C. (2007b). Differential Ability Scales 2nd Edition technical manual. San Antonio, TX: Harcourt Assessment, Inc.
- Gathercole, S. E., Alloway, T. P., Willis, C., & Adams, A. M. (2006). Working memory in children with reading disabilities. *Journal of experimental child psychology, 93*(3), 265-281. doi:10.1016/j.jecp.2005.08.003
- Georgiou, G. K., Das, J. P., & Hayward, D. V. (2008). Comparing the contribution of two tests of working memory to reading in relation to phonological awareness and rapid naming speed. *Journal of Research in Reading, 31*(3), 302-318. doi: 10.1111/j.1467-9817.2008.00373.x
- Georgiou, G. K., Das, J. P., & Hayward, D. (2009). Revisiting the "simple view of reading" in a group of children with poor reading comprehension. *Journal of Learning Disabilities, 42*(1), 76-84. doi: 10.1177/0022219408326210
- Gersten, R., Fuchs, L. S., Williams, J. P., & Baker, S. (2001). Teaching reading comprehension strategies to students with learning disabilities: A review of research. *Review of Educational Research*, 71(2), 279-320. doi: 10.3102/00346543071002279
- Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial and Special Education*, 7(1), 6-10. doi: 10.1177/074193258600700104
- Harmer, J. (2007). How to teach English: New edition. Harlow: Pearson Education Limited.
- Hoover, W. A., & Gough, P. B. (1990). The simple view of reading. *Reading and writing, 2*(2), 127-160. doi: 10.1007/BF00401799
- Johnston, T. C., & Kirby, J. R. (2006). The contribution of naming speed to the simple view of reading. *Reading and Writing*, 19(4), 339-361.doi: 10.1007/s11145-005-4644-2

- Keenan, J. M., Betjemann, R. S., & Olson, R. K. (2008). Reading comprehension tests vary in the skills they assess: Differential dependence on decoding and oral comprehension. *Scientific Studies of Reading*, 12(3), 281-300. doi: 10.1080/10888430802132279
- Kendeou, P., Savage, R., & van den Broek, P. (2009). Revisiting the simple view of reading. *British Journal of Educational Psychology, 79*(2), 353-370. doi:10.1348/978185408X369020
- Krathwohl, D. R. (2002). A revision of Bloom's taxonomy: An overview. *Theory Into Practice, 41*(4), 212-218. doi:10.1207/s15430421tip4104\_2
- Lim, J. Q. (2016, August 11). *Rising number of students with special needs in mainstream schools.*Channel NewsAsia. Retrieved from https://www.channelnewsasia.com
- Lyon, G. R., Shaywitz, S. E., & Shaywitz, B. A. (2003). A definition of dyslexia. *Annals of Dyslexia, 53* (1), 1-14. doi: 10.1007/s11881-003-0001-9
- Manis, F. R., Seidenberg, M. S., & Doi, L. M. (1999). See Dick RAN: Rapid naming and the longitudinal prediction of reading subskills in first and second graders. *Scientific Studies of Reading*, 3(2), 129-157. doi: 10.1207/s1532799xssr0302\_3
- Martin, F., Claydon, E., Morton, A., Binns, S., & Pratt, C. (2003). The development of orthographic and phonological strategies for the decoding of words in children. *Journal of Research in Reading*, 26(2), 191-204. doi: 10.1111/1467-9817.00196
- Näslund, J. C., & Schneider, W. (1991). Longitudinal effects of verbal ability, memory capacity, and phonological awareness on reading performance. *European Journal of Psychology of Education*, 6(4), 375-392. doi: 10.1007/BF03172772
- National Reading Panel (US), National Institute of Child Health, & Human Development (US). (2000). Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction. National Institute of Child Health and Human Development, National Institutes of Health. Retrieved from https://www1.nichd.nih.gov/publications/pubs/nrp/Documents/report.pdf
- Ng, G. (2012, March 9). 20 primary schools in school-based dyslexia pilot. *Asiaone News.*Retrieved from http://www.asiaone.com
- Norton, E. S., & Wolf, M. (2012). Rapid automatized naming (RAN) and reading fluency: Implications for understanding and treatment of reading disabilities. *Annual review of psychology*, 63, 427-452. doi: 10.1146/annurev-psych-120710-100431
- Oakhill, J. V., & Cain, K. (2012). The precursors of reading ability in young readers: Evidence from a four-year longitudinal study. *Scientific Studies of Reading, 16*(2), 91-121. doi: 10.1080/10888438.2010.529219
- Ogle, D. M. (1986). KWL: A teaching model that develops active reading of expository text. *The Reading Teacher, 39*(6), 564-570. Retrieved from http://www.jstor.org/stable/20199156
- Pammer, K., & Kevan, A. (2007). The contribution of visual sensitivity, phonological processing, and nonverbal IQ to children's reading. *Scientific Studies of Reading, 11*(1), 33-53. doi: 10.1080/10888430709336633
- Pilonieta, P., & Medina, A. L. (2009). Reciprocal teaching for the primary grades: "We can do it, too!". *The Reading Teacher, 63*(2), 120-129. doi: 10.1598/RT.63.2.3
- PsychCorp. (2009a). Wechsler Individual Achievement Test Third Edition. San Antonio, TX: Pearson.
- PsychCorp. (2009b). Wechsler Individual Achievement Test Third Edition technical manual. San Antonio, TX: Pearson.
- Quinn, J. M. (2016). *Predictors of reading comprehension: A model-based meta-analytic review* (Doctoral dissertation). Retrieved from http://purl.flvc.org/fsu/fd/FSU\_2016SU\_Quinn\_fsu\_0071E\_13315

Ricketts, J., Nation, K., & Bishop, D. V. (2007). Vocabulary is important for some, but not all reading skills. *Scientific Studies of Reading*, 11(3), 235-257. doi: 10.1080/10888430701344306

- Roberts, G., Good, R., & Corcoran, S. (2005). Story retell: A fluency-based indicator of reading comprehension. *School Psychology Quarterly, 20*(3), 304-317. doi: 10.1521/scpq.2005.20.3.304
- Rose, J. (2009). *Identifying and teaching children and young people with dyslexia and literacy difficulties: An independent report.* Retrieved from Digital Education Resource Archive website: http://dera.ioe.ac.uk/14790/7/00659-2009DOM-EN\_Redacted.pdf
- Savage, R., Burgos, G., Wood, E., & Piquette, N. (2015). The Simple View of Reading as a framework for national literacy initiatives: a hierarchical model of pupil-level and classroom-level factors. *British Educational Research Journal*, 41(5), 820-844. doi: 10.1002/berj.3177
- Scarborough, H. S. (1998). Predicting the future achievement of second graders with reading disabilities: Contributions of phonemic awareness, verbal memory, rapid naming, and IQ. *Annals of Dyslexia*, 48(1), 115-136. doi: 10.1007/s11881-998-0006-5
- Seigneuric, A., Ehrlich, M. F., Oakhill, J. V., & Yuill, N. M. (2000). Working memory resources and children's reading comprehension. *Reading and Writing, 13*(1-2), 81-103. doi: 10.1023/A:1008088230941
- Sénéchal, M. (2006). Testing the home literacy model: Parent involvement in kindergarten is differentially related to grade 4 reading comprehension, fluency, spelling, and reading for pleasure. *Scientific Studies of Reading*, 10(1), 59-87. doi: 10.1207/s1532799xssr1001\_4
- Shaaban, K. (2006). An initial study of the effects of cooperative learning on reading comprehension, vocabulary acquisition, and motivation to read. *Reading Psychology, 27* (5), 377-403. doi: 10.1080/02702710600846613
- Singapore Examinations and Assessment Board. (2015). *PSLE English language implemented from the year of examination 2015.* Retrieved from https://www.seab.gov.sg/docs/default-source/national-examinations/syllabus/psle/2018\_psle\_subject\_info/0001\_2018.pdf
- Stothard, S. E., & Hulme, C. (1996). A comparison of reading comprehension and decoding difficulties in children. In Cornoldi, C. & Oakhill, J (Eds.), *Reading comprehension difficulties: Processes and intervention* (pp. 93-112). New Jersey: Lawrence Erlbaum Associates, Publishers.
- Strichart, S.S. & Mangrum, C.T., (2002). *Teaching learning strategies and study skills to students with learning disabilities, attention deficit disorders, or special needs* (3rd ed.). Boston: Allyn & Bacon.
- Tarchi, C. (2010). Reading comprehension of informative texts in secondary school: A focus on direct and indirect effects of reader's prior knowledge. *Learning and Individual differences*, 20(5), 415-420. doi: 10.1016/j.lindif.2010.04.002
- Tighe, E. L., & Schatschneider, C. (2014). A dominance analysis approach to determining predictor importance in third, seventh, and tenth grade reading comprehension skills. *Reading and Writing*, 27(1), 101-127. doi: 10.1007/s11145-013-9435-6
- Wagner, R., Torgesen, J., Rashotte, C., & Pearson, N. (2012). *Comprehension Test of Phonological Processing* (2nd ed.). Austin, TX: Pro-Ed
- Wechsler, D. (2003a). Wechsler Intelligence Scale for Children 4th Edition. San Antonio, TX: PsychCorp.
- Wechsler, D. (2003b). Wechsler Intelligence Scale for Children 4th Edition technical and interpretive manual. San Antonio, TX: PsychCorp.

- Wechsler D. (2014a). Wechsler Intelligence Scale for Children 5th Edition. San Antonio, TX: NCS Pearson.
- Wechsler D. (2014b). Wechsler Intelligence Scale for Children 5th Edition technical and interpretive manual. San Antonio, TX: NCS Pearson.
- Yeo, L. S., Ong, W. W., & Ng, C. M. (2014). The home literacy environment and preschool children's reading skills and interest. *Early Education and Development, 25*(6), 791-814. doi: 10.1080/10409289.2014.862147



## iStudySmart™

**EQUIPPING STUDENTS WITH THE ESSENTIAL STUDY SKILLS** 



**MODULES** 

PLANNING AND ORGANISATION SKILLS

TERTIARY WRITING SKILLS





Supports STRUGGLING LEARNERS WITH DYSLEXIA

Term 1 - 2 (Jan to Jun) Term 3 - 4 (Jul to Dec)

**FUNDING & BURSARIES** ARE AVAILABLE\*

### WHAT'S UNIQUE ABOUT iStudySmart<sup>™</sup>?

- Combines both e-learning and online consultation sessions
- Personalised feedback
- Programme specifically designed for Upper Secondary and Tertiary Stufents

FIND OUT MORE AT TINYURL.COM/DAS-ISS



FOR MORE INFORMATION ON iStudySmart™ CALL 6444 5700

(Mon to Fri: 9.00am to 5.30pm)

Asia Pacific Journal of Developmental Differences Vol. 11, No. 1, July 2024 pp. 225—245 DOI: 10.3850/S2345734124002257



# Exploring the Challenges of Dyslexia in Education and the Workplace: A Multi-Case Study of Academic and Professional Journeys

Fatemeh Zolfagharian<sup>1\*</sup>, Mahnaz Akhavan Tafti <sup>1,2</sup> and Elaheh Jarrahi<sup>1</sup>

- 1 Iranian Specific Learning Disorders Association
- 2 Department of Educational Psychology, Al-Zahra, Tehran

#### Abstract

The objective of this study was to investigate the lived experiences of individuals with dyslexia. We examined 13 individuals with dyslexia, encompassing school-leaving teenagers, adults who discontinued their education, and those with higher education backgrounds, to gain insights into their career paths. Our research employed a multiple-case study approach, allowing for an in-depth examination of each case. We recruited adult participants with dyslexia through the website and virtual channels of the Iranian Learning Disabilities and Differences Association. Following diagnostic interviews, a review of educational records, and the completion of the Adult Reading Checklist (ARC-P), a final sample of 13 participants was selected. These participants were categorised into three demographic groups. Semistructured interviews were conducted, and Braun and Clarke's reflexive thematic analysis method was applied, resulting in the extraction of four key themes. Our findings revealed that the lack of proper diagnosis contributed to various educational challenges and emotional difficulties for the participants. Additionally, it was observed that nearly all participants gravitated towards careers that allowed them to leverage their visual-spatial talents and creativity, such as design, tailoring, and illustration. This study underscores the importance of further research to explore the relationship between dyslexia and visual spatial abilities, as well as to gain a deeper understanding of the motivations and skills of dyslexic individuals across different fields.

Keywords: Dyslexia, academic and professional experiences, visual-spatial talents, creativity.

Dr Fatemeh Zolfagharian, Iranian Specific Learning Disorders Association, fetemezol@gmail.com

<sup>\*</sup> Correspondence to:

#### INTRODUCTION

Dyslexia is a prevalent learning challenge that persists into adulthood, significantly impacting various aspects of individuals' lives (Doust et al., 2022; Farah et al., 2021; Alexander-Passe, 2018). This condition, rooted in one or more issues within the nervous system (Brimo et al., 2021; Stein, 2023), presents dyslexic individuals with the formidable task of recognising and comprehending the fact that written and spoken words consist of discrete components and blocks (Shaywitz & Shaywitz, 2020). These challenges often manifest as a deficiency in phonological awareness (Liberto et al., 2018; Cheema et al., 2023; Castles & Friedmann, 2014; Thomson et al., 2012), resulting in difficulties in reading fluently and accurately, as well as in writing words correctly. It is important to emphasise that these challenges have no bearing on the intelligence of individuals with dyslexia (Holmes et al., 2021; Shaywitz & Shaywitz, 2020).

Instead, it is more accurate to describe dyslexia as an unexpected reading disability (Catts & Petscher, 2021). Dyslexia poses significant obstacles, leading individuals to lag behind their peers and engendering extensive emotional, educational, and social challenges (Zou et al., 2022; Claessen et al., 2020; Wilmot et al., 2023).

In parallel with these deficits, numerous researchers have uncovered a paradoxical blend of weaknesses and strengths in dyslexic individuals (Taylor & Vestergaard, 2022; Holme et al., 2021; Kannangara, 2018; Franks & Frederick, 2013; Hickman & Brens, 2014). This longstanding enigma in dyslexia research, dating back to Orton's pioneering work in 1890 and persisting to this day, centers on the coexistence of these weaknesses and strengths (West, 2014). Notably, the narratives of accomplished dyslexics who have achieved Nobel Prizes stand as a testament to their remarkable potential and capabilities, despite facing academic challenges and navigating a challenging path to higher education (Diamond, 2023; Locke et al., 2016; Bacon et al., 2013).

Many dyslexic children exhibit robust problem-solving and visual-spatial skills (West, 2022; Bacon & Handley, 2010; Cooper, 2009; Davis & Braun, 2010; Kapoula et al., 2016; Alencar, 2003; Leveroy, 2013), often highlighting their artistic inclinations (Chakravarty, 2009). Additionally, dyslexic individuals frequently demonstrate remarkable proficiency in three- dimensional spatial awareness, with applications in architecture, construction, mechanics, interior design, and art (Kannangara, 2018). The distinctive cognitive profile of dyslexia also offers advantages in specialised fields such as astronomy, as evidenced by research (Schneps et al., 2011). Notably, the British Government Communications Headquarters (GCHQ) has acknowledged the value of dyslexia, considering it a clandestine asset in espionage efforts and employing dyslexic individuals in top-secret activities (West, 2014).

While some argue that dyslexics may gravitate toward fields relying on non-verbal skills due to their verbal challenges (Winner et al., 2001), recent findings from qualitative and

quantitative research suggest that the preference for visual thinking is intrinsic to the phenomenological experience of dyslexics (Bacon & Bennett, 2012). They do not merely default to these fields; instead, they naturally align with them. Moreover, emerging neurological research confirms that dyslexics employ distinct cognitive strategies and pursue professions based on the unique structures and functions of their brains (Pietro et al., 2023; Richlan, 2020; Stein, 2023; Longobardi et al., 2019; Viersen et al., 2019).

Prominent entrepreneurs like Richard Branson and Charles Schwab, both dyslexic, assert that dyslexia has contributed to their success while conventional schooling poses challenges (Logan, 2009). Importantly, dyslexic individuals with academic achievements can be found in various fields, including medicine, chemistry, and law.

The apparent contradictions in the statistics regarding adult dyslexics create controversy surrounding their educational experiences. On one hand, in the United States, approximately 35% of entrepreneurs are dyslexic, with 22% classified as severely dyslexic (Logan, 2009). Conversely, there is a substantial number of dyslexic dropouts and juvenile delinquents who become entangled in the judicial system and prisons (Jones & Manger, 2019; Kirk & Reid, 2001; Samuelsson et al., 2003; Talbot, 2010). Recent research in this domain indicates that around 47% of prisoners exhibit symptoms of dyslexia (Cassidy et al., 2021).

In the accounts of some dyslexics, they attribute their success to supportive teachers who played a pivotal role (Leitão et al., 2017; Knight, 2018). These educators not only motivated them to complete high school but also encouraged them to pursue higher education (Miles et al., 2006; White et al., 2020). Nevertheless, many studies indicate that teachers often lack sufficient knowledge about dyslexia and how to manage it effectively in the classroom (Leitão et al., 2017; Macias, 2013; Moats, 2009; White et al., 2020; Worthy et al., 2016). Experts in dyslexia suggest that most dyslexics may leave school with severely diminished self-esteem and negative experiences (Alexander-Passe, 2018; Burden, 2005 & 2008; Gallagher et al., 2020; Scott, 2016; Shaywitz & Shaywitz, 2020; Zeleke, 2004). However, their resilience ignites when they begin harnessing their strengths in alternative domains (Agahi, 2015). Alexander-Passe posits that traumatic experiences serve as potent motivational triggers for successful dyslexics (2016).

#### RATIONALE AND AIM FOR THE CURRENT STUDY

As we delve into the topic, it becomes apparent that some dyslexic individuals select their professions based on their innate visual-spatial abilities, often bypassing traditional academic education and training courses, yet attaining remarkable success in their chosen fields. Paradoxically, their recollections of school are often marred by traumatic experiences (Alexander-Passe, 2015 & 2018). While there exists a substantial body of research focusing on the achievements of dyslexic individuals who have pursued academic education, there remains a conspicuous dearth of research dedicated to

dyslexic dropouts. This unexplored territory is ripe for investigation, as the distinctive educational circumstances leading to their departure from conventional schooling could offer valuable insights for devising both remedial and preventive measures.

In this research endeavor, we aim to uncover the diverse experiences that dyslexic individuals encounter during their educational journeys. Specifically, we seek to understand the shared experiences of individuals who have dropped out of formal education or teetered on the brink of expulsion, in contrast to their dyslexic peers who have persevered in their academic pursuits, achieving noteworthy levels of success. We are eager to gain insights into the educational encounters these individuals have had and to elucidate the profound impact of these experiences on their professional development in adulthood.

To address these inquiries, we have embarked on an investigation encompassing several cases involving dyslexic individuals who are currently navigating the tumultuous waters of dropping out of school, alongside adults who departed the educational system years ago. We intend to juxtapose their experiences with those of dyslexic individuals who have attained high levels of academic education. By undertaking this comparative analysis, we aim to shed light on the factors that shape the educational trajectories and eventual professional outcomes of dyslexic individuals across these distinct pathways.

#### **METHODOLOGY**

Our research methodology employed a multiple-case study approach, which facilitated a comprehensive and in-depth examination of each case. This choice was deliberate, as multiple- case studies enable a shift in focus from individual cases to the exploration of differences and commonalities between them (Hunziker & Michael, 2021). According to Zach (2006), this method enables the identification of recurring patterns and generates fresh insights into the subject matter. As articulated by Greene and David (1984), a multiple-case study involves a structured investigation of multiple cases, with the analysis of results aimed at drawing generalizable conclusions applicable to a target population. Thus, this approach allowed us to investigate the unique educational experiences of dyslexic individuals, providing valuable information for educational decision-making.

The collected data from our study's participants, obtained through semi-structured interviews, underwent analysis using the thematic analysis method. Thematic analysis is a qualitative and highly adaptable approach that empowers researchers to discern emerging patterns (Ghasemi & Hashmi, 2019). In our research, we employed the six-stage analysis framework proposed by Brown and Clarke (2006, 2019) to categorise the data and identify four overarching themes.

#### **Materials**

Adult Reading Checklist (ARC-P): To ensure a more precise diagnosis, we utilised the Adult Reading Checklist ARC-P, originally developed by Smith and Everett (2001). The Persian version of this checklist was prepared and validated in 2013 by Pourtemad and colleagues. It boasts an internal consistency score of 74% and a reliability coefficient of 52%. This checklist comprises 15 questions, with responses recorded on a Likert scale. The total score is calculated as the sum of the values associated with each answer to all the questions. Scores falling below 45 indicate the absence of dyslexia, while scores ranging from 45 to 60 signify stable symptoms of mild dyslexia. Scores exceeding 60 indicate stable symptoms of moderate or severe dyslexia.

#### Job Investigations and Interviews

#### Semi-Structured Interviews

Each dyslexic individual participated in a semi-structured interview, encompassing six general questions:

- 1. How did you experience the initial stages of your formal education in primary school, particularly concerning reading and writing?
- 2. Did you encounter challenges in specific school subjects, or did you excel in any particular area?
- 3. Were you confronted with emotional difficulties during your school years?
- 4. Did you exhibit a distinct interest in artistic, technical, or practical tasks?
- 5. To what extent were your talents recognised, encouraged, and supported during your educational journey?
- 6. How did you arrive at your current occupation?

#### Additional Questions for Dyslexic Dropouts and School-Leaving Teens

- 1. What prompted your decision to drop out of school?
- 2. How did you acquire the necessary skills for your chosen profession without formal training courses?

#### **Participants & Procedure**

To assemble a cohort of individuals with dyslexia for our study, we initiated a recruitment drive via online platforms and virtual channels affiliated with the Iranian Learning Disabilities and Differences Association. Our targeted outreach was directed at individuals who exhibited symptoms indicative of dyslexia and expressed willingness to participate in a research study. Consequently, we successfully assembled a pool of 15 adults and teenagers who met these criteria.

Upon gathering potential participants, we conducted an extensive review of their developmental backgrounds and educational records. This meticulous evaluation helped us ascertain their eligibility and suitability for inclusion in the study. Subsequently, we subjected them to the Adult Reading Checklist ARC-P, a diagnostic tool developed by Smith and Everett in 2001. Based on Smith and Everetts, the ranking for dyslexia is as follows:

- ♦ Scores below 45 suggest the absence of dyslexia;
- Scores falling within the range of 45 to 60 indicate mild dyslexia;
- ♦ Scores above 60 indicate moderate to severe dyslexia.

Table 1. The Adult Reading Checklist-P (ARC-P) Scores

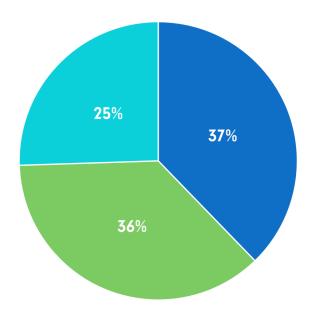
Name	ARC-P—score
Ahmad	65
Ali	70
Fatemeh	68
Danial	55
Maryam	66
Mohammad	68
Amir	52
Reza	60
Fariba	88
Iman	65
Amir Reza	82
Hamidreza	90
Arash	57

Note: The numbers recorded in this table for each person show the score they got in the reading of the adult reading checklist ARC-P developed by Smith and Everett (2001)test. Subsequently, we used the ARC-P scores to identify and select a final sample of 13 participants who exhibited varying degrees of dyslexia symptoms. This rigorous selection process ensured that our study encompassed a diverse range of dyslexic experiences and levels of severity.

Table2. Participants' Demographics

Name	Age	Education	Occupation		
Ahmad	40	MA in animation	Character designer and animator		
Ali	35	MSc in Telecommunications and Electricity	Media affairs technician		
Fatemeh	32	MA in Sewing Ddesign	Design teacher		
Danial	30	MA in Industrial Design	Designer		
Maryam	48	Education up to middle school	Tailor		
Mohammad	43	Education up to middle school	Car mechanic		
Amir	36	Education up to high school	Factory internal director and entrepreneur		
Reza	49	Education up to middle school	Car repairman, electrical appliance repairman, and interior decorator		
Fariba	13	High school dropout	Hairdresser		
lman	15	High school dropout	Supermarket accountant		
Amir Reza	15	High school dropout	Designer, painter and illustrator		
Hamidreza	17	High school dropout	Cattleman		
Arash	16	High school dropout	Auto mechanic student		

Note: This table contains information about the current educational status, occupation, and age of the participants.



- A. Dyslexics with Academic Education (Master's Degree)
- B. Adults who dropped out of Primary School
- C. High School Teenagers on the brink of dropping out of School

Figure 1. Educational Status Of The Participants

#### **Interviews and Data Analysis**

The interviews were conducted through online platforms, and explicit consent was obtained from all participants before recording each session. We sought permission from all participants to include their first names while holding their last (family) names in the research. This approach was taken to uphold confidentiality and adherence to the ethical guidelines of the study.

This meticulous data collection process spanned a duration of three months. To ensure data consistency, all interviews were conducted by a single interviewer, the primary researcher. All dyslexia participants in this study were native Persian speakers, and the interviews were conducted in the Persian language. Following the interviews and data analysis, the research findings were translated and summarised into English by the researchers.

Notably, one of the participants with dyslexia was concurrently engaged in the IELTS test during the study, providing valuable insights into his experiences in learning a second language and the obstacles he encountered. This presents a potential avenue for future research.

Subsequently, we commenced the data analysis process, following Clarke and Brown's model. The analysis unfolded in several stages:

#### **Transcription**

In the initial stage, the verbatim responses provided during the interviews were meticulously transcribed.

#### Open Coding

The first researcher undertook the initial open coding process, generating a preliminary set of codes. This code set was then subjected to review by a second researcher to enhance accuracy and comprehensiveness. Through a collaborative effort, two sets of codes were harmonised and refined, resulting in a more precise and detailed compilation of new codes.

#### **Theme Extraction**

Building upon the refined codes, thematic elements were extracted, identifying recurrent patterns and concepts within the data.

#### **Examination of Themes**

The first researcher thoroughly examined the emerging themes, scrutinising their significance and relevance within the context of the study. Following this comprehensive analysis, the identified themes were presented for validation and approval by the study's supervisor, who served as the second researcher. This collaborative review ensured the rigor and robustness of the thematic analysis process.

Ultimately, this meticulous analysis yielded four overarching themes that encapsulated the rich and diverse experiences of the participants.

#### **Analysis**

Our analysis unveiled four prominent themes, each addressing a distinct facet of our research objective.

#### **Preference for Visual-Spatial Professions**

Participants across all three groups expressed a compelling inclination toward visual spatial tasks from an early age. Many recounted their childhood fascination with activities such as painting, construction, and games that involved spatial thinking. This early interest exerted a profound influence on their academic journeys. For instance, individuals like Iman leveraged their exceptional visual memory to excel in fields like accounting, where the capacity to retain a multitude of prices simultaneously proved advantageous. Representative responses from participants illuminate this theme:

#### **Amirreza**

"During my assignments, I had a habit of adorning the margins of my notebooks with doodles. I found the prospect of inscribing black text on a blank page overwhelming, so I preferred having something visual to accompany it. In class, I'd surreptitiously sketch the teacher's visage, hand gestures, or the classroom surroundings under my desk, a tactic that made the hours pass more swiftly."

#### **Fatemeh**

"As a second-grader, the word 'boat' in a reading lesson ignited my imagination. I'd envision myself on a sunlit boat at sea, transported from the classroom. My teacher's reproaches would repeatedly yank me back to reality, leaving me powerless against these captivating daydreams."

#### Ali

"My fascination with structures and building blocks drew me to fields like telecommunications and media. I also harbor a fascination for grammatical structures in language learning, despite the challenges of spelling. This duality, wherein I find certain aspects intriguing and others taxing, is emblematic of my dyslexic experience."

#### Consequences of Being Misunderstood in School

Ten out of the 13 participants reported grappling with emotional difficulties during their school years, underscoring a pervasive sense of being misunderstood. Only one participant received a correct dyslexia diagnosis in a school setting, while the others remained undiagnosed or, in two unfortunate instances, were misdiagnosed and subjected to inappropriate treatments. These participants commonly recounted negative school environments marked by instances of bullying and a lack of support. However, two participants (Ahmad and Amir) with no apparent emotional issues during their schooling described the school as a relaxed environment where their interpersonal skills thrived. The remaining 11 participants shared distressing memories from their school days, exemplified by these experiences:

#### **A**mirreza

"One particularly daunting moment in school occurred when the teacher called me to the board for a dictation exercise. I was overwhelmed with anxiety; my hands shook, my palms sweated, and I stammered through the task. The chalk slipped from my grasp repeatedly until the teacher, in front of the entire class, struck me with the fallen chalk and disdainfully labeled me 'clumsy.'"

#### Fatemeh

"My teacher subjected me to physical abuse in front of my older sister, who attended the same school. The humiliation was unbearable, and I wished to vanish. I was perpetually singled out for blame, compelling me to occupy the back of the classroom, striving to remain inconspicuous."

#### Αli

"Recollections of unpleasant school days, hours of monotonous dictations and readings, and ceaseless familial disputes are seared into my memory. Feelings of shame and guilt persist, manifesting as stress and lethargy whenever I encounter difficulties in reading or face academic setbacks."

#### **Creating Motivation with the Help of Educational Authorities**

The narratives of three highly educated participants (Ali, Danial, and Fatemeh) underscored the transformative impact of having motivating teachers. These individuals recounted how thepresence and support of these educators ignited their academic success. These teachers recognised and celebrated their students' abilities, thus inspiring greater effort and dedication to their studies and examinations. Conversely, the teenagers who left school shared experiences of feeling unrecognised and misunderstood in educational settings, prompting them to withdraw. It was beyond the traditional classroom environment where their capabilities found acknowledgment and fostered stable careers. A few illustrative responses include:

#### **Fariba**

"Since my early years in elementary school, I frequented counseling centers at my teachers' behest. Despite numerous assessments and hours of coaching, I struggled in exams. I endured criticism from teachers and faced isolation from classmates who viewed me as a lazy student with mental issues. Despite my burgeoning talent for drawing, it went largely unnoticed. The incessant ridicule and lack of support eventually led my mother, a hairdresser, to withdraw me from school. Under her guidance, I discovered my passion and aptitude for hairdressing, cementing my resolve to steer clear of an educational environment that had caused me immense distress."

#### Hamidreza

"End-of-year exams became a source of immense stress for both myself and my mother. While I excelled in home-based studies, my performance during exams was hindered by memory recall challenges. My mother often requested oral exams, to which some teachers reluctantly acceded. Despite these accommodations, I encountered criticism from school authorities. Consequently, no teacher was eager to have me in their class."

#### **Fatemeh**

"My art teacher unearthed my remarkable drawing talent during middle school, despite my less-than-stellar academic performance. She celebrated my abilities by awarding me my first prize and offering public commendations in front of my peers. This transformational experience reshaped my outlook on education, igniting a newfound dedication to excel in all my assignments, especially within the realm of art."

#### The Impact of Hands-On Experiences on Professional Development

All three dyslexic groups emphasised the superior value of hands-on experiences over theoretical education. Even those with academic backgrounds recognised the pivotal role played by practical work in their growth and development. Dyslexic dropouts frequently made strides through trial and error, benefiting from constructive feedback gleaned from hands-on tasks and their innate creativity. Teenagers on the verge of leaving school also found books inadequate and turned to online resources like Google, YouTube, Instagram, and Telegram for self-guided learning. Notable excerpts from their narratives elucidate this theme:

#### Maryam

"During a particularly engrossing evening, I lost track of time while crafting a dress tailored to a customer's specifications. I meticulously stitched and revised the pattern until dawn broke. Once my mind becomes fixated on a pattern, I'm driven to perfect it. Without formal training, I've honed my skills through iterative practice. I now possess the proficiency to sew garments flawlessly, obviating the need for frequent fittings."

#### Ahmad

"Upon entering the Faculty of Arts after high school, I finally gained unrestricted access to pursuits that captivated my imagination. It was akin to a prison break. The practical coursework in the faculty provided me with ample opportunities to showcase the visual aspects of my mind. This daily exposure to diverse facets of my cognitive landscape invigorated me, enabling me to translate mental images into tangible creations without constraints—an apex of my talents, particularly in character design and animation."

#### Danial

"In my workplace, I frequently come up with unconventional yet elegantly simple solutions to challenges, especially during problem-solving exercises. These solutions typically stem from the knowledge I've gained through hands-on experience and curiosity, rather than from books, formal education, or university courses. These personal experiences, combined with my thought processes, often lead me to solutions that fall outside the conventional framework, eluding the understanding of others. For a long time, I assumed that this ability was something everyone possessed. However, over the course of my professional experiences, I've come to recognize it as a unique mental attribute. I've often asked my colleagues, "Did you ever consider this perspective?" only to receive a unanimous "No" in response.

#### Reza

"I've never pored over a single page of a manual for repairing vacuum cleaners or TVs. Limited internet access also prevented me from capitalising on online tutorials. I left high school early, believing it wouldn't serve my purpose. Instead, I've cultivated my skills through hands-on experience. Each device has served as my teacher, guiding me through disassembly and reassembly, troubleshooting, and repair through trial and error. I can mentally dissect a car engine, piece by piece, and rectify any issues before reassembling it. My sole challenge lies in becoming so engrossed in a task that I lose track of time, dedicating hours to a single project."

#### **Arash**

"I was perpetually drawn to my father's auto repair shop more than to my homework. The allure of solving the electrical intricacies of cars held my fascination. I'd rush through my assignments so my father would assume I'd finished and permit me to join him at the shop. There, I'd spend my afternoons observing and learning from my father. As time passed, he entrusted me with increasingly complex mechanical tasks, even soliciting my assistance with challenges he couldn't overcome in high-end and foreign vehicles. This evolution ultimately eradicated the need for a high school diploma in my chosen profession."

#### CONCLUDING COMMENTS

Students with dyslexia often encounter both academic challenges resulting from a lack of proper diagnosis and education and emotional difficulties throughout their schooling years (Claessen et al., 2020; Alexander-Passe, 2018; Burden, 2008; Scott, 2016). While some individuals with dyslexia manage to pursue further education using compensatory techniques (Stein, 2023), others decide to discontinue their education (Al-Lamki, 2012).

The findings of this study, conducted in Iran, highlight that out of the 13 dyslexic individuals examined, five dyslexic teenagers are currently at risk of dropping out, and four adult dyslexics dropped out after completing elementary school. Almost all of them reported facing negative emotional experiences.

In line with the findings of Gallagher et al. (2020) and Livingston et al. (2018) the interviews conducted with individuals diagnosed with dyslexia revealed a common theme of delayed and insufficient diagnosis, along with inadequate education, resulting in substantial cognitive and educational challenges. Furthermore, it was observed that their teachers had an incomplete understanding of their conditions, as supported by previous studies (Washburn et al., 2011; Worthy et al., 2016; White et al., 2020). This aligns with prior research, which has identified a lack of accurate diagnosis and insufficient knowledge of dyslexia as the primary educational barriers faced by these individuals (Gibbs & Elliott, 2015; Peltier et al., 2022; Sümer Dodur & Altindağ Kumaş, 2020; Washburn et al., 2017). The interviews conducted also shed light on the persisting negative emotional experiences and traumas reported by some dyslexic individuals, as documented by Alexander-Passe (2018).

A significant finding of this research is the identification of visual-spatial abilities as a common characteristic among individuals with dyslexia. This inclination towards visualspatial fields as career choices can be attributed to two hypotheses. First, dyslexics may possess a natural advantage in visual-spatial abilities and are drawn to careers that leverage this skill (Bacon et al., 2013; Chakravarty, 2009; Cooper, 2009; Kannangara, 2018; Kapoula et al., 2016; Shaywitz & Shaywitz, 2020). Second, dyslexics may opt for visual-spatial careers as a compensatory measure for their cognitive limitations in verbal ability (Winner et al., 2001). However, further research is necessary to gain a deeper understanding of these assumptions. Most existing studies on dyslexic careers have predominantly focused on adults with dyslexia who pursued higher education and attended university (Anderson & Shaw, 2020; Franks & Frederick, 2013; Hickman & Brens, 2014; Longobardi et al., 2019; MacCullagh et al., 2016). In this study, we made a noteworthy discovery regarding the participants who either dropped out of school or have been out of school for some time. It was found that they have transitioned into careers that heavily rely on visual-spatial abilities. Out of the 13 individuals whose occupations were examined, 9 (comprising 5 teenagers and 4 adults) did not receive any formal education or specific training related to their chosen or preferred jobs. The diverse range of occupations among these participants includes character designer/ animator, media-related technician, design teacher, designer, tailor, car mechanic, factory internal director/entrepreneur, car repairman/electrical appliance repairman/ interior decorator, hairdresser, supermarket accountant, designer/painter/illustrator, cattleman, and auto mechanic trainee.

It's noteworthy that except for accounting, the occupations in question place a higher premium on visual-spatial abilities as opposed to verbal abilities. This observation is in line with previous research studies conducted by Alden and Pollock in 2011, Bacon and Bennett in 2012, Hickman and Brens in 2014, Kannangara in 2018, Miller and Miller in 2013, Schneps et al. in 2011, and West in 2022 .During an interview with Iman, a teenager who had left school but was working as a supermarket accountant, we uncovered an intriguing facet of his skill set. He possessed an exceptional visual memory, to the extent that his manager affectionately dubbed him the "price and accounting ledger." This nickname underscores the strong link between his proficiency in accounting and his remarkable visual memory. In Iman's case, his visual-spatial abilities were a key factor contributing to his success in the field of accounting, a correlation that aligns with the broader findings in the aforementioned research.

Our research provides valuable support for the idea that individuals with dyslexia are not limited to those with a university education when it comes to their attraction to visual-spatial careers. This attraction extends to teenagers and adults who, for various reasons, may have left the traditional school system. These findings emphasise the broad applicability of this trend among dyslexics, spanning different educational backgrounds and life stages. Nonetheless, it's important to acknowledge that while our research sheds light on this phenomenon, further investigation is warranted to enhance the robustness of these conclusions. Additional studies, as suggested by experts such as Gilger (2017) and Moojen et al. (2020), can help to verify and expand upon our findings, offering a more comprehensive understanding of the relationship between dyslexia and career choices, particularly in the context of visual-spatial occupations. Such research can contribute to the development of more targeted and effective interventions and support systems for individuals with dyslexia, regardless of their educational trajectories.

A crucial area that calls for deeper investigation pertains to the cognitive factors motivating individuals with dyslexia to pursue specific professions, notably those in higher education- dependent fields like medicine. It's of paramount importance not to assume that these professions, including medicine and law, rely exclusively on verbal aptitude while overlooking the significance of visual-spatial skills. During our interviews, we encountered two notable instances where individuals exhibited a profound fascination with the structural aspects of subjects like chemistry, biology, and even grammar. This observation finds support in the experiences of accomplished dyslexics and Nobel Prize laureates, as detailed in the works of Shaywitz and Shaywitz (2020) and West(2022). This underscores the fact that some individuals with dyslexia may excel in fields requiring a deep understanding of intricate structures and concepts, challenging the misconception that dyslexia predominantly hinders verbal abilities and career options. Further exploration of these cognitive factors and their relationship with career preferences can offer valuable insights into the diverse strengths and talents of individuals with dyslexia.

The interviews yielded a clear insight: the participants' attraction to visual-spatial occupations was not driven by a need to compensate for verbal deficiencies. Instead, it

was rooted in their natural visual-spatial aptitudes, which had been evident even before they entered formal education. Furthermore, they actively nurtured and pursued their interests in these areas, a pattern that extended to both dyslexics who left school prematurely, as well as those who pursued higher education. Remarkably, many of these individuals perceived the traditional school system as a barrier to their abilities. It was only when they reached the university level that they could fully embrace and actively pursue careers in visual-spatial fields.

This recurring theme among dyslexics is consistent with the findings of prior studies, including those conducted by Alexander-Passe (2015 & 2016), Davis and Braun (2010), and West (2014 & 2022). It underscores the notion that, for individuals with dyslexia, their visual-spatial talents often emerge as strengths and can be a driving force behind their career choices and academic success, particularly in settings where their abilities are not hindered but rather encouraged.

During the interviews conducted with dyslexics who pursued higher education, another noteworthy observation emerged regarding the presence of a supportive figure who played a pivotal role in their academic journey. This individual, often a teacher, recognised their potential and encouraged them to pursue their interests. However, among dyslexics who dropped out of school, whether as teenagers or adults, such supportive figures were not commonly reported. Instead, they frequently expressed feelings of being misunderstood and unsupported during their school years. Only two of the dyslexic individuals in the study did not encounter significant difficulties in school and were diagnosed with dyslexia in adulthood by chance. The majority of participants shared their experiences of emotional struggles throughout their educational journey (Anderson and Shaw, 2020; Livingston et al., 2018; Scott, 2016). In summary, based on the interviews conducted with both educated dyslexics and those who dropped out of school, several key findings emerged that greatly influence their academic and career trajectories. These factors include the presence of visual-spatial cognitive abilities, the impact of supportive teachers, and the recognition and understanding of dyslexia within the educational system. The absence of support and recognition can lead to difficulties in school and eventual dropout, whereas having the necessary support can lead to academic success and the pursuit of careers aligned with visual-spatial abilities. Further investigations are warranted to enhance our understanding of dyslexics' needs in both education and career contexts and to provide better support and guidance.

#### LIMITATIONS

The research conducted in this study is hindered by limited sample size. To enhance the credibility and validity of the findings, it is crucial to obtain a larger and more diverse sample of individuals who are school dropouts with dyslexia. Moreover, surveying various job sectors is essential to gain insights into their preferred types of employment. In addition, the negative stigma associated with dyslexia creates a significant obstacle

as it leads many accomplished dyslexics to hide their condition from colleagues and their surroundings. The concealment of dyslexia among successful individuals presents a notable hurdle in obtaining a more extensive sample for comprehensive analysis and exploration purposes.

#### REFERENCES

- Agahi, A., (2015). *Investigating the strengths of dyslexia in successful adults and university students* [Ph.D. Dissertation].
- Alden, S., & Pollock, V. L. (2011). Dyslexia and the studio: Bridging the gap between theory and practice. *International Journal of Art & Design Education, 30*(1), 81–89. https://doi.org/10.1111/j.1476-8070.2011.01671
- Alexander-Passe, N. (2015). Investigating post-traumatic stress disorder (PTSD) triggered by the experience of dyslexia in mainstream school education? *Journal of Psychology & Psychotherapy, 5*(6). https://doi.org/10.4172/2161-0487.1000215
- Alexander-Passe, N. (2016). The school's role in creating successful and unsuccessful dyslexics. Journal of Psychology & Psychotherapy, 06(01). https://doi.org/10.4172/2161-0487.1000238
- Al-Lamki, L. (2012). Dyslexia: Its Impact on the Individual, Parents, and Society. Sultan Qaboos Univ *Med J. Aug;12*(3):269-72. doi 10.12816/0003139.
- Alexander-Passe, N. (2018). dyslexia, traumatic schooling, and career success: Investigating the motivations of why many individuals with developmental dyslexia are successful despite experiencing traumatic schooling [Ph.D. Dissertation]. http://sure.sunderland.ac.uk/id/eprint/9728
- Anderson, J., & Shaw, S. (2020). The experiences of medical students and junior doctors with dyslexia: A survey study. *International Journal of Social Sciences & Educational Studies, 7*(1). https://doi.org/10.23918/ijsses.v7i1p62
- Bacon, A. M., & Handley, S. J. (2010). Dyslexia and reasoning: The importance of visual processes. British Journal of Psychology, 101(3), 433–452. https://doi.org/10.1348/000712609x467314
- Bacon, A. M., & Bennett, S. (2012). Dyslexia in higher education: The decision to study art. *European Journal of Special Needs Education, 28*(1), 19–32. https://doi.org/10.1080/08856257.2012.742748
- Bacon, A. M., Parmentier, F. B. R., & Barr, P. (2013). Visuospatial memory in dyslexia: Evidence for strategic deficits. *Memory*, *21*(2), 189–209. https://doi.org/10.1080/09658211.2012.718789
- Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise, and Health, 11*(4), 589–597. https://doi.org/10.1080/2159676X.2019.1628806
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa
- Brimo, K., Dinkler, L., Gillberg, C., Lichtenstein, P., Lunström, S., Åsberg Johnels, J. (2021). The occurrence of neurodevelopmental problems in dyslexia. *Dyslexia*. 1–17. https://onlinelibrary.wiley.com/doi/10.1002/dys.1681
- Burden, R. (2005). *Dyslexia and self-concept: Seeking a dyslexic identity.* John Wiley & Sons Incorporated.
- Burden, R. (2008). Is dyslexia necessarily associated with negative feelings of self-worth? A review and implications for future research. *Dyslexia*, 14(3), 188–196. https://doi.org/10.1002/dys.371

- Cassidy, L., Reggio, K., Shaywitz, B. A., Holahan, J. M., & Shaywitz, S. E. (2021). Dyslexia in incarcerated men and women: A new perspective on reading disability in the prison population. *Journal of Correctional Education*, 72(2), 61-81.
- Castles, A., & Friedmann, N. (2014). Developmental dyslexia and the phonological deficit hypothesis. *Mind & Language, 29*(3), 270–285. https://doi.org/10.1111/mila.12050
- Catts, H. W., & Petscher, Y. (2021). A cumulative risk and resilience model of dyslexia. *Journal of Learning Disabilities*, *55*(3), 171-184. https://doi.org/10.1177/00222194211037062
- Claessen, M., Dzidic, P., Boyes, M., Badcock, N., Nayton, M., & Leitão, S. (2020). Educators' perceptions of the impact of reading difficulties for young people. *Australian Journal of Learning Difficulties, 25*(1), 51–64. https://doi.org/10.1080/19404158.2020.1734952
- Chakravarty, A. (2009). Artistic talent in dyslexia—A hypothesis. *Medical Hypotheses, 73*(4), 569–571. https://doi.org/10.1016/j.mehy.2009.05.034
- Cheema, K., Fleming, C., Craig, J., Hodgetts, W. E., & Cummine, J. (2023). Reading and spelling profiles of adult poor readers: Phonological, orthographic and morphological considerations. *Dyslexia*, 1–20. https://doi.org/10.1002/dys.1731
- Cooper, R. (2009). *Dyslexia. Neurodiversity in Higher Education*, 63–89. https://doi.org/10.1002/9780470742259
- Davis, R. D., & Braun, E. M. (2010). *The gift of dyslexia: Why some of the smartest people can't read– and how they can learn.* Penguin Group.
- Diamond., M. (2023). A dose of positivity. Tools, techniques, and strategies to live life on your terms. Dallas, tx 75231, MATT HOLT, BenBella Books, inc.
- Doust, C., Fontanillas, P., & Eising, E. (2022). Discovery of 42 genome-wide significant loci associated with dyslexia. *Nat Genet 54*, 1621–1629 https://doi.org/10.1038/s41588-022-01192
- Alencar, E. S. (2003). Upside-down brilliance: The visual-spatial learner. *Gifted and Talented International*, 18(1), 53–54. https://doi.org/10.1080/15332276.2003.11673009
- Franks, K., & Frederick, H. (2013). Dyslexic and entrepreneur: Typologies, commonalities, and differences. *Journal of Asia Entrepreneurship and Sustainability, 9*(1), 95-115.
- Farah, R., Ionta, S., & Horowitz-Kraus, T., (2021). Neuro-Behavioral Correlates of Executive Dysfunctions in Dyslexia Over Development From Childhood to Adulthood. *Front. Psychol.* 12:708863. doi 10.3389/fps.2021.708863
- Ghasemi, Y., & Hashmi, A., (2019). Conducting research using thematic analysis method: a practical and step-by-step guide for learning and Education (Study Case: Music Consumption of Master's Students of Eyalam University). *Scientific Quarterly Journal of Elam Culture, 20,* 64 and 65.7-33.
- Gallagher, A. L., Galvin, R., Robinson, K., Murphy, C.-A., Conway, P. F., & Perry, A. (2020). The characteristics, life circumstances and self-concept of 13-year-olds with and without disabilities in Ireland: A secondary analysis of the growing up in Ireland (GUI) study. *PLOS ONE, 15*(3), e0229599. https://doi.org/10.1371/journal.pone.0229599
- Gibbs, S., & Elliott, J. (2015) The differential effects of labeling: How do 'dyslexia' and 'reading difficulties' affect teachers' beliefs. *European Journal of Special Needs Education, 30*(3), 323 -337. https://doi.org/10.1080/08856257.2015.1022999
- Gilger, J. W. (2017). Beyond a reading disability: Comments on the need to examine the full spectrum of abilities/disabilities of the atypical dyslexic brain. *Annals of Dyslexia*, 67(2), 109 –113. https://doi.org/10.1007/s11881-017-0142
- Greene, D., & David, J. L. (1984). A research design for generalizing from multiple case studies. *Evaluation and Program Planning,* 7(1), 73–85. https://doi.org/10.1016/0149-7189(84)90027-2

- Hickman, R., & Brens, M. (2014). Art, pedagogy, and dyslexia. *International Journal of Art & Design Education*, 33(3), 335–344. https://doi.org/10.1111/jade.12067
- Holmes, J. V., Fourie, M. P., Van Der Merwe, A., Burke, & Fritz, E. (2021). Developmental Dyslexia and Compensatory Skills: The man who could not read but learned to fly. *Asia Pacific Journal of Developmental Differences Vol. 8* No. 1 January. DOI: 10.3850/S2345734121000061
- Hunziker, S., Blankenagel, M. (2021). Multiple Case Research Design. In: *Research Design in Business and Management.* Springer Gabler, Wiesbaden. https://doi.org/10.1007/978-3-658 34357-6 9
- Jones, L. Ø., & Manger, T. (2019). Literacy skills, academic self-efficacy, and participation in prison education. *The Wiley Handbook of Adult Literacy*, 151–169. https://doi.org/10.1002/9781119261407.ch7
- Kannangara, C. (2018). Not all those who wander are lost: Examining the character strengths of dyslexia. *Global Journal of Intellectual & Developmental Disabilities, 4*(5). https://doi.org/10.19080/gjidd.2018.04.555648
- Kapoula, Z., Ruiz, S., Spector, L., Mocorovi, M., Gaertner, C., Quilici, C., & Vernet, M. (2016). Education influences creativity in dyslexic and non-dyslexic children and teenagers. *PLOS ONE, 11*(3), e0150421. https://doi.org/10.1371/journal.pone.0150421
- Kirk, J., & Reid, G. (2001). An examination of the relationship between dyslexia and offending in young people and the implications for the training system. *Dyslexia*, 7(2), 77–84. https://doi.org/10.1002/dys.184
- Knight, C. (2018). What is dyslexia? An exploration of the relationship between teachers' understandings of dyslexia and their training experiences. *Dyslexia*, *24*(3), 207–219. https://doi.org/10.1002/dys.1593
- Leitão, S., Dzidic, P., Claessen, M., Gordon, J., Howard, K., Nayton, M., & Boyes, M. E. (2017). Exploring the impact of living with dyslexia: The perspectives of children and their parents. *International Journal of Speech-Language Pathology, 19*(3), 322–334. https://doi.org/10.1080/17549507.2017.1309068
- Leveroy, D. (2013). Locating dyslexic performance: Text, identity, and creativity. *Research in Drama Education: The Journal of Applied Theatre and Performance, 18*(4), 374–387. https://doi.org/10.1080/13569783.2013.836919
- Liberto, G. M. D., Peter, V., Kalashnikova, M., Goswami, U., Burnham, D., & Lalor, E. C. (2018). Atypical cortical entrainment to speech in the right hemisphere underpins phonemic deficits in dyslexia. *NeuroImage*, 175, 70–79. https://doi.org/10.1016/j.neuroimage.2018.03.072
- Livingston, E. M., Siegel, L. S., & Ribary, U. (2018). Developmental dyslexia: Emotional impact and consequences. *Australian Journal of Learning Difficulties, 23*(2), 107–135. https://doi.org/10.1080/19404158.2018.1479975
- Locke, R., Alexander, G., Mann, R., Kibble, S., & Scallan, S. (2016). Doctors with dyslexia: Strategies and support. *The Clinical Teacher, 14*(5), 355–359. https://doi.org/10.1111/tct.12578
- Logan, J. (2009). Dyslexic entrepreneurs: The incidence; their coping strategies and their business skills. *Dyslexia*, *15*(4), 328–346. https://doi.org/10.1002/dys.388
- Longobardi, C., Fabris, M. A., Mendola, M., & Prino, L. E. (2019). Examining the selection of university courses in young adults with learning disabilities. *Dyslexia*, *25*(2), 219–224. https://doi.org/10.1002/dys.1611
- MacCullagh, L., Bosanquet, A., & Badcock, N. A. (2016). University students with dyslexia: A qualitative exploratory study of learning practices, challenges, and strategies. *Dyslexia*, 23

- (1), 3-23. https://doi.org/10.1002/dys.1544
- Macias, L. (2013). *Embracing dyslexia* [Motion Picture]. In Janson Media. https://www.youtube.com/watch?v=cBIK0XVPbXo.
- Marshall, A. (2015). *Brain scans show dyslexics read better with alternative strategies*. Davis Dyslexia Association International. https://www.dyslexia.com/research/articles/alternative-brain-pathways/
- Miles, T. R., Thierry, G., Roberts, J., & Schiffeldrin, J. (2006). Verbatim and gist recall of sentences by dyslexic and non-dyslexic adults. *Dyslexia*, 12(3), 177–194. https://doi.org/10.1002/dys.320
- Miller, Z. A., & Miller, B. L. (2013). Artistic creativity and dementia. *Progress in Brain Research*, 204, 99–112. https://doi.org/10.1016/b978-0-444-63287-6.00005-1
- Moojen, S. M. P., Gonçalves, H. A., Bassôa, A., Navas, A. L., de Jou, G., & Miguel, E. S. (2020).

  Adults with dyslexia: How can they achieve academic success despite impairments in basic reading and writing abilities? The role of text structure sensitivity as a compensatory skill.

  Annals of Dyslexia, 70. https://doi.org/10.1007/s11881-020-00195-w
- Peltier, T. K., Washburn, E. K., Heddy, B. C., & Binks-Cantrell, E. (2022). What do teachers know about dyslexia? It's complicated! *Reading and Writing*. https://doi.org/10.1007/s11145-022-10264-8
- Pietro, D., Willinger, N., Frei, N., Lutz, C., Coraj, S., Schneider, C., Stämpfli, C, Stämpfli, P., & Brem, S. (2023). Disentangling influences of dyslexia, development, and reading experience on effective brain connectivity in children, *NeuroImage 268*, 119869. https://doi.org/10.1016/j.neuroimage.2023.119869
- Pouretemad, H. R., Rostami, M., & Babamohamadi, M. (2013). Psychometric Properties of the Persian Version of Adult Dyslexia Checklist and Adult Reading Checklist. *Journal of Cognitive Psychology Achievements, volume 21*/number 2/page 255-268
- Richland, F., (2020). The Functional Neuroanatomy of Developmental Dyslexia Across Languages and Writing Systems. *Front. Psychol. 11*:155. doi 10.3389/fps.2020.00155
- Samuelsson, S., Herkner, B., & Lundberg, I. (2003). Reading and writing difficulties among prison inmates: A matter of experiential factors rather than dyslexic problems. *Scientific Studies of Reading*, 7(1), 53–73. https://doi.org/10.1207/s1532799xssr0701\_04
- Schneps, M. H., Brockmole, J. R., Rose, L. T., Pomplun, M., Sonnert, G., & Greenhill, L. J. (2011). Dyslexia is linked to visual strengths useful in astronomy. *Bulletin of the American Astronomical Society, 43.*
- Scott, L. (2016). SEND The schools and colleges experience: A report to the secretary of state for education. http://dera.ioe.ac.uk/id/eprint/27721
- Shaywitz, S., & Shaywitz, B. (2014, June). Information on House Resolution 456 and House Resolution 623. *The Yale Center for Dyslexia and Creativity*. https://dyslexia.yale.edu/articles\_directors/information-on-house-resolution-456-and-h-res-623
- Smythe, L., & Everatt, J. (2001). Reading adult checklist. Copyright.
- Snowling, M. (2012). Changing concepts of dyslexia: nature, treatment, and co-morbidity. *Virtual Issue Journal of Child Psychology and Psychiatry, 53*, 9.e1-e3.
- Shaywitz, S., & Shaywitz, J. (2020). Overcoming dyslexia (2nd Edition). Vintage.
- Stein, J. (2023). Theories about Developmental Dyslexia. *Brain Sci. 13*, 208. https://doi.org/10.3390/brainsci13020208
- Silverman, L. (2013, August 12). *Breakthroughs in the assessment of the gifted.* [Conference Keynote Handout]. The World Council for Gifted and Talented Children, Louisville, United States. https://www.slideshare.net/wcqtc/linda-silverman-handouts

- Sümer Dodur, H. M., & Altindağ Kumaş, Ö. (2020). Knowledge and beliefs of classroom teachers about dyslexia: The case of teachers in Turkey. *European Journal of Special Needs Education*, 1–17. https://doi.org/10.1080/08856257.2020.1779980
- Talbot, J. (2010). Prisoners' voices: Experiences of the criminal justice system by prisoners with learning disabilities. *Tizard Learning Disability Review, 15*(3), 33–41. https://doi.org/10.5042/tldr.2010.0403
- Taylor, H. & Vestergaard, M. D. (2022). Developmental Dyslexia: Disorder or Specialization in Exploration? *Front. Psychol. 13*:889245. doi 10.3389/fps.2022.889245
- Viersen, S., de Bree, E. H., Kroesbergen, E. H., Slot, E. M., & de Jong, P. F. (2015). Risk and protective factors in gifted children with dyslexia. *Annals of Dyslexia, 65,* 178–198. https://doi.org/10.1007/s11881-015-0106-y
- Thomson, J. M., Leong, V., & Goswami, U. (2012). Auditory processing interventions and developmental dyslexia: A comparison of phonemic and rhythmic approaches. *Reading and Writing*, 26(2), 139–161. https://doi.org/10.1007/s11145-012-9359-6
- Washburn, E. K., Mulcahy, C. A., Musante, G., & Joshi, R. M. (2017). Novice teachers' knowledge of reading-related disabilities and dyslexia. *Learning Disabilities: A Contemporary Journal*, 15 (2), 169-191
- West, T. G. (2014). "Amazing shortcomings, amazing strengths" beginning to understand the hidden talents of dyslexics. *Asia Pacific Journal of Developmental Differences, 1*(1), 78–89. https://doi.org/10.3850/s2345734114000076
- West, T. G. (2022). Personal memories of Donald A.B. Lindberg M.D., visual thinker, and medical visionary. Transforming Biomedical Informatics and Health Information Access: Don Lindberg and the U.S. National Library of Medicine. https://doi.org/10.3233/shti211027
- White, J., Mather, N., & Kirkpatrick, J. (2020). Preservice educators' and noneducators' knowledge and perceptions of responsibility about dyslexia. *Dyslexia*, 26(2). https://doi.org/10.1002/dys.1653
- Winner, E., von Karolyi, C., Malinsky, D., French, L., Seliger, C., Ross, E., & Weber, C. (2001).

  Dyslexia and visual-spatial talents: Compensation vs deficit model. *Brain and Language, 76*(2), 81–110. https://doi.org/10.1006/brln.2000.2392
- Wolff, U., & Lundberg, I. (2002). The prevalence of dyslexia among art students. *Dyslexia, 8*(1), 34–42. https://doi.org/10.1002/dys.211
- Worthy, J., DeJulio, S., Svrcek, N., Villarreal, D. A., Derbyshire, C., LeeKeenan, K., Wiebe, M. T., Lammert, C., Rubin, J. C., & Salmerón, C. (2016). Teachers' understandings, perspectives, and experiences of dyslexia. *Literacy Research: Theory, Method, and Practice, 65*(1), 436–453. https://doi.org/10.1177/2381336916661529
- Zach, L. (2006). Using a multiple-case studies design to investigate the information-seeking behavior of arts administrators. *Library Trends*, *55*(1), 4–21. https://doi.org/10.1353/lib.2006.0055
- Zeleke, S. (2004). Self-concepts of students with learning disabilities and their normally achieving peers: A review. *European Journal of Special Needs Education, 19*(2), 145–170. https://doi.org/10.1080/08856250410001678469
- Zou, L., Zhu, K., Jiang, Q., Xiao, P., Wu, X., Zhu, B., & Song, R. (2022). Quality of Life in Chinese Children with Developmental Dyslexia: A Cross-Sectional Study. *BMJ Open, 12*, e052278



#### BENEFITS OF A **RETA MEMBER**

- ★ Bi-annual RETA Chronicles, an exclusive members only magazine
- Bi-annual Asia Pacific Journal of Developmental Differences (APJDD)
- ★ 10% discount on the resources sold by DAS
- ★ 10% discount on courses and workshops conducted by DAS Academy
- ★ 10% discount on full age assessments for dyslexia
- Access to DAS Academy library & e-journals
- Invitation to workshops/talks/sharing sessions by quest speakers
- Invitation to speak at conferences, workshops and courses
- Opportunity to be listed on RETA website for private consultation (Not applicable for DAS Staff and AEDs)

Be **RECOGNISED** for your expertise in the field of **SPECIAL EDUCATIONAL NEEDS** 

**Register of Educational Therapists (Asia)** (**RETA**) provides a list of private tutors and consultants in the various fields of SpLD that you can look through and connect with.

For educators who make a difference, join us as a RETA Member and be listed in our Register.



6444 5700 / www.RETA.sg / info@reta.sg

Asia Pacific Journal of Developmental Differences Vol. 11, No. 1, July 2024 pp. 245—262 DOI: 10.3850/S2345734124002456



## Dean Bragonier and Noticeability: The man, the model and the need

## Angela Fawcett<sup>1\*</sup> and Dean Bragonier<sup>2</sup>

- 1 Editor in Chief, Asia Pacific Journal of Developmental Differences, Singapore
- 2 Executive Dyslexic, NoticeAblility, USA

#### Preface

In preparing this article, as first author I am conscious that it may not fit with some people's definition of an academic article, because only positive assessments of Noticeability are provided here. Let me fill you in on the background. Dean Bragonier was invited to present his work in this journal but was unable to deal with the quantity of writing because of his dyslexia, and opted to give the journal an interview instead. This approach instantiates that adopted by his company NoticeAbility, which deliberately moves young adolescents away from reading and writing, where they struggle, to a workshop format working on projects in small groups, where they can show leadership, teamwork and demonstrate their strengths. This type of research approach is proving remarkably successful these days with an emphasis on the whole child, executive function, including self-control, selective attention, cognitive inhibition, working memory and cognitive flexibility, (Diamond, 2013) as well as self-esteem, providing an environment where they can challenge themselves and show their strengths, with interventions targeting self-image in order to release the potential for success that may be hidden in these children. NoticeAbility works by including teaching staff as observers of the program, and involving parents, who may all be surprised by the confidence, motivation and effectiveness revealed. It is an approach that could be easily adopted by others, and evaluated more formally within a research setting. The article itself is designed to inspire further research of this type, as well as to offer an alternative to the many articles reflecting failure in this group. As such, it is intended to inspire the reader to consider the strengths in dyslexia, rather than focusing on dyslexia as a deficit, and provides justification from the research literature for the approach adopted.

Angela Fawcett, Editor in Chief, Asia Pacific Journal of Developmental Differences, Singapore , Email angela@das.org.gs

<sup>\*</sup> Correspondence to:

#### **Abstract**

In this article the authors report an interview between Dean Bragonier, Executive Dyslexic of NoticeAbility, USA and Angela Fawcett, international researcher into dyslexia, and explore the research literature on strengths and weaknesses in dyslexia. The interview was motivated by a series of conversations between the authors, and proposed by Fawcett in order to explore the underlying motivation and rationale for the work of the NoticeAbility group in designing and delivering entrepreneurial curricula for middle school children with dyslexia, in order to highlight their strengths in this area. Inspired by the highly successful keynote presentation by Bragonier at Unite SpLD, 2021, incorporating his research, the article attempts to provide a vehicle to escape any perceived ongoing constraints of dyslexia on academic self-expression from Bragonier, showcasing his motivation and the success of the approach he has been able to adopt in improving the motivation and self-esteem of dyslexic children, and the impact of these programmes on their parents and teachers. His approach is illustrated by the work of his son Bodhi in the recent Magellan Campaign visit to the UK, analysing the impact of positive role models in dyslexia. The article concludes with a review of the Positive dyslexia movement and its impact on dyslexia support.

Keywords:

#### THE MAN - THE INTERVIEW TRANSCRIPT

"My mother had knowledge of dyslexia due to her work as a child developmental psychologist. Because she got her PhD from Columbia University in New York, she was able to ask other professionals if they could test me, which they did, and determined I was dyslexic. The fact that I was diagnosed in the 1970s is very progressive, even compared to today where very few people with dyslexia actually get a diagnosis or even understand what dyslexia is for that matter.

One of the main reasons why I'm doing what I do is because of that diagnosis. The result of that diagnosis was that my parents were able to get me the structured literacy I needed to learn how to read. I was placed in private education which allowed me to be in an environment where some of the teachers knew what dyslexia was and were able to support me in the way I need to be supported. However, people in the field of dyslexia will often say that if a child is identified, diagnosed, and receive structure literacy, that they will automatically be a success. But while those steps are absolutely mandatory, it isn't the entire equation for personal empowerment. It's part of the equation. What is also required are tools to build the students self-confidence. From a dyslexic perspective, I had every advantage you could ask for, yet I still felt different and broken as I went through school. I didn't believe that I had any self-worth. Even

with classroom accommodations, a child with dyslexia can feel broken, lazy, and stupid. And when the child has a negative self-perception, it can erase the benefits of literacy and structured intervention.

So, how do we start building self-esteem while students receive all the accommodation they need? If we can couple structured literacy with social emotional learning, students can begin to understand their potential. They can feel confident as they address the challenges of their dyslexia. They can move forward into the world with a new level of confidence as they notice their true potential. I went into this work because of the frustration I felt listening to people from some of the best universities in the United States say, 'We have the answer and its structured literacy.' I can tell you that that is only partially true. But that is not the entire answer. Students require personal empowerment and confidence to succeed.

When I saw this opportunity, I began to tell my story and build a program to enable students to see what they are good at. From this point of view, they can start to create genuine self-confidence. I began to work alongside those diagnosing students and teaching literacy. By adding social emotional learning to the equation, we helped teachers see something they didn't yet realize was missing.

Dyslexia is the same around the world. It doesn't matter if you are in Africa, Asia or America, a person with dyslexia is a person with dyslexia. They have the same traits. They have the same typical kind of behaviour. Dyslexic is neurobiological, not cultural. Our brains have a slightly different construction and wiring. This is frequently noticed under particular circumstances, like learning to read and spell. . Consider for a moment that the human brain is built to speak, see, and to hear. Most of us are born with these abilities. However, writing and reading are artificial communication devices. They are human-made inventions designed to take the invisible, the spoken word, and transform it into something visible. For one reason or another, it is more difficult for people with dyslexia to learn this artificial form of communication. It's not a defect but, instead, simply a difference in the way their brain functions.

In the United States, the biggest obstacle for teachers is getting support from the government and their administrators. Dyslexia is a diagnosis that is protected by federal and state laws. These laws ensure that students are given specific accommodations. However, suppose you have a child diagnosed with dyslexia in your school. In that case, administrators must provide them with evidence-based interventions that are much more expensive than non-evidence-based instruction. So, rather than saying a child has dyslexia, administrators often say that the student has a 'specific learning disability' or a 'language-based learning disability'.

These terms avoid using the word dyslexia. As a result, students with dyslexia receive intervention but not the more expensive type that are routed in evidence. In America, people refer to this battle as the 'reading wars', with some people arguing for evidence-based intervention and others promoting less expensive, less effective intervention. It is the children with dyslexia who suffer from this debate causing unnecessary failure, frustration, and low self-confidence. This is what encouraged me to create a social-emotional learning curriculum.

Through our program, students with dyslexia have the chance to discover what they're good at. Parents observe their children's excitement for the program as they discover they are intelligent and creative not broken or stupid. Finally, a teacher is able to say to the parents, "You are right. Your child is brilliant; he is just in an environment (traditional school) which is not built to recognize what he is good at but, instead, where his weakness lie." After the program, parents are often relieved and encouraged.

In addition to the program's impact on students and parents, we've seen tremendous enthusiasm from the teachers who deliver it. The program enables them to reach students who normally get discouraged which makes them feel guilty because they don't know how to connect with these students. By delivering our program, they learn a different way of working with these students by paying attention to the child's abilities."

Interview ends.

#### **Instructor Training Overview**

How do NoticeAbility achieve their positive outcomes? If we consider training for their instructors, this similarly moves away from a deficit focus, focusing instead on a curriculum designed to accentuate dyslexia strengths, building in key aspects of socioemotional support and executive function to ensure success (following Diamond, 2013), which are now seen as key to success in dyslexia..

Table 1. Feedback from instructor training. NoticeAbility (2020)

It was truly an enlightening, inspiring, and thought-provoking experience.

I used to think dyslexia was a learning disability that was a challenge for students. But now I think that students with dyslexia are a gift and it is our jobs as educators to tap into their strengths and see what they can achieve.

A pre-post design was used to analyse the improvements in knowledge of dyslexia in the NoticeAbility instructors, and their preparedness to engage with dyslexic students. Based on a Wilcoxon signed rank score test, highly significant impact was found for knowledge of dyslexia, with 74% of participants increasing their knowledge and 59% evaluating themselves as better prepared to deal with dyslexia successfully. At the end of the training period, participants were able to successfully navigate around the NoticeAbility system, working both online on the teaching platform and with the printed materials.

Using a net Promoter score based on likelihood of recommending the course, participants achieved a score of 54, where 22 is the average in studies of this type. In order to enhance this learning, opportunities for practical application are provided which have been shown to be the most effective practice (Gates Foundation, 2014). The approach adopted builds on active learning, collaboration and feedback, highlighted in Darling-Hammond et al, 2017).

Table 2. Feedback - what did you gain from instructor training. NoticeAbility (2020)

The opportunity to start to make a positive difference in a student's life.

An understanding of all the things a dyslexic can achieve and that it is not a bad thing to be dyslexic

#### **Educator Capacity**

The key to long-term success for students with SpLD (Newman et al., 2011) are two-fold, firstly, supportive and understanding teachers and secondly, close relationships with mentors. At NoticeAbility both of these have been achieved by adopting a strength-based perspective based on a sound understanding of the neuroscience of dyslexia, scaffolded by adult mentors. This unusual perspective allows NoticeAbility to move away from the traditional focus on deficits, to consider instead individual differences and how best to enhance these strengths within an interactive classroom experience geared to success.

#### **Evaluating NoticeAbility**

The format for NoticeAbility is based on Critical Disability Theory (Hosking, 2008) that sees disability as socially dictated by a mismatch between the abilities of the child and the school environment in which they are placed. The solution to this in terms of Noticeability is to re-educate all the protagonists, the child, the teacher and the parents so that the environment is more conducive to success for dyslexia, focusing on unique strengths, and avoiding traditional literacy tasks where possible. The techniques involved

include use of audio- visual aids, computers, and a curriculum which highlights known strengths in dyslexia, including Entrepreneurship, Architecture and Art, as well as the opportunities to apply these skills under the lead of a mentor.

In order to evaluate the success of the project, a pilot study using the Stigma Consciousness Questionnaire- Learning Disabilities (SCQ-LD, Daley & Rappolt-Schlichtmann, 2018) was conducted at pre and post-test. This uses a Likert type scale to measure how prepared students are for school and their readiness to improve, persevere, and solve problems creatively. The results indicated a significant improvement at level p=0.01. Feedback from the parents endorsed the improvements in self-esteem (82%), confidence (73%), peer relationships and attitudes to school (64%), with teachers providing a 100% endorsement for all but attitudes which showed 50% improvement. After the course, students reported significantly increased academic tenacity in planning ahead to achieve their goals, deal with challenging problems, and solve these more creatively.

#### The System in Practice

Over the period 20221-2022 and beyond, NoticeAbility, comprising Dean Bragnier, his wife Sally and their teenage son Bohdi, set out to recreate the journey that Magellan undertook as an explorer in 1519, circumnavigating the world. Realising the limitations of running a not for profit organisation based in the USA, this group sought to extend their reach worldwide, by setting up free workshops for dyslexic students and their educators across the world. Rather than focusing on any perceived limitations, the program was devised to allow participants to sample from the rich curriculum which the team had developed. The topics available included entrepreneurship, art, engineering and design, all areas in which dyslexic students have shown exceptional strengths. See for example the study by Wolf and Lundberg, 2002, on the prevalence of dyslexia in art students.

Raising funds through sponsorship, a programme of travel in 3 phases, across 3 regions Worldwide was set up, building on existing links with dyslexia organisations worldwide, to chrystallise this network of organisations into a coherent whole. The early stages of the COVID pandemic were used to develop remote learning programmes with isolated communities in Central Africa and Australia. Before setting off on this epic journey, a series of workshops and meetings were planned, delivered free to students, schools and parents, who provided the premises for the workshops to take place. Schools and organisations that took part in a full 3-hour workshop were given free access to a module from the curriculum for use within their school.

A report in September 2022, highlighted the ongoing activities in Phase 1, in Europe and Morocco, with an unanticipated level of programme adoption in England, Malta and the Netherlands. Each workshop was led by the dyslexic instructor, Dean for

entrepreneurship, Bohdi for engineering and design, and Sally for art, with the students involved encouraged to play an active role in leadership and execution of the tasks involved. Families were encouraged to observe in order to help them recognise the untapped potential of their dyslexic children. Dr Helen Ross, trustee of the British Dyslexia association commented following a workshop in Swindon

"Watching Dean and Bodhi deliver their empowering workshops together was a joy and a privilege. They have such a profound understanding of the challenges of dyslexia as they are both dyslexic, but they use that understanding and their strong father-son bond to empower and edify young people to see their own strengths."

Dr Helen Ross, personal communication.

Here we provide a review of the contribution of Bodhi Bragonier, then aged 13, in leading 2 full day workshops in Engineering and Architecture. It seems that Bodhi was the inspiration behind the Magellan project, having tried to set up three businesses at the unusually early age of 7! The review is provided by Graham Humphries, Governor of Moon Hall Educational Trust, a school in the UK for dyslexic children from year 3-11, which benefits from small class sizes and a family ethos. Moon Hall took part in the Magellan project, when Bodhi was nominated for the British Dyslexia association's Outstanding Young Person Award, 2022. The Magellan project presents personalised learning in small free workshops involving dyslexic participants and their families, as well as their teachers, emphasising positive aspects of dyslexia.

Review for Bodhi Bragonier for the British Dyslexia award for Outstanding young dyslexics. Graham Humphries, Moon Hall Educational Trust.

"Bodhi is an inspirational teenage role model for his generation. As a "pure bred" dyslexic (both his parents are dyslexic) he talks about his dyslexia with pride. He is a World-Wide Ambassador helping raise well-being and aspiration amongst dyslexic children. An advocate for their "special difference." He is a poet, entrepreneur, and wonderful enthusiast for all. He has created a business to sell love notes. (acts of kindness) He has invented and marketed a board game to help solve family disagreements. He has formed Bodhi' Boot Camp (BBC) to aid fitness.

He has led seminars and workshops alone and with his Father for dyslexic students, their parents/carers and Teachers with confidence and panache. He has travelled the World, recently Ghana, Thailand, Indonesia and England to promote the abilities of dyslexic children. He is passionate that the cycle of failure so many dyslexic pupils experience, that so often leads to poor behaviour, or becoming the "class clown" is diagnosed, remediated and redirected. This path, for so many dyslexics leads to addiction, crime and imprisonment and he aspires to break this cycle.

Promoting the "Dyslexic Advantage" is in his soul. He is already beginning to understand neurodiversity and change agents to develop Dyslexic Empowerment. In his own poetic words, he encapsulates the dyslexic experience: "School can be hard when the words are askew. And everyone else is faster than you... When I smell the paper and hear the rustle I have an inner tussle..."He encourages confidence, self -worth. He tells dyslexic youngsters "Do things you love"; "Find where you lose time". See https://www.youtube.com/watch?v=YTebjEEbK6Q "

Graham Humphries, trustee Moon Hall Educational Trust

Following up on the impact of the time Bodhi spent with Moon Hall school, Graham Humphries, while recognising how difficult it was to formally evaluate such a scheme, was able to confirm informally that there had been a surge in confidence within the pupils, which seemed to still be in place in ongoing surveys within the school.

#### Background. The need for a model of this type

Literacy has long been recognised as the key to success in education, for children from all backgrounds, with children who struggle in the early years doubly disadvantaged. Unfortunately, there can be no doubt that UK schools are not being as effective as hoped in remediating reading failure (OECD, 2015), ranked 22nd for reading, notably one of the lowest of the English-speaking countries, although recent ranks have shown some improvement. However, the situation has been deteriorating further given the increasing demands on schools in terms of recent cuts to their funding systems, which will have continuing impact on the provision of support for struggling learners. The full, cumulative cost to the state of failure in literacy has been estimated at £45,000 per child once future educational, employment and health consequences are considered (KPMG, 2006).

In 2019, a report from the All Party Parliamentary group (APPG) on dyslexia in the UK on the Human costs of dyslexia, identified that 95% of children felt frustrated by their dyslexia and 82% preferred to hide their difficulties through embarrassment (APPG, 2019). Moreover, the report also indicated that a student with dyslexia is 3.5 times more likely to be excluded than their non-dyslexic peers. This has been exacerbated by the impact of COVID, (BDA 2021) with 95% of parents feeling inadequate to support their children at home, and a greater impact on both adults and children with dyslexia based on the need to process remotely in the UK, and similar findings in Spain and Italy (Forteza-Forteza et al, 2021, Bachenis et al, 2021).

In line with the interview with Dean Bragonier, there has been a long history of reports of low self-esteem and self-image in dyslexia, with early work from Humphrey and Mullins (2002) identifying a range of issues. This is based on the concept that literacy is

typically seen as correlating with intelligence, and by implication those who cannot read perceive themselves to be stupid. It is not inevitable that dyslexic children suffer from low self-esteem, it depends on the understanding of their difficulties, and the match between the child, the family and their school environment For example, research from Burdett and Burdon (2005) has shown that dyslexic children attending specialist schools do not suffer from the low self-esteem that has typically been identified in dyslexia.

More recently Glazzard, (2010) indicated that early diagnosis and understanding has the most positive impact on self-esteem. Key proponents of the importance of self-image in success for dyslexia across the age range include Alexander-Passe, (e.g Alexander-Passe, 2006, 2010, 2015), based on post traumatic success, a theme Alexander Passe (2020) returns to in his most recent book on entrepreneurship and dyslexia. In 2020, Giovagnoli et al examined differences in self-esteem and anxiety in dyslexic and control children, identifying significant increases in problems in dyslexia in adolescence in comparison with younger children. It is hardly surprising that the experience of continued failure and stress, plus the stigmatisation that has been associated with dyslexia (Pinel, 1999) impacts on feelings of self-worth in this way. Furthermore even when dyslexic children achieve success, they attribute this to external factors, rather than to their own abilities and efforts,(Lithari, 2019) in what the author refers to as a 'fractured academic ability'. Most recently, in 2023, in a series of studies presenting theory and data, Wilmot et al (2023a) identified a feeling of 'otherness' in dyslexic children, with exhausted and overwhelmed children and mothers, due to a poor person/environment fit leading to behavioural meltdowns and school refusal. In related theoretical research, Wilmot et al (2023b) published a scoping review, identifying 98 articles investigating mental health and dyslexia, and found a preponderance of work with primary school children, and a tendency to rely on parental reports, emphasising the need for further work with older children.

There are elements within Dean Bragonier's interview that suggest poor choices have sometimes been made in his life, which he recognises himself, that could easily have detracted from future success. If we consider the literature on dyslexia and other learning disabilities emerging from both the UK and the USA, it becomes clear that there are heightened risks of maladaptive behaviour for adolescents and young adults with dyslexia which can blight the lives and life chances of those who experience this. For example, a major report in the UK on 2029 prisoners at Chelmsford identified 53% as dyslexic (Hewitt-Main 2012), but noted that they would rather remain incarcerated in their cells than engage with traditional education classes in prison.

Jackie Hewitt-Main, a successful business woman who had recently been diagnosed as dyslexic at the age of 40, introduced a successful mentoring system led by prisoners, focusing on strengths and understanding of dyslexia, in order to build IT and social skills, which reduced recidivism to a mere 5.9% in this population (Hewitt-Main, 2021). The links between dyslexia and crime are not inevitable, but depend on the lived experience of

the child with dyslexia. This is demonstrated in an article from Willcutt and Pennington (2000) drawing on a large sample of dyslexic twins and their probands, which indicated higher rates of internalising and externalising disorders in the dyslexic group. However, this was not associated with aggression, delinquency, oppositional defiant disorder or conduct disorder. Interestingly, this group who formed part of a longitudinal study are likely to have received good support in dealing with their dyslexia, and this may well have mitigated their risk of negative outcomes.

In the USA, heightened risk for low educational attainment, unemployment, substance abuse and criminal behaviour have been identified as a consequence of inadequately supported dyslexia. This includes 32% drop out from school, (Cortiella &Horowitz, 2014) and reduced rates of 41% completing college compared to 59% of their typically achieving peers (Newman et. al. 2011; National Center for Education Statistics). Moreover, this impacts on career development for those who did not complete high school (Newman et al., 2011), with 38% of this group looking for work for more than 6 months, which makes them at risk of substance abuse and criminal behaviour. Moreover, Newman et al (2011) note that 76% of this group have had some involvement with the criminal justice system in the USA. A remarkably similar level of learning disabilities has been identified in the USA as in the UK, 55% within 8 years of leaving school (Cortiella & Horowitz, 2014, p. 25). Further studies in the UK have identified learning disabilities ranging from severe to borderline in detention centres (Kirk &Reid, 2001; Dyslexia Action, 2005). Overall, twice as many dyslexic as typical achievers are caught up in the criminal justice system (Macdonald, 2012, p.430).

This also links to risks arising from addiction and substance abuse, with twice as many dyslexic as non-dyslexic peers exhibiting a range of characteristic risks for substance abuse, between 40 and 60 % (Califano, 2000, p. 10). The costs of these addictions are high, an average \$148,767 per year to imprison one individual (Justice Policy Institute, 2014). Moreover, the penalties for low educational achievement are financial, earning between \$10,000 - \$36,000 less than college graduates (US Census Bureau, 2012). Costs to US society can range from \$300,000 every year (Sum et al., 2009) to \$500 billion per year (Califano, 2000). Conversely, the outcomes for dyslexics who manage to overcome their difficulties suggests a very different range of outcomes. Research in the UK, for example, has indicated that those dyslexic students who have been successful in accessing a degree course are at significantly lower risk for substance addiction of all types than their non-dyslexic peers, (Wilcockson et al, 2016, Wilcockson, Mcelhatton and Fawcett, 2018).

It seems that dyslexia can be characterised by either monumental success or failure. Interest in high achieving individuals has burgeoned over the years, but the majority of interest has focused on individuals with exemplary success (see for example Fink, 1998) who seem to be characterised by a passion for their subject which has helped them overcome their reading difficulties. There is not only evidence for more life affirming

success in this group, but also consistent evidence emerging for not only a higher incidence of entrepreneurs amongst dyslexics (35%, Logan, 2009) but also that 40% of all self-made millionaires are dyslexic (Tulip Financial Report, 2003. Thomas West in the USA, dyslexic himself, has written for many years on the extraordinary capacities amongst the dyslexic community for visual thinking, identifying a series of Nobel prize winners in one dyslexic family (West, 1999). Nevertheless, those who have tried to quantify this success experimentally, have largely failed to identify superior strengths in controlled conditions.

However, more recently, Nicolson and his colleagues (Nicolson, 2015, Agahi, 2015, Sepulveda, 2018) have identified a range of signature strengths in dyslexia, which could potentially be found in those who have been successful enough to reach university. This is characterised as big picture thinking, and they caution that for each individual dyslexic, it is important to identify their relative strengths and work towards these. There seems to be so much potential for success or failure within the dyslexic population, and that an appropriate educational experience which draws out the potential for strengths can be key in achieving a good outcome for this group. Kannangara (2015), in a similar vein, presents an article based in her own experience of dyslexia, differentiating between languishing and thriving dyslexics based on a fixed or growth mindset. Later, Kannagara and colleagues (2018) adapted Seligman's questionnaire for dyslexia and compared the character strengths of dyslexia in the UK and USA, finding that the 240-item questionnaire was too long for most dyslexics to complete successfully.

In terms of strengths, it is here that NoticeAbility, the system designed by Dean Bragonier seems to come into play. The concept of NoticeAbility is built on empowering dyslexics to discover their abilities whilst still in middle school, before their struggles in secondary school impact their progress too far for recovery. They have identified a range of protective factors that can reduce the odds of failure and help to bolster ongoing success. Key amongst these are the following, adapted from NoticeAbility 2020 "a supportive home life, a strong sense of connection to friends and community, and a strong sense of self- confidence" (NCLD, Student Voices Executive Summary, 2015 p. 3).

The theoretical basis of NoticeAbility has been drawn from the work of Hosking, (2008) in the Critical Disability Theory, encouraging a focus on the 'knowledge, skills and unique abilities' of those with disabilities, rather than accepting the socially constructed premise based on mishandling disability, that all disabilities are inevitably impaired'. Successful engagement must include not only the student but also their family, building on the neuroscience of dyslexia, the work of the Eide's, (Eide and Eide, 2012), and redefining dyslexia in terms of strengths rather than simply weaknesses, building the cognitive assets of the student towards successful outcomes.

This change in direction in understanding the strengths as well as the weaknesses of dyslexia has led to an approach within research which emphasises wellbeing, both

emotional and mental. So, we find successful interventions for dyslexia incorporating Mindfulness (Nakita and Thoma, 2024), and Zarei and Yarigarravesh (2024) and an interest in the development of a growth mindset in this group. Furthermore, a recent review by Smith-Spark and Gordon identified the need to consider automaticity and procedural learning in relation to executive function, implicating issues such as working memory and fluency as key to successful performance. Studies including Fara and colleagues 2024, have shown that executive function-based reading training impacts on functional connections between and within sensory networks in dyslexia.

A systematic review of research by Gibby-Leversuch and colleagues (2021) found that positive attributions, good social relationships and positive attitudes towards neurodiversity engendered feelings of self-worth in dyslexia, whereas those who displayed negative feelings of self-worth were influenced by stereotypes of laziness and stupidity that others have associated with dyslexia.

#### The Importance of the Role Model in Positive Psychology

Why is it so important that dyslexic participants, their teachers and their families identify with positive role models for success? The literature is clear that dyslexic children are susceptible to low self-esteem and feelings of self-worth that hinders their progress even more than their dyslexia itself (Zuppardo et al, 2023) It seems that these feelings have been accentuated post COVID and distance learning (British Dyslexia association, 2021, Forteza-Forteza et al, 2021, Bachenis et al, 2021). Studies have also noted the impact of low SES on children in Singapore, in terms of access to remote learning and immediacy of feedback (Yong and Asmuri, 2021). It could well be argued that lockdown has provided a significant set of new difficulties for children with dyslexia, compounding their original difficulties md making them more heavily entrenched.

It is by no means uncommon for teachers to assume that a dyslexic child 'should try harder', indeed this was a common refrain throughout the author's son's school days many years ago, despite his formal diagnosis. Similarly, many families will accept that their child is lazy or disengaged, particularly if they have had difficulties themselves and have struggled over the years with undiagnosed dyslexia. Such parents find it harder to engage with authority figures and provide emotional support for their dyslexic children. The child themselves may internalise these perceptions of themselves, reinforcing their limitations, and this may hinder their progress even further. Participation in the NoticeAbility workshops can change those perceptions, which may still linger in the teaching profession, particularly when led by an adolescent, such as Bodhi.

For a dyslexic child born to dyslexic parents as Bohdi Bragonier was, there are two clear choices. If the parents hold a growth mindset and have dealt well with their dyslexia, as shown by Dean Bragonier and his wife, Sally Taylor, the child internalises that dyslexia is

not simply a deficit but a difference in processing. On the other hand, if the parents are embittered by a sense of failure based on their dyslexia, they will find it hard to engage with their children in the same struggles that blighted their own lives as children, and their responses may be negative and destructive to incipient strengths.

In conclusion, it seems that parents have a crucial role to play in the success of dyslexic children, in identifying their strengths and encouraging them to follow their passions. Movements such as NoticeAbility can be key in this progress, encouraging the whole family to adopt a growth mindset where dyslexia is concerned, focusing on the strengths and identifying the passions that drive their dyslexic children and providing the best conditions they can to help them fulfil their potential. Teachers and instructors have a responsibility to relate to the whole child, rather than just to their disabilities, promoting their strengths as well as aiding their difficulties. The adoption and understanding of Positive dyslexia in all its aspects, can provide the first steps in moving dyslexic children and adults from languishing to thriving, from failure to success (Kannangara, 2105).

In conclusion, it is important to note that the majority of research into self-esteem and well-being is based on questionnaire studies which are vulnerable to how the participant is feeling at the time. It can be quite possible to answer differently in the morning and the afternoon, depending on the participant's current mood or recent life experiences. What we are trying to address here, is the creation of a more positive growth mindset which will allow dyslexic students to achieve their potential. There are many approaches that can do this, but in some ways the results are nebulous and can only really be seen in ongoing success for those who have participated in such approaches. Nevertheless, if this can move a struggling dyslexic student from failure to success, taking part could not be more worthwhile.

#### **REFERENCES**

- Agahi, A. S. (2015). *Investigating the strengths of dyslexia in successful adults and university students.* PhD thesis, University of Sheffield.
- Alexander-Passe, N. (2006). How dyslexic teenagers cope: an investigation of self-esteem, coping and depression. *Dyslexia 12*: 256-275.
- Alexander-Passe, N. (2010). *Dyslexia and Depression: The Hidden Sorrow.* Nova Science Publishers, New York.
- Alexander-Passe, N. (2015). *Dyslexia and Mental Health: Helping people to overcome depressive, self-harming and other adverse emotional coping strategies.* Jessica Kingsley Publishers, London.
- Alexander-Passe, N. (2020). *Dyslexia, Trauma, and Traits for Success.* In B. Pavey, M. M., Meehan, & Alexander-Passe, N. (Eds.) *Entrepreneurship, Dyslexia, and Education: Research, Principles, and Practice,* 144. Routledge Press. London.
- Baschenis, I. M. C., Farinotti, L., Zavani, E., Grumi, S., Bernasconi, P., Rosso, E., Provenzi, L.,

- Borgatti, R., Termine, C., & Chiappedi, M. (2021). Reading Skills of Children with Dyslexia Improved Less Than Expected during the COVID-19 Lockdown in Italy. *Children, 8,* 560. https://doi.org/10.3390/children8070560
- Bill and Melinda Gates Foundation. (2014). *Teachers know best: Teachers views on professional development.* Seattle, MA.
- British Dyslexia Association (2021). *The impact of COVID on the Dyslexic community. Report on findings from BDA surveys,* 7th March-3rd April 2021. BDA.org.uk
- Burden, R., & Burdett, J. (2005). Factors associated with successful learning in pupils with dyslexia: A motivational analysis. *British Journal of Special Education. 32*. 100 104. 10.1111/j.0952-3383.2005.00378.x.
- Califano, J. (2000). Substance Abuse and Learning Disabilities: Peas in a Pod or Apples and Oranges. The National Center on Addiction and Substance Abuse at Columbia University.
- Cortiella, C., & Horowitz, S. H. (2014). *State of Learning Disabilities: Facts, Trends and Emerging Issues.* New York: National Center for Learning Disabilities.
- Daley, S. G., & Rappolt-Schlichtmann, G. (2018). Stigma Consciousness Among Adolescents With Learning Disabilities: Considering Individual Experiences of Being Stereotyped. *Learning Disability Quarterly*, 41(4), 200-212. https://doi.org/10.1177/0731948718785565
- Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective teacher professional development*. Palo Alto, CA: Learning Policy Institute.
- Diamond, A. (2013). Executive Functions. Annu. Rev. Psychol., 64:135-68.
- Dyslexia Action. (2005). *The incidence of hidden disabilities in the prison population.* Egham: Dyslexia Action.
- Edwards, J. (1994). The scars of dyslexia: Eight case studies in emotional reactions. Cassell,
- Eide, B. L., & Eide F. F. (2012). *The Dyslexic advantage: Unlocking the hidden potential of the dyslexic brain.* New York, NY: Hudson Street Press.
- Farah, R., Dworetsky, A., Coalson, R. S., Petersen, S. E., Schlaggar, B. L., Rosch, K. S., & Horowitz-Kraus, T. (2024). An executive-functions-based reading training enhances sensory-motor systems integration during reading fluency in children with dyslexia. *Cerebral Cortex, 34*(4), bhae166.
- Fink, R. P. (1998). Literacy development in successful men and women with dyslexia. *Ann. of Dyslexia 48*, 311–346. https://doi.org/10.1007/s11881-998-0014-5
- Forteza-Forteza, D., Rodríguez-Martín, A., Álvarez-Arregui, E., & Menéndez Álvarez-Hevia, D. (2021). Inclusion, Dyslexia, Emotional State and Learning: Perceptions of Ibero-American Children with Dyslexia and Their Parents during the COVID-19 Lockdown. *Sustainability, 13*, 2739. https://doi.org/10.3390/su13052739
- Gibby-Leversuch, R., Hartwell, B. K. & Wright, S. (2021). Dyslexia, Literacy Difficulties and the Self-Perceptions of Children and Young People: a Systematic Review. *Curr Psychol, 40*, 5595–5612. https://doi.org/10.1007/s12144-019-00444-1
- Giovagnoli, S., Mandolesi, L., Magri, S., Tossani, E., & Benassi, M. (2020). Internalizing symptoms in developmental dyslexia: A comparison between primary and secondary school. *Frontiers in psychology, 11*, 504662.
- Glazzard, J. (2010). The impact of dyslexia on pupils' self-esteem. *Support for Learning, 25*: 63-69. https://doi.org/10.1111/j.1467-9604.2010.01442.x
- Hewitt-Mann, J. (2012). *Dyslexia behind Bars Final Report of a Pioneering Teaching and Mentoring Project at Chelmsford Prison 4 years on.* Mentoring 4 U, Benfleet.
- Hosking, D. (2008). Critical disability theory. Paper presented at the 4th Biennial Disability Studies

- Conference 2-4 September. Lancaster, UK: Lancaster University.
- Humphrey, N., & Mullins, P. M. (2002). Self-concept and self-esteem in developmental dyslexia. *Journal of Research in Special Educational Needs, 2*(2). https://doi.org/10.1111/j.1471-3802.2002.00163.x
- Justice Policy Institute. (2014). *Sticker shock: Calculating the full price tag for youth incarceration.* Washington, DC:
- Kannangara, C., Jerome C., Sowmya P, Allen, R. (2018). Not All Those Who Wander are Lost: Examining the Character Strengths of Dyslexia. *Glob J Intellect Dev Disabil. 4*(5): 555648. DOI: 10.19080/GJIDD.2018.04.555648.
- Kirk, J., & Reid, G. (2001). An examination of the relationship between dyslexia and offending in young people and the implications for the training system. *Dyslexia*, 7:77–84.
- KPMG Foundation. (2006). The long term costs of literacy difficulties. KPMG Foundation
- Leather, C., & Everatt, J. (2024). Success and Adult Dyslexia: Personal Perspectives, Practical Ideas, and Theoretical Directions. Cambridge University Press.
- Lithari, E. (2019). Fractured academic identities: Dyslexia, secondary education, self-esteem and school experiences. *International Journal of Inclusive Education, 23*, 280–296. https://doi.org/10.1080/13603116.2018.1433242
- Logan, J. (2009). Dyslexic entrepreneurs: the incidence; their coping strategies and their business skills. *Dyslexia*, 15:328–346.
- Nasika, F., & Thoma, T. (2024). The Human Side of Dyslexia: An Exploration of Children's Self-Esteem and Potential Interventions. In *Childhood Developmental Language Disorders: Role of Inclusion, Families, and Professionals* (pp. 249-264). IGI Global.
- NCLD. (2025). Student Voices: A Study of Young Adults With Learning and Attention Issues. (2015). Retrieved from https://www.ncld.org/archives/re-ports-and-studies/student-voices-a-study-of-young-adults-with-learning-and-attention-issues
- Newman, L., Wagner, M., Knokey, A. M., Marder, C., Nagle, K., Shaver, D., Wei, X., with Cameto, R., Contreras, E., Ferguson, K., Greene, S., & Schwarting, M. (2011). The *Post-High School Outcomes of Young Adults With Disabilities up to 8 Years After High School. A Report From the National Longitudinal Transition Study-2* (NLTS2) (NCSER 2011-3005). Menlo Park, CA: SRI International.
- Nicolson, R. (2015). Positive Dyslexia. Rodin Books, Sheffield
- OECD (2015). *Education at a Glance 2015: OECD Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/eag-2015-en.
- Pinel, E. C. (1999). Stigma consciousness: The psychological legacy of social stereotypes. *Journal of Personality and Social Psychology, 76*, 114–128.
- Petteruti, A., Schindler, M., & Ziedenberg, J. Kannangara, C. (2015). From Languishing Dyslexia to Thriving Dyslexia: Developing a New Conceptual Approach to Working with People with Dyslexia. *Frontiers in Psychology. 6.* 10.3389/fpsyg.2015.01976.
- Reiter, A., Tucha, O., & Lange, K. W. (2005). Executive functions in children with dyslexia. *Dyslexia,* 11(2), 116-131.
- Sepulveda, P. (2018). Dyslexia: Hidden talents in the workplace. PhD thesis, University of Sheffield. Smith-Spark, J. H., & Gordon, R. (2022). Automaticity and Executive Abilities in Developmental Dyslexia: A Theoretical Review. *Brain Sciences. 2*(4):446. https://doi.org/10.3390/brainsci12040446
- Sum, A., Khatiwada, I., & McLaughlin, J. (2009). *The consequences of dropping out of high school: joblessness and jailing for high school dropouts and the high cost for taxpayers.* Boston, MA: Center for Labor Market Studies, Northeastern University.

- Tulip Financial Group. (2003). Study commissioned for a BBC Two series 'The Mind of the Millionaire'. London: British Broadcasting Corporation
- US Census Bureau. (2012). *Statistical Abstract of the United States: 2012* (131st Edition). Retrieved from https://www2.census.gov/ library/publications/2011/compendia/statab/131ed/tables/educ.pdf
- U.S. Department of Education. Institute of Education Sciences, Nation-al Center for Education Statistics
- West, T. G. (1999). The Abilities of Those with Reading Disabilities: Focusing on the Talents of People with Dyslexia" Chapter II, Reading and Attention Disorders – Neurobiological Correlates, edited by Drake D. Duane, M. D. Timonium, MD:York Press, Inc., 1999
- Wilcockson, T. D. W., Pothos, E. M., Fawcett, A. J. (2016). Dyslexia and Substance Use in a University Undergraduate Population. *Substance use & Misuse, 51,* 1, 15-22.
- Wilcockson, T., Mcelhatton, C., & Fawcett A. J. (2018). Likelihood of Substance Abuse for Dyslexics May Be Influenced by Socioeconomic Background and Metacognition. International *Journal of Mental Health and Addiction*. DOI: 10.1007/s11469-018-0044-0
- Wilmot, A., Hasking, P., Leitão, S., Hill, E., & Boyes, M. (2023a). Understanding Mental Health in Developmental Dyslexia: A Scoping Review. *International Journal of Environmental Research and Public Health.* 20(2):1653. https://doi.org/10.3390/ijerph20021653
- Wilmot, A., Pizzey, H., Leitão, S., Hasking, P., & Boyes, M. (2023b). Growing up with dyslexia: Child and parent perspectives on school struggles, self-esteem, and mental health. *Dyslexia*, 29 (1), 40–54. https://doi.org/10.1002/dys.1729
- Wolff, U., & Lundberg, I. (2002). The prevalence of Dyslexia among art students. *Dyslexia, 8*: 34-42. https://doi.org/10.1002/dys.211
- Zarei, F., & Yarigarravesh, M. (2024). [Effectiveness of Mindfulness on Self-esteem and Social Interactions of Students with Dyslexia (Persian)]. *Journal of Learning Disabilities, 13* (2):18-31. https://doi.org/10.22098/jld.2024.14138.2131
- Zuppardo, L., Serrano, F., Pirrone, C., & Rodriguez-Fuentes, A. (2023). More Than Words: Anxiety, Self-Esteem, and Behavioral Problems in Children and Adolescents With Dyslexia. *Learning Disability Quarterly*, 46(2), 77-91. https://doi.org/10.1177/07319487211041103





ONE IN 10

people will have some form of learning difference.

People with dyslexia uses the RIGHT BRAIN more than the left when learning.



People with dyslexia can find **UNIQUE SOLUTIONS** to problems.

Around 40% of people with dyslexia also have **ADHD**.



They do not "see" words in reverse. The

### **b** & d **LETTER** REVERSAL

occurs when they are unable to name the letter.



They observe things from different angles and have

STRONG VISUALISATION SKILLS.



## DYSLEXIA RUNS IN FAMILIES.

Children have 50% chance of having dyslexia is one parent has it.



Many are talented, creative and **BIG PICTURE THINKERS.** 

Research has found that around 35% OF ENTREPRENEURS in the United States and 26% IN SINGAPORE have dyslexia.



6444 5700 Mon - Fri, 9.00am - 5.30pm

www.das.org.sg



**CONNECT WITH US!** 



f 👩 @dyslexiasg



### **UNITE 2024 CONFERENCE**

Uniting Ideas in Teaching Excellence: 21 to 22 June 2024

The UNITE Conference seeks to bring together parents, teachers and practitioners working with children with specific learning difficulties and special educational needs. This conference will be showcasing research that covers aspects of behavioural, literacy and social emotional support, intervention and assessment for children with special learning needs. SpLD experts share their research in short, engaging and entertaining sessions accompanied by poster presentations and the chance to talk directly with researchers who are making a difference in the Asian region.

Keynote Presentation — Conference Day 1—21 June 2024



## "I Learn Differently" Supporting students who struggle to learn

### Geetha Shantha Ram 1\*

#### 1. Dyslexia Association of Singapore

This keynote presentation delves into the often-overlooked demographic of individuals who learn differently (ILD) within educational settings. While not formally diagnosed with conditions like dyslexia, ILDs face significant learning challenges that impact their academic journey. Surprisingly, they constitute a sizable portion of the student body, outnumbering those officially recognised with special educational needs (SEN). Despite their diverse strengths and weaknesses, ILDs navigate a complex educational landscape marked by hurdles such as processing speed deficits and intermittent academic setbacks.

Drawing on case studies and empirical data collected through the Dyslexia Association of Singapore's (DAS) initiatives, this presentation sheds light on the presence of ILDs and underscores the transformative benefits of the targeted interventions. It showcases how tailored support can empower ILDs to unlock their true potential across various subjects and age groups.

In the context of Singapore's commendable efforts to support students with diagnosed conditions, there exists a pressing need to broaden attention to encompass this larger cohort of learners who may require supplementary assistance despite lacking formal diagnoses. This need is particularly salient within the framework of compulsory education, where all Singaporean children, including those with mild SEN, are mandated to enrol in mainstream schools equipped to accommodate diverse learning needs. Embracing and addressing the challenges faced by ILDs not only fosters inclusivity but also enriches the educational landscape for all learners.

Keywords: Dyslexia, Special Educational Needs (SEN), struggling learners, Educational therapy, intervention, response to intervention.

<sup>\*</sup> More information about the presenter and presentation:

Keynote Presentation—Conference Day 2—22 June 2024



## Literal Inequality: The Injustice of Dyslexia

### Martin Bloomfield1\*

Dyslexia Bytes - www.youtube.com/@DyslexiaBytes , UK

#### **Abstract**

Dyslexia is not merely a literacy issue. UNESCO has identified literacy as a human right, yet the disproportionate number of dyslexics in prison, sleeping rough, and suffering mental health problems shows that where it matters, those who need it most are being denied the very thing they're entitled to – sometimes through ignorance or refusal, but often, through fear of expense – even where the economic case for inclusive education is overwhelming.

Injustice is hardwired into our practices: from the earliest mentions of dyslexia in the scientific literature, society has labelled children as deficient, disabled, and even (in some cases) cursed. The education system has institutionalised feelings of worthlessness for dyslexic children. The medical profession has contributed to millions of early and preventable deaths. Artificial Intelligence, even while offering solutions to many of the challenges that dyslexic students face, itself reflects, magnifies, and creates further inequalities. From all sides, some of our most vulnerable children and adults are stigmatised.

And yet it doesn't have to be like that. Alternative provision can and does produce extraordinary results. Indeed, we know that dyslexics actually outperform non-dyslexics when given appropriate teaching. We know what works; we know how to apply it; and we know how cost-effective it is. The only question is – what's stopping us? This talk is a call to arms. Dynamic and interactive, it will present some startling facts, statistics, and research. Attendees will leave with a new understanding of where the injustices lie, and how to challenge and change them.

Keywords: Dyslexia, SpLD, Neurodiversity, Neurodivergent, Ethics, Justice, Injustice, Equality, Inequality, Equity, Mental health, Literacy, Human rights, Education

UNITE 2024—bit.ly/UNITE2024 Correspondence to: UNITE 2024 Committee: unite@das.org.sg

<sup>\*</sup> More information about the presenter and presentation:

Keynote Presentation—Conference Day 2—22 June 2024



## Parenting Diverse Needs - A Father and Mother's Voice

### Tina Tan<sup>1\*</sup> and Dr Frankie Tan

- 1. The Society for the Promotion of ADHD Research and Knowledge (SPARK)
- 2. Sport Singapore

#### Abstract

Parents of children with special needs go through many unseen struggles. From unpredictable and frequent interruptions to daily family life to facing huge strains on family relationships and resources. From the process of identifying the child's needs to accessing a diagnosis to coming to terms with what the diagnosis entails. Parents seem to face an endless and undulating journey of loving and supporting their difficult child towards a more normal growth and development, whilst navigating the pressures of societal demands on them and their children to "be normal" and "not a disruption" to their peers and teachers.

Listen to Frankie and Tina share their personal journeys and life lessons as they have journeyed with their now 20-year-old son, who was diagnosed with ADHD and Dyslexia at age 6, and Autism Spectrum Disorder at age 10. While learning to support their son, they've also reached out to support other fathers and mothers along the same journey as themselves. They will reflect on the unseen and unspoken challenges parents face, as well as the critical role parents play in helping their children access and engage interventions towards coping with and even overcoming their challenges.

International Forum—Conference Day 1—21 June 2024

## Dyslexia in Education, Reflections from Hong Kong, Latvia, Pakistan and Australia

Lee Siang<sup>1\*</sup>, Kevin Kien Hoa Chung<sup>2</sup>, Eva Birzniece<sup>3</sup>, Tom Schmidt<sup>3</sup>, Anushka Daroga Kharadi<sup>4</sup> and Mandy Nayton<sup>5</sup>

- Dyslexia Association of Singapore
- 2. The Education University of Hong Kong
- 3. Latvian Dyslexia Association
- 4. Institute of Behavioural Psychology, Pakistan
- 5. DSF Literacy and Clinical Services & AUSPELD

#### **Abstract**

Hear from the distinguished authors of The Routledge International Handbook of Dyslexia in Education!

Drawing from the wealth of knowledge presented in the book "The Routledge International Handbook of Dyslexia in Education," edited by Gad Elbeheri and Lee Siang, this live forum promises to be a valuable resource for educators, researchers, and anyone interested in dyslexia awareness and intervention.

By exploring these diverse international perspectives on dyslexia, our webinar aims to foster a deeper understanding of the challenges and successes in different regions of the world.

Attendees will gain valuable insights, shared experiences, and practical strategies to enhance dyslexia awareness, identification, and support in their communities. Join us for this forum to embrace dyslexia and together, we can make a difference in the lives of individuals with dyslexia worldwide.



## DST2 - A Step Forward in Dyslexia Screening

## Angela Fawcett\*

1. Dyslexia Association of Singapore

#### **Abstract**

The DST battery of tests has proved one of the most popular screening tests for dyslexia worldwide, with over 1 million children and adults benefitting from the profile derived. In this talk, we present the most recent instantiation of the test DST2, which brings together 5 tests into one, suitable for use remotely or face-to-face and including new tests of executive function. This test has been normed on 900 and will be published in August 2024 by Pearson Education.

KEYWORDS: Screening, executive function, 4.5-65

<sup>\*</sup> More information about the presenter and presentation:



# Strengthening Singapore Preschool educator's confidence in incorporating Theory of Mind (ToM) Strategies during shared book reading

Boen Ern Xin Michelle<sup>1\*</sup> and Ke Yiyun Joyce<sup>1</sup>

1. PAP Community Foundation (PCF)

#### Abstract

The Nurturing Early Learners (NEL) curriculum framework in Singapore, as outlined by the Ministry of Education (2022), places strong emphasis on cultivating social and emotional competencies during preschool education. Among the five socio and emotional competencies highlighted, social awareness, which focuses on understanding others' viewpoints and empathetic responses stands out. This competency aligns with the Theory of Mind (ToM), a concept rooted in recognising diverse thoughts and emotions in individuals, as established by Premack and Woodruff (1978). ToM deficits can profoundly impact social relationships, influencing perspective-taking, conversation quality, and friendship formation. Prior studies in Singapore regarding ToM has been focused on understanding the impact of socio-cultural factors on ToM in preschool children (Hashim, Kim, Fischer, Yeung & Yu, 2021; Qu & Shen, 2013a; Qu, Shen & Qiangian, 2013b). Using a flexible online training module, this qualitative study aims to strengthen educators' confidence in incorporating ToM strategies when facilitating children's play and social skills following a flexible training module on the application of ToM strategies in the classroom. The results of the study will provide insights into the effectiveness of using such a training method to support educator's capacity building. This will contribute towards fostering a more comprehensive and impactful learning environment for young children, nurturing their social and emotional growth.

Keywords: Theory of Mind, social emotional competencies, social skills, social skills deficits, social-emotional development, early childhood, preschool educators, perspective -taking, shared book reading

UNITE 2024—bit.ly/UNITE2024 Correspondence to: UNITE 2024 Committee: unite@das.org.sg

<sup>\*</sup> More information about the presenter and presentation:



## Orthographic Awareness and Its Relationship to Chinese Word Reading and Spelling in Young Bilingual Learners with Chinese Reading Difficulties in Singapore

## Catherine Ni Chunhong<sup>1\*</sup>

1. Dyslexia Association of Singapore

#### Abstract

Impairment in orthographic awareness (OA) is one of the primary cognitive deficits of Chinese reading difficulties (RDs). This study aimed to investigate the development of Chinese OA in elementary school learners in the bilingual context of Singapore by examining the structural and functional aspects of OA. This study also aimed to evaluate the relationship between the two facets of OA and Chinese word reading and spelling in typically developing (TD) learners and learners with Chinese RDs. 218 bilingual TD learners from Grades 3 to 5 and 513 bilingual learners with Chinese RDs from Grades 1 to 6 were assessed on their OA, word reading, and spelling. The results showed that structural and functional OA development has reached a high level in Grade 5 TD learners. As for learners with Chinese RDs, there appears to be stagnated development of OA from the middle to upper elementary grades. The significantly lower OA scores in learners with Chinese RDs compared to TD learners suggested OA impairments. In addition, the difference in functional OA score between TD learners and learners with Chinese RDs was found to be more significant than that of their structural OA score. The regression analysis showed that both structural and functional OA significantly contribute to word reading and spelling for both groups of learners. Functional OA played an increasingly important role in word reading and spelling as learners progressed from lower to upper elementary. Our findings emphasized the importance of targeted intervention in building structural and functional OA in learners with Chinese RDs.

Keywords: Chinese reading difficulties, orthographic awareness, bilingual, word reading, spelling, dyslexia

UNITE 2024—bit.ly/UNITE2024 Correspondence to: UNITE 2024 Committee: unite@das.org.sg

<sup>\*</sup> More information about the presenter and presentation:



### Storytelling for Children with Special Educational Needs

Chen Wei Teng<sup>1\*</sup>

The Oak Planters, Singapore

#### Abstract

Stories are meant to be enjoyed by everyone but for children with specific learning differences, the conventional storytelling sessions are challenging territories for them, including their caregivers. Learn more about their challenges and how to help neurodivergent children enjoy a good story alongside their neurotypical peers – so that storytelling can offer a space to allow individuals with diverse needs to experience the world together. Participants will learn tips on some preparatory steps that can be taken to prepare a conducive environment for storytelling, as well as what can be introduced during storytelling to sustain the attention of the children.

Keywords: storytelling, special educational needs

<sup>\*</sup> More information about the presenter and presentation:



## Integrating Assistive Technology into Correctional Learning – Perspectives of Instructors

#### Christina White Prosser<sup>1\*</sup>

1. University of Calgary, Canada

#### Abstract

There are considerable challenges in empowering struggling learners within Canadian correctional institutions with access to technology. Due to aging facilities, challenges with IT infrastructure, and the adoption of tech in programming, there is limited access to technology. However, many in the corrections population are neurodiverse and would benefit from the benefits of assistive technology. While 5% to 10% of the Canadian population have a learning disability, the incidence of learning disabilities in corrections can be up to 25%.

My research project provides an opportunity to discover how assistive technology designed to assist with literacy learning supports students with Neurodiversity. The objectives of this research focus on better understanding how instructors and students in Canadian correctional facilities can use assistive technology, specifically scanning pens, to enhance literacy learning. Using mixed methods, including pre and post-literacy tests and semi-structured interviews the data gathered provides perspectives on the development of curriculum that includes specific integration of assistive technology, the learning differences, if any, between those learners in the experimentation group and those in the control group, and the perspective of the learners on their experiences using assistive technology. In this session I will speak to the instructor participants' experiences with integrating technology into the curriculum, what teaching strategies were effective and what they observed while students used the assistive technology to learn. This study will add to our understanding of how to implement assistive technology for adult learners in a correctional environment.

Keywords: Adult Learning, Neurodiversity, Literacy, Corrections, Learning disabilities, Dyslexia

<sup>\*</sup> More information about the presenter and presentation:



## 5 Minutes of Digital Inclusion: Raising awareness one step at a time

## Damaris Carlisle 1\* and Jennifer George<sup>2</sup>

- 1. LASALLE College of the Arts, Singapore
- 2. Goldsmiths University London, UK

#### Abstract

In the evolving landscape of higher education, a concerning gap persists: educators often lack the resources to meet the diverse learning needs of their students, exacerbated by budget and time constraints. Jennifer George and Damaris Carlisle address this issue through their initiative '5 Minutes of Digital Inclusion.' Our project aims to democratise access to knowledge on learning differences and digital inclusion tools, without adding to the already heavy workload of educators. Delivered as daily videos and readings, these compact, easily digestible segments fit into any busy schedule, offering essential insights on fostering inclusive educational spaces. Our approach is designed to be a catalyst, encouraging educators to delve deeper into the nuances of what it means to create truly inclusive classes and materials. Participants are invited to invest just 5 minutes a day for 25 days to engage with this content, aiming to prompt systemic change by inspiring individual actions. We believe that each small dose of information can act as a stepping stone toward a more inclusive higher education system. Join us on this journey toward making diversity and inclusion not just buzzwords, but integral components of education for all.

Keywords: awareness raising, accessibility, digital technology, higher education, inclusion

<sup>\*</sup> More information about the presenter and presentation:



## Numeracy and Chinese literacy support for learners who learn differently but do not have a diagnosis of dyslexia

## Edmen Leong<sup>1\*</sup>

1. Dyslexia Association of Singapore

#### Abstract

The Dyslexia Association of Singapore (DAS) has been supporting learners with dyslexia by developing and delivering a range of programmes that are catered to their specific needs. In recent years, we have received requests from parents and organisations to support learners who, similar to learners with dyslexia, learn differently but do not meet the full requirements of a dyslexia diagnosis. Amongst the range of programmes, the DAS' numeracy and Chinese literacy programmes piloted supporting this group of learners within our classrooms. Profiling tests were conducted to assess the students' needs prior to entry to the programmes. The progress of this unique group of students were tracked through tests administered over the course of their attendance in the programmes and through interviews with their educational therapists. Data collected suggested that this group of learners do benefit from the programmes, they are very similar to the profiles of learners with dyslexia, and that it is important to appropriately profile students according to their needs. This suggests bigger possibilities in the support provided for all learners to learn differently.

Keywords: Chinese, Maths, Struggling Learners, no dyslexia diagnosis, intervention

<sup>\*</sup> More information about the presenter and presentation:



## The International FIDI Academy School: didactics, nature and movement. A new frontier for academic success

### Eleonora Palmeri<sup>1\*</sup>

1. Psychological and Pedagogical Victor Center Macerata, Italy

#### Abstract

The International FIDI Academy School was born from the idea of a group of specialized pedagogues and Itard therapists who believe in motor coordination and didactics. The coordination of the project is by Dr. Eleonora Palmieri, Clinical Psychologist, Pedagogist and Neuropsychomotor specialist, director of the "Victor" Psycho-Pedagogical Center in Macerata. It is an initiative born from the desire to offer children and young people of all ages an alternative to traditional school, in a place surrounded by nature. Participants learn through the ecological-dynamic practices of the Crispiani Method, a global method, suitable for everyone and therefore highly inclusive, capable of early intercepting any school difficulties such as dyslexia and dyspraxia. The formula "didactics in nature and movement" sums up the importance of Neuroactivation Training based on Cognitive Motor Training. Motor skills are an integral part of teaching and help children and youngsters to achieve academic success. Working Method of Champion LIRM (Intensive Reading and Motor Speed).

Keywords: academic success, motor coordination, executive functions, didactics and learning.

<sup>\*</sup> More information about the presenter and presentation:



## Use of Poetry to empower students with SEN

## Dr Elizabeth Ow Yeong Wai Mang<sup>1\*</sup>

 Psychology and Child & Human Development (PCHD), National Institute of Education, Singapore

#### Abstract

Poetry as a powerful empowerment tool for students with special educational needs (SEN) has been neglected and not been surfaced and reintroduced fully for mainstream inclusive support. Poetry not only serves as an effective vehicle in supporting students with SEN in language and literacy, but the effects of poetry memorisation transcend and impact students beyond literary exploration, as it not only supports brain development but also instil confidence and self-efficacy amongst those who practise it while providing for the joy of learning. This small-scale qualitative study uses both document analysis of past research, as well as an ethnographic analysis of the use of poetry and poetry memorisation and recitation as a means of empowerment amongst local students (past and present). This study concludes that the use of poetry should be resurfaced as a viable mode of empowerment in teaching and learning for students with SEN.

KEYWORDS: Poetry, SEN, Recitation, memorisation

<sup>\*</sup> More information about the presenter and presentation:



## Reading fluency in 4th grader Students in Latvia - Measures, Types of Mistakes and Implications for Instruction

Eva Birzniece<sup>1\*</sup>

1. Latvian Dyslexia Association, Latvia

#### Abstract

The written Latvian language is a very transparent orthography which traditionally has led to very lax instruction of reading – it is assumed that as soon as a student knows the letters, he/she can read (a connected text). Though, the morphology in Latvian is very complex and could make reading in Latvian more difficult than predicted by the transparent orthography. During soviet times there was a formal though brief and inconsistent direct training in reading in 1 st grade, but it was abandoned when Latvia created its first re-independent state education standard. Regardless of that, Latvia has fared comparatively well on 4 th grade international PIRLS reading tests. But, when 15year-old students are tested in OECD PISA reading tests, we see that student skills have declined. This has suggested for a long time that reading instruction as it was, was not effective in the long run. The research on reading fluency and typology of mistakes conducted in academic year 2022/2023 for 4 th grade students of Latvia demonstrates that many students fail to reach reading fluency age/grade norm. Apart from the absolute low numbers of reading fluency another alarming tendency is that students in the 10 th and 25 the percentiles progress significantly slower than their peers reading in 75 th and 90 the percentile. The most common mistakes are reading phonetically and morphologically difficult/long words (consisting of 3 and more syllables) and understanding indirect/metaphoric meanings of expressions in literary text. These findings bring us to a conclusion that Latvia urgently needs to bring explicit reading instruction back to primary grades and develop remedial reading programmes for those students who learn reading slower than their peers. Another task of our educational system is to develop data based levelled reading methodologies and, while striving to improve reading fluency of around 45% of poor readers, also develop compensation for insufficient reading ability - audio and multimedia textbooks and study materials not to deprive many students of academic content.

UNITE 2024—bit.ly/UNITE2024 Correspondence to: UNITE 2024 Committee: unite@das.org.sg

<sup>\*</sup> More information about the presenter and presentation:



## Dyslexia in the Malay Language in Singapore

### Hamadatun Yusuf<sup>1\*</sup>

Dyslexia Association of Singapore

#### Abstract

This presentation explores the findings of a research study that delves into the specific difficulties encountered by individuals who are English-Malay bilingual learners with dyslexia in Singapore. The purpose of the research was to gain a better understanding of the difficulties faced by bilingual learners with dyslexia when acquiring the Malay language, particularly in the aspect of reading and reading comprehension. Additionally, the study aimed to provide insights into the experiences of learners with similar profiles in the context of Malay as a second language. Inductive analysis revealed that word reading difficulties were affected by unfamiliarity of words, increasing word length and complexity of syllables and affixed words. Challenges in reading comprehension were due to poor word vocabulary and long comprehension passages. Additionally, the perceived usefulness of the Malay language as an alternative language for communicating with members of the community, as well as feeling supported in the classroom were the underlying motivating factors to learn the language. These findings suggest that in teaching learners of this unique profile, phonological knowledge and morpheme instruction can facilitate reading in the Malay language. The length and lexical level of a given passage is also a factor to take into account when assigning tasks in the classroom. Finally, the esteem and anxiety levels must be considered for these English-Malay bilingual learners with dyslexia to maintain interest and motivation to learn Malay as a second language in Singapore.

Keywords: dyslexia, English, Malay, Singapore, bilingual

<sup>\*</sup> More information about the presenter and presentation:



## RETA Case Management Discussion: Struggling Learners – Who are they and how do they learn? A case study

Hani Zohra Bte Muhamad<sup>1\*</sup>, Dede Tham<sup>2</sup>, Hope Kelly<sup>1</sup>, Winston Quek<sup>1</sup>

- 1. Dyslexia Association of Singapore
- 2. Chen Su Lan Methodist Children's Home

#### Abstract

Parents and laymen may use the term "struggling learners" broadly to mean children who may not learn as well as their peers. However, "struggling learners" means something different to educators. In schools, this group of students refer to those identified as needing supplemental academic intervention services. Students who struggle could have been impacted by adverse family environments. They might develop poor mental health conditions or have poor emotional regulation which affects learning. Students may struggle with learning if they have dyslexia, attention deficit hyperactivity disorder, autism or cognitive developmental delay. This study investigates how students with an impoverished start to life and education attain literacy skills. Although no assessment was done, they show signs of dyslexia and have poor vocabulary and word recognition. They also show poor emotional regulation. These factors contribute to their poor reading and spelling ability. The remediation process includes teaching reading and spelling via phonics instructions. Explicit teaching of grammar rules is injected into writing activities. Principles of Orton-Gillingham (OG) and Mediational Intervention for Sensitizing Caregivers (MISC) are utilised to build rapport and confidence. Students' ability to learn is observed and monitored weekly. Strategies to inculcate a positive learning habit are implemented to improve students' ability to sustain attention in a lesson. Results show that with the right teaching approach to motivate them, these students will attain literacy skills. Their positive learning attitude has resulted in reading and spelling progress. Recommendations on how to engage and teach such students are put forth for fellow educators to consider implementing.

Keywords: struggling learner, dyslexia, ADHD, low-income families

UNITE 2024—bit.ly/UNITE2024 Correspondence to: UNITE 2024 Committee: unite@das.org.sg

<sup>\*</sup> More information about the presenter and presentation:



The right to success in Blackpool secondary schools (England) – a case study about improving literacy in disadvantaged students

Jessica Colleu Terradas<sup>1\*</sup>

1. Catholic Education, Archdiocese of Canberra & Goulburn, Australia

#### Abstract

Participants will learn about how a network of eight secondary schools has been addressing the low reading abilities of many adolescents aged 11-14 in Blackpool, one of the most deprived areas in England. As part of the Blackpool Literacy project, the schools have committed to a collective approach to sharing data and best practices grounded in the science of reading, and have already seen strong results. Screening options and suggestions for remedial programs will be explored. Suitable for upper primary and secondary teachers and leaders. This is a case study from my Churchill Fellowship report.

Keywords: reading instruction and intervention, response to intervention, literacy, science of reading, Multi-tiered system of support, screening, progress monitoring

<sup>\*</sup> More information about the presenter and presentation:



## Empowering Struggling Learners: A Research Roadmap for the Dyslexia Association of Singapore

Joanne Yoong<sup>1\*</sup> and Oliver Yuen<sup>1\*</sup>

1. Research For Impact, Singapore

#### Abstract

In Singapore, individuals who experience learning difficulties without a formal diagnosis of a learning disability are increasingly recognised as individuals who learn differently and are also known as struggling learners. Despite forming a significant fraction of Singapore's student population, they may be excluded from receiving targeted support or government subsidies, even though there is a growing body of research highlighting the feasibility and effectiveness of locally adapted evidence-based interventions that meet their needs. To foster a more equitable educational landscape, policymakers must prioritise expanding access, appropriateness, and affordability of programming for children who learn differently.

Keywords: Struggling learners, structured intervention, individuals who learn differently, neurodiverse

<sup>\*</sup> More information about the presenter and presentation:



# An Exploratory Study on the Collaboration between SENO and Teachers in Mainstream Elementary Schools in Singapore

June Siew<sup>1\*</sup>, Tan Ai Girl<sup>2</sup> and Loh Pek Ru<sup>2</sup>

- 1. DAS Academy, Singapore
- 2. National Institute of Education, Nanyang Technological University, Singapore

#### Abstract

Effective support of students with special educational needs (SEN) in mainstream schools requires good collaborative practices between educators and school support personnel within the schools. An exploratory study was conducted to examine how Special Educational Needs Officers (SENO) collaborate with teachers in Singapore's mainstream schools to support these students. The main aim of the study was to examine the collaboration practices between SENOs and teachers in mainstream schools. A total of eight participants, four SENO and teacher pairs from four elementary schools in Singapore, took part in the study. The four female SENOs were between 29 to 36 years old (mean age: 32.5 years). Their years of service in education ranged from two years six months to 12 years (mean: 8.1 years). In each school, observation and interview of the SENO-participants occurred before that of teacher-participants. Seven major themes emerged from the analysis: Contact, information sharing, joint decision, accountability, student support, human factor and inclusive culture. Implications for practice, limitations, and suggestions for future study were presented.

Key terms: collaboration, mainstream teachers, special educational needs officers, Singapore

<sup>\*</sup> More information about the presenter and presentation:



# Building a support pathway for students with English language difficulties: What can we do?

Kevin Kien Hoa Chung<sup>1\*</sup>

1. The Education University of Hong Kong

#### **Abstract**

The importance of students with English learning difficulties as a second language and additional language has been increasingly recognised by educators, parents, and policymakers. Emerging evidence has shown the cooccurrence of reading difficulties between Chinese and English, and the estimated occurrence rate ranged from 30 to 50% for Hong Kong Chinese students at risk of reading difficulties in both Chinese and English. In this talk, the speaker will highlight the challenges facing Chinese students with English learning difficulties (ELD) in Hong Kong, China, and provide a variety of strategies and activities to promote students with ELD in the classroom and at home from the Jockey Club Project RISE.

<sup>\*</sup> More information about the presenter and presentation:



# Quality transition strategies for young people with intellectual disabilities

### Kitty Yuen Han Mo<sup>1\*</sup>

1. Hong Kong Shue Yan University, Hong Kong

#### Abstract

Young people with mild or moderate intellectual disabilities need to leave special schools and enter adult employment services when they reach the age of 18. Literature suggests that quality transition strategies will help the transition process such as increasing family carers' knowledge of adult services, enhancing their involvement in the transition, promoting school-home collaboration and further facilitating student-and-family-centred transition planning. In Hong Kong, there is a need to develop an understanding of transition strategies and components of transition plans to inform policy development and frontline school practice. In this qualitative study, research objectives include:

(a) examining factors that promote quality transition between special school and post-school placements for people with intellectual disabilities and their family carers and (b) investigating the components of the overall transition plan and the type of quality transition strategies. In total, 23 young people with intellectual disabilities, their parents and teachers were interviewed.

The results indicated that transition strategies were categorized into five areas namely: (a) personal (e.g. hygiene and personal self-care training); (b) interpersonal (e.g. communication skills training); (c) vocational (e.g. job training and job fieldwork practice); (d) family (e.g. parents' workshop); and (e) social (e.g. community living training). Factors promoting quality transition include collaboration between special schools and social services agencies, parental input and involvement, special school teachers' awareness of the job markets, cooperation and communication among professionals within the school, resource provision of vocational training services, and transition strategies matched the student's ability and willingness.

Keywords: Transition strategies, people with intellectual disabilities

<sup>\*</sup> More information about the presenter and presentation:



# Dyslexia Awareness and Remedial Intervention Strategies in Schools – The Role of Impactful Training and Advocacy

### Komal Parthasarathy<sup>1\*</sup>

Madras Dyslexia Association, India

#### **Abstract**

Certain children have challenges with learning and behaviour from time to time. During a child's preschool years and throughout their school years, parents and educators should be on the lookout for patterns that may signal an underlying learning disability (LD). Towards this objective, a six-day training program was designed for primary school educators to facilitate early detection, which would help children receive extra help sooner and prevent them from falling behind. The program's focal point was twofold: heightening dyslexia awareness and implementing pragmatic remedial strategies to assist students with Specific Learning Disabilities (SLD). This study delves into the assessment of the efficacy of the aforesaid training program, its impact on teachers' awareness levels and their adeptness in executing remedial strategies. Study Methodology encompassed the development of an exhaustive questionnaire, capturing qualitative and quantitative parameters. Data was gathered via face-to-face interviews with each teacher and analyzed using weighted scores, based on the relative significance of each parameter. The program's content garnered commendable acclaim, for its informative nature and the incorporation of practical activities that seamlessly align with regular classroom teaching. Post-program, educators demonstrated a pronounced understanding of dyslexia's characteristics, identifying students with specific learning difficulties via a meticulously administered checklist and in deploying remedial strategies, bolstering competencies in reading, spelling, writing, and mathematics. The study reemphasized the significant need for such increased awareness sessions for teachers at various levels to facilitate intervention at the right time to make a positive difference in the diverse learning needs to children with learning disabilities.

Keywords: Advocacy, Early Identification, Awareness Training to Teachers, Remedial Intervention, Inclusive Education, Multisensory Approaches (VAKT)

<sup>\*</sup> More information about the presenter and presentation:



# Blending Critical Design Futures Thinking: Empowering SpLD Educators and Learners for a Resilient Tomorrow

### Nadya Shaznay Patel1\*

1. Dyslexia Association of Singapore

#### Abstract

In the evolving tapestry of Education 4.0, intertwining Critical, Design, and future thinking is paramount to enriching the educational experiences of educators and learners with Specific Learning Difficulties (SpLD). This keynote delves into the nuances of transdisciplinary learning, underscores the evolving essence of 21st-century skills, and champions the convergence of Critical, Design, and Futures Thinking for an inclusive and pioneering approach to SpLD education. This presentation will underscore

- The Power of Holistic Thought Modalities: Cultivate environments that promote innovation and deep understanding by blending Critical, Design, and Futures Thinking;
- II. The Imperative of Digital Literacy: Equip SpLD students with not just the ability to use technology, but to engage ethically and problem-solve in a digital landscape;
- III. The Need for a Transdisciplinary Approach: Foster learning that is contextual and aligned with real-world challenges, breaking traditional disciplinary confines.

Building upon empirical insights and contemporary research in helping learners internalise core thinking skills, the talk will explore the harmonious coalescence of these thought modalities, striving to infuse resilience, adaptability, and creativity into educators and students alike. Three recommendations will be shared: Engage in this interactive sharing as we cocreate knowledge, share insights, and envision an educational future that embraces inclusivity, innovation, and transformation. Together, let's synchronise ideas and elevate teaching excellence, illuminating the path for every learner, regardless of their struggles.

Keywords: Critical Design Futures Thinking, Education 4.0, Transdisciplinarity

<sup>\*</sup> More information about the presenter and presentation:



# Virtual Educational Therapy – Experiences And Perceptions Of Educational Therapists At The Dyslexia Association of Singapore

### Nurul Hudaa Mohamed Daud<sup>1\*</sup>

1. Dyslexia Association of Singapore

#### **Abstract**

School closures were implemented in the first quarter of 2020 to curb the spread of COVID-19. Without adequate preparation time, students and teachers faced the problem of transitioning from face-to-face to online classes. Educational therapy sessions at the Dyslexia Association of Singapore (DAS) were affected too. This study explored educational therapists' experiences and perceptions of online teaching and learning with school-going age students with dyslexia during the COVID-19 pandemic. To accomplish this, a phenomenological approach was employed using in-depth interview techniques with ten educational therapists from the DAS. A six-stage thematic analysis by Braun and Clark (2006) was employed to determine the themes for this study. The findings revealed four key themes: a) benefits of virtual educational therapy, b) challenges of virtual educational therapy, c) perceived success factors and conditions for effective virtual educational therapy, and d) after-effects of educational therapy for educational therapists. The findings suggested ways that could help educational therapists design better virtual lessons in the future. While online platforms may not be ideal for dyslexic learners, educational therapists believe that age and technological capability contribute significantly to the feasibility of virtual educational therapy. Recommendations for further research include, a) a study to explore dyslexic learners' perspective and experience of online learning, b) a survey of online learning with other programmes, not just the literacy programme and lastly, c) an investigation into the mental health and well-being of dyslexic learners and educational therapists relating to online learning.

Keywords: COVID-19, dyslexia, educational therapy, online teaching, phenomenological case study, remote teaching

<sup>\*</sup> More information about the presenter and presentation:



# Scaffolding reading comprehension - The CSIM (Comprehension Scaffolding Interrogative Method) App

Patricia Mui Hoon Ng<sup>1\*</sup>, and Ethan Ming Quan Leo<sup>2</sup>

- 1. Educational Consultant, Singapore
- 2. IT Stack Developer, Singapore

#### **Abstract**

Have you ever encountered children who can read but fail to answer "Wh" questions coherently? This paper examines some reasons why this happens and how scaffolding for reading comprehension can be done with the use of a reading comprehension app called CSIM - Comprehension Scaffolding Interrogative Method. The above-mentioned method is effective in various research papers and the content developer of this app has published a comprehension book for practices based on the mentioned scaffolding methodology. Hence, the comprehension passages in the app are adapted from the book and the respective methodology is adopted as well. The reading passages in the app come in a variety of genres and the stories are well-suited for all ages. By the proven methodology of scaffolding the schemata of sentences and user-friendly illustrated game practices, the CSIM app enhances the ability of the user to comprehend reading passages. The advantage of using the CSIM app therefore goes beyond the effectiveness of the methodology in that the technology of the app makes repeated practice much more convenient and appealing than the original pen-and-paper practices for children. With the dawn of the post-pandemic era of COVID-19 and children growing up as digital natives, this app will serve all learners in ways that are radically different from how the generations previously did. Therefore, the CSIM app can be a great learning companion not just for the hyperlexic or poor-comprehenders, but for the general population as well when it comes to learning the English language through reading comprehension.

KEYWORDS: Reading comprehension, scaffolding, hyperlexia, poor-comprehenders, special-needs, intervention, technology.

<sup>\*</sup> More information about the presenter and presentation:



### Journey as a parent and educator of children with special needs

### Patricia Tan<sup>1\*</sup>

Parent of a child with SEN

#### **Abstract**

Parenting a child with autism spectrum disorder (ASD) and learning difficulties presents unique challenges, particularly when special education needs are involved. Patricia enjoys working with children and believes that a child learns best when the child is enjoying the lesson. She will be sharing about her journey from both a parent's and an educator's point of view.

Keywords: Parent, teacher, educator, autism, special education needs

<sup>\*</sup> More information about the presenter and presentation:



# An Investigation On Cognitive-Linguistic Skills Of English-Chinese Bilingual Learners With And Without Dyslexia In Singapore

#### Priscillia Shen<sup>1\*</sup>

1. DAS Academy, Singapore

#### Abstract

This research investigates dyslexia and the cognitive-linquistics skills, namely phonological awareness, orthographic knowledge, morphological awareness and rapid naming, of bilingual learners in Singapore whose first language is English and second language is Chinese. The two main research aims are to investigate whether the English-Chinese bilingual learners with dyslexia diagnosed only in English are weaker than their typical counterparts in reading and all cognitive-linguistic skills in both languages or either language, and to investigate which cognitive-linguistic skills are strong predictors of reading in each language. Results show that the bilingual learners with dyslexia performed significantly poorer than their typical counterparts in reading and all cognitivelinguistic skills in both languages, although their dyslexia were diagnosed only in English. Results also found all English cognitive-linquistic skills predictive of English word reading, especially the unique predictive roles of morphological awareness and orthographic knowledge after rapid naming and phonological awareness were controlled. However, only rapid naming and morphological awareness were found to be predictive of Chinese word reading. The results suggest that dyslexia may manifest differently in reading and cognitive-linguistic skills of English and Chinese languages in the English-Chinese bilingual learners, based on the two different predictive models with different empirically and theoretically supported orders of cognitive-linguistic skills as predictors for reading development in the two languages. The difference in the unique contributions of the four cognitive-linguistic skills underlying the reading development of both languages may suggest the difference lies in language structure and instruction.

Keywords: dyslexia, bilingualism, English reading, Chinese reading, cognitive-linguistic skills

<sup>\*</sup> More information about the presenter and presentation:



## Wonder Exercises and its Impact on Learning

## Sanskruti Shah<sup>1\*</sup> and Yashodhara Narayanan<sup>1</sup>

Madras Dyslexia Association, India

#### **Abstract**

A child's foundation to development and learning starts with sensory and motor interactions with the world while simultaneously developing their brain and body. This inturn has an impact on the child's life through schooling and beyond. Simple exercises and activities that can be done without fancy equipment or modern contraptions can be used at home and in the classroom to augment teaching methodologies. These have proven beneficial to children in general, and children with learning disabilities especially.

Using wonder exercises is a fun way to help children build neural pathways in their brain. These networks form the foundation for children to build more complex networks that are required for formal academic work. These help create networks that allow children to develop complex thoughts and engage in tasks effectively. It is hence imperative to include structured as well as fun sensorimotor activities as a part of the child's individualized educational plan. Sensory motor development is vital and sets the path to children gaining life skills, self-confidence, and mastery of their body and environment.

The proposed talk is to demonstrate, through case studies, how at MDA and our partner school, Wonder Exercises are being used to enable holistic intervention of children with SLD to improve their motor function, sensory detection, and create learning readiness to accelerate the expected academic changes.

<sup>\*</sup> More information about the presenter and presentation:



# Investigating the impact of a short-term targeted Preschool Intervention Programme on struggling 5 and 6 years old preschoolers in Singapore

Shakthi Bavani D/O Sathiasilan<sup>1\*</sup> and Weng Yiyao<sup>1</sup>

1. Dyslexia Association of Singapore

#### Abstract

This study builds upon previous research that demonstrated significant improvements in early literacy skills through the implementation of the Preschool Early Literacy Programme (PELP) in Singapore, which was designed based on Orton Gillingham principles (Sim et al., 2015; Wong & Sathiasilan, 2018). In this study, our primary objectives were to examine the extent to which these improvements were attributed to maturation over time and investigate the efficacy of a shorter targeted programme. We evaluated the impact of the intervention on Kindergarten 1 and Kindergarten 2 preschoolers identified as struggling learners by their teachers or medical professionals. Participants completed a pre-test, followed by a post-test conducted 10 weeks later. The intervention group received 20 hours of early literacy intervention spread over 10 weeks, while the control group did not receive any form of intervention.

The experimental group outperformed the control group in phonogram knowledge, phonemic awareness, high-frequency word recognition, reading, and spelling. These results suggested that PELP effectively improved early literacy skills in struggling learners. The implications of these findings are discussed, alongside the study's limitations, and directions for future research are proposed.

Keywords: intervention, preschool, Singapore

<sup>\*</sup> More information about the presenter and presentation:



# Enabling online remediation using multiple intelligences - an online classroom approach

Siti Halimah Binte Mohamed Yahaya<sup>1\*</sup> and Wang Dingxiong, Andy<sup>1</sup>

1. Dyslexia Association of Singapore

#### **Abstract**

The Prep 2 PSLE (Preparation for English Paper 2 PSLE) Programme was designed and implemented in 2013 with the primary goal of supporting primary school students with dyslexia and other specific learning differences (SpLD) in their school and national examinations. Previous studies have demonstrated that the programme is effective in addressing the examination needs of this group of learners through an explicit and systematic teaching methodology. In 2020, the program embraced online teaching and virtual lessons by incorporating video lessons and online educational apps into its curriculum delivery. This study seeks to evaluate the effectiveness of teaching practices through an examination of the utilization of online teaching tools to foster student learning, application, and engagement in virtual classrooms. This qualitative investigation involved the observation of one-hour-long recorded online classroom sessions of two separate virtual classes, each led by different educational therapists. The researchers analyzed how these therapists employed online learning tools, resources, and questioning strategies to elicit responses from the participating 5 students, aged between 10 and 12. The research data indicates that online tools are effective in enhancing cognitive engagement and critical thinking among learners. It also demonstrates the varied approaches educational therapists employ when integrating these tools into their instructional methods. The findings of this study offer valuable insights to educational therapists, highlighting opportunities to enhance their teaching methods through a strategic fusion of teaching tools and questioning techniques.

Keywords: online teaching, SpLD, English language intervention, teaching practices

<sup>\*</sup> More information about the presenter and presentation:



# Empowering teachers to build literacy foundations through UDL in the preschool classroom

### Tammy Lim Mei Ern<sup>1\*</sup> and Teo You See

PAP Community Foundation, Singapore

#### **Abstract**

Children read to acquire knowledge and develop understanding about the world around them. Phonological awareness is key to shaping foundational literacy skills (Catts et al., 2001), is highly predictive and causally related to children's later ability to read (Snow, Burns, & Griffin, 1999). Developing phonological awareness lays the foundation for understanding the sound structure of language, which facilitates phonemic awareness and phonics acquisition (Schuele & Boudreau, 2008). As Singapore progresses towards including children with developmental needs within mainstream preschools, teachers need to tailor their teaching approaches to meet the individual learning needs of each child. Principles of Universal Design for Learning (UDL) are often used to support diverse learners in a classroom. This case study explores supporting K1 and K2 teachers to implement UDL strategies during literacy lessons. We hypothesise that embedding phonological awareness strategies through principles of UDL in lessons and play activities will enhance children's literacy abilities. Children's literacy outcomes, and teachers' perception of changes in their confidence, knowledge and abilities will be measured and shared. With UDL embedded in literacy lessons within the classrooms, it will provide increased equitable learning opportunities, allowing all children of diverse needs to develop strong phonological awareness skills essential for literacy development from an early age.

Keywords: Literacy, phonological awareness, Universal Design for Learning (UDL), diverse learners, early childhood, preschool educators

<sup>\*</sup> More information about the presenter and presentation:



The role of neighbourhood density & visual support in phonological decoding treatments: Choosing intervention targets for non-readers and sight word readers with special education needs

Tan Seok Hui<sup>1\*</sup>

1. Rainbow Centre, Singapore

#### **Abstract**

Word decoding is an important skill for beginner readers to acquire (Scarborough, 2001). Extant literature has demonstrated that individuals with specific learning differences do experience word and phonological decoding difficulties: Poor word decoding and phonological awareness have been shown to contribute to poor reading skills for children with an Autism Spectrum Disorder or ASD (e.g., Henderson, Clarke, & Snowling, 2014; Nation, Clarke, Wright, & Williams, 2006; Westerveld, Paynter, O'Leary, & Trembath, 2018; White, Frith, Milne, Rosen, Swettenham, & Ramus, 2006), and children with cerebral palsy (e.g., Asbell, Donders, Tubbergen, & Warschausky, 2010; Peeters, Verhoeven, Moor, & Balkom, 2009). The efficacy of word decoding interventions targeting phonological awareness in other populations such as children with Down Syndrome is well-established (e.g., Lemon & Fuchs, 2010; see also Lim, 2022). In contrast, few studies have examined the efficacy of such interventions for children with ASD and children with cerebral palsy. In the local special education context, although students who understand and express themselves verbally at sentence level typically acquire literacy skills through classroom instruction, a few students at each cohort do lag behind their peers either as non-readers or with weak word reading and spelling skills. This talk presents phonological decoding interventions for such students (i.e., adolescents with ASD or cerebral palsy who are non-readers or who are unable to read nonwords). Clinical practice findings that highlight the role of psycholinguistic variables (e.g., neighbourhood density) and speech sound development (e.g., early sounds) for selecting treatment target words, and the effectiveness of using strategies such as visual support (Goetz, Hulme, Brigstock, Carroll, Nasir, & Snowling, 2008) for achieving intervention goals, are presented in this talk.

Keywords: phonological decoding, word reading intervention, non-readers, autism, cerebral palsy

<sup>\*</sup> More information about the presenter and presentation:



- ★ Bi-annual RETA Chronicles, an exclusive members only magazine
- Bi-annual Asia Pacific Journal of Developmental Differences (APJDD)
- ★ 10% discount on the resources sold by DAS
- ★ 10% discount on courses and workshops conducted by DAS Academy
- ★ 10% discount on full age assessments for dyslexia
- Access to DAS Academy library & e-journals
- Invitation to workshops/talks/sharing sessions by guest speakers
- Invitation to speak at conferences, workshops and courses
- Opportunity to be listed on RETA website for private consultation (Not applicable for DAS Staff and AEDs)

Register of Educational Therapists (Asia) (RETA) provides a list of private tutors and consultants in the various fields of SpLD that you can look through and connect with.

#### MEMBERSHIP LEVELS (3 YEAR RATE)

Affiliate - \$130 Associate - \$180 Associate Plus - \$230 Member - \$280 Associate Fellow - \$330 Fellow - \$380

If within the 3 years, a member requests for an upgrade in member level, e.g. Member to Fellow, an additional \$50 will be charged but you do not have to pay the additional difference in member fee amount e.g. \$380-\$280=\$100. The new membership fee will apply when membership expires and member has to renew.

For educators who make a difference, join us as a RETA Member and be listed in our Register.



6444 5700 / www.RETA.sg / info@reta.sg

#### DAS INTERNATIONAL LAUNCHES A

# CONCIERGE ASSESSMENT SERVICE

#### FREE INITIAL CONSULTATION WITH OUR REGISTERED PSYCHOLOGIST

Valid from June to August 2022



- Dyslexia
- Dyslexia for Adults
- Dyscalculia
- Attention Deficit Hyperactivity Disorder (ADHD)
- School Readiness (Mainstream Schools)
- Special Educational (SPED) School Entry
- An assessment report within 2 weeks
- A personalised approach for every client
- Direct access to the psychologist within 3 working days of receiving the enquiry form



#### WE RECOMMEND OUR POPULAR 3 PLUS SERVICE COMBINATION

#### DAS INTERNATIONAL CONCIERGE ASSESSMENT

A one-stop service delivered by registered psychologists

#### 10 HOURS OF SPECIALIST TUTORING

Customised one-to-one programme for Literacy and Maths. Delivered by Specialist teachers through face to face or online learning, bringing intervention to the home

#### TRAINING COURSE OR CERTIFICATE BY DAS ACADEMY

Learn more about how to support your child by attending a course or workshop



#### REGISTER FOR A FREE INITIAL CONSULTATION

Scan the QR code or go to

### **BIT.LY/CONCIERGE-ASSESSMENT**



# Asia Pacific Journal of Developmental Differences

#### **Guidelines for Contributors**

#### Overview

The Asia Pacific Journal of Developmental Differences (APJDD) will be unique in addressing a range of special educational needs including dyslexia, autism, dyspraxia, dyscalculia, ADHD in the Asian context. The journal will cover theory into practice and will provide a showcase for research in the Asian context as well as highlighting research areas which have implications for further research within Asia and beyond.

#### Frequency of Journal

The Journal will be published twice a year in January and July.

#### **Contributions Considered for the Journal**

Primary consideration for publications will be given to manuscripts that are focused on developmental differences within the Asia Pacific region. Manuscripts will be peer reviewed and included in the journal on the following criteria:

- They contribute to the further understanding of developmental differences as well as the applications and implications in the educational, social and cultural environments.
- They include sound research methods, interpretation and validity of results
- They contain organised and clarity of writing
- ♦ They contribute to the local Asian context
- They should be original papers that have not been submitted to other journals or publications.

#### **Editorial Policy—Retractions**

The APJDD takes the issue of retractions very seriously. In line with requirements of major academic journals the APJDD will continue to monitor publications for retractions. No future citation will be permitted for articles that have been retracted and a correction will be issued if any such article is published in error. In the case of citations prior to retraction no such correction will be issued, in line with the policy for other journals of this type. Please contact the editor in the first instance if there are any concerns. COPE guidelines have been accessed in preparing this guidance.

Articles published in the APJDD should be original work that has not been published in this form elsewhere. In rare instances where previous publication has been made, this will be fully acknowledged.

#### Scientific Review Committee

In common with a number of other academic journals, a scientific review committee assists the editor and editorial board in the review process.

- Dr Shaimaa Abdelsabour, Researcher and Teacher of English, Ministry of Education, Kuwait
- ◆ **Dr Neil Alexander-Passe**, Head of AEN/SENCO (SEN Researcher and Author), Additional Educational Needs, East Barnet School, London, United Kingdom
- Dr Yousuf ALmurtaji, Lecturer, Public Authority for Applied Education & Training, Kuwait
- ♦ **Dr Amanda Denston**, Researcher, University of Canterbury, New Zealand
- ♦ Pei Yi Fong, Specialist Psychologist, Dyslexia Association of Singapore
- ♦ **Dr Janet Hoskin**, Senior Lecturer Special Education, University of East London, United Kingdom
- ♦ **Pearllyn Kang,** Specialist Psychologist, Dyslexia Association of Singapore
- Dr Kwok Fu Yu, Psychology, School of Social Sciences, Nanyang Technological University, Singapore
- ♦ Edmen Leong, Director, Specialised Educational Services, Dyslexia Association of Singapore
- ♦ **Shaian Lim Jia Min,** Specialist Psychologist, Dyslexia Association of Singapore
- ♦ **Dr Emma Moore**, Edinburgh University, Department of Music, Scotland
- ♦ **Ngooi Mun Yi Yvette**, Specialist Psychologist, Dyslexia Association of Singapore
- Sharyfah Nur Fitriya, Senior Educational Therapist & Educational Advisor, Dyslexia Association of Singapore
- ♦ Suvarna Rekha, Consultant Psychologist at IIIT-H and Moolchand Neurocenter, India
- ◆ **Dr Amir Sadeghi**, Assistant Professor for the Department of English Language Teaching, Islamic Azad University, Damavand Branch in Iran & Adjunct Researcher for the Language and Literacy Research Lab, University of Canterbury, New Zealand
- ♦ Ami Sambai, Assistant Professor, University of Tsukuba, Japan
- Shakthi Bavani D/O Sathiasilan, Senior Educational Therapist & Specialised Educational Services
   Preschool Core Team Member, Dyslexia Association of Singapore
- ♦ **Dr Priscillia Shen,** Assistant Head of DAS Academy, Singapore
- ◆ **Dr June Siew,** Head of DAS Academy, Singapore
- Dr Pawadee Srisang, Lecturer, Science and Arts, Burapha University, Chantaburi Campus, Thailand
- ♦ **Dr Thomas Wilcockson**, Lecturer, Loughborough University, United Kingdom

#### **Submission of Manuscripts**

All manuscripts are to be sent in electronic copy (MS WORD) as well as a PDF copy of the final edited document. PDF copy is required to verify the word copy and for publishing purposes. There is no need to submit hard copies of manuscripts.

Images, charts and diagrams should be sent separately where possible to ensure high quality reproductions.

Submissions are to be emailed to the editor at both email addresses below:

#### Angela Fawcett

DAS Research Consultant Dyslexia Association of Singapore, Emeritus Professor, Swansea University, angela@das.org.sg

#### **Deborah Hewes**

Managing Editor

Dyslexia Association of Singapore deborah.hewes@das.org.sg

#### **DAS Research Committee**

Dyslexia Association of Singapore research@das.org.sg

#### **Preparation of Manuscripts**

It is expected that all manuscripts be submitted using the American Psychological Association (APA) standard of referencing and publication. APA style is detailed in the Publication Manual of the American Psychological Association (7th ed), which offers sound guidance for writing with clarity, conciseness and simplicity. Authors should follow the APA style in preparation of their manuscripts.



**Our Mission:** Empowering those who learn differently, including those

with dyslexia, to achieve their true potential.

**Our Goal:** To establish a world-class organisation committed to

empowering people who learn differently including those

with dyslexia in Singapore.

#### **Our Aims:**

 To put quality first in delivering a comprehensive and effective professional service for individuals with dyslexia and those who learn differently on a not-for profit basis.

- To put quality first in delivering a comprehensive and effective professional service for people with dyslexia and those who learn differently;
- 3. To provide an assessment service for those who learn differently;
- 4. To provide a remediation service for people with dyslexia, other specific learning differences and those who learn differently, including educational therapies
- 5. To raise public and professional awareness of the nature, risk factors and incidence of dyslexia and other learning challenges;
- 6. To enable others (teachers, parents and professionals) to help people with dyslexia and other learning challenges;
- 7. To support and elicit support for people with dyslexia and those who learn differently and their families;
- 8. To promote and carry out local research on dyslexia and other learning challenges to disseminate the results; and
- 9. To network with organisations with similar objectives in and outside Singapore.

#### ABOUT DYSLEXIA ASSOCIATION OF SINGAPORE (DAS)

Registered in 1991, the Dyslexia Association of Singapore (DAS) is today a vibrant Social Service Agency with almost 300 full-time and part-time staff who provide a wide range of programmes for individuals who learn differently, including persons with dyslexia and specific learning differences (SpLDs) in Singapore. DAS Educational Therapists, Speech and Language Therapists and Specialist Psychologists provide services to over 3,500 preschool, primary and secondary school students in 12 centres all over Singapore. DAS recognises that children who struggle to learn, including those with dyslexia and SpLDs, require a comprehensive and holistic range of programmes and services. Our SpLD Assessment Services, the DAS assessment arm, conducts assessments in areas such as dyslexia, dyscalculia, attention deficit hyperactivity disorder (ADHD), school readiness and more. These assessments provide valuable insights into each student's learning profile, enabling us to tailor interventions and support strategies accordingly.

The Main Literacy Programme (MLP), partially funded by the Ministry of Education, is a cornerstone of our efforts, supporting over 3,000 primary and secondary students. This programme delivers critical interventions in reading fluency, comprehension, spelling and writing, empowering students to develop essential literacy skills. In addition to MLP, our English Language and Literacy Division offers specialised programmes to enhance English literacy skills across all levels of education. Our iReaCH™ programme focuses on improving reading comprehension and writing skills for students from Primary 1 to Secondary 5. Meanwhile, our iStudySmart™ programme aims to empower individuals who learn differently with essential skills for success in higher education and beyond. From Secondary 3 onwards, students can benefit from this programme, which covers time management, prioritisation, planning, organisation, tertiary writing and presentation skills.

Furthermore, through our Specialised Educational Services (SES) Division, DAS provides support in Mathematics, Chinese, Science and Speech and Language Therapy. We also offer programmes in nonacademic pursuits such as Speech and Drama and ArtVenture, enriching students' learning experiences and fostering holistic development. Increasingly, DAS provides support for individuals who learn differently, including those with dyslexia, impacted by other SpLDs such as ADHD, dyspraxia, dyscalculia and non-verbal learning differences.

Young adults in Institutes of Higher Learning can access assessment and specialist tutoring services to support their educational journey. Presently, DAS needs to raise almost \$3 million each year to provide bursaries for its lower-income students and reduce the need to increase programme fees. The DAS training arm, DAS Academy, provides certificate courses, diploma and master's level courses for the professional development of special needs, mainstream teachers and other educational professionals. This includes a diploma accredited by the International Dyslexia Association, the only course outside the United States to receive this honour. The aim is to build a pool of expertise in Singapore for the support of students with learning differences. DAS Academy also offers courses and workshops for parents and caregivers.

### Asia Pacific Journal of Developmental Differences

Volume 11 \* Number 1 \* July 2024

#### Contents

1 Editors Comments

Angela Fawcett

- 5 Empowering Struggling Learners in Singapore Kah-Hung Yuen and Joanne Yoong
- 19 Virtual Educational Therapy—Experiences and Perceptions of Educational Therapists at the Dyslexia Association of Singapore Nurul Hudaa Binte Mohamed Daud
- 67 Blended Synchronous Learning Environment- Perceptions and Experiences of Educational Therapists at Dyslexia Association of Singapore

  Praba Siva
- 79 The impact of social-emotional competencies on drama students with dyslexia during the pandemic
  Muzdalifah Hamzah and Amrit Kaur Gill
- 123 Identifying Training Needs in Using Educational Technology: a New Integrated Model
  Soofrina Mubarak
- 181 Designing for Dyslexic Individuals in the digital environment
  Wu Junyi
- 195 Evaluating a Reading Comprehension Curriculum and Factors Predicting Reading Comprehension Performance

  Fong Pei Yi and Lay See Yeo
- 225 Exploring the Challenges of Dyslexia in Education and the Workplace: A Multi-Case Study of Academic and Professional Journeys
  Fatemeh Zolfagharian, Mahnaz Akhavan Tafti and Elaheh Jarrahi
- 245 Dean Bragonier and Noticeability: The man, the model and the need Angela Fawcett and Dean Bragonier
- 265 UNITE 2024 Conference Abstracts

